



# Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	1 <sup>st</sup>			
Course Title	:	<b>COMPUTER AIDED ENGINEERING DRAWING</b>			
Course Code	:	<b>23ESCM12</b>			
Course Type (Theory/ Practical/ Integrated)	:	Theory			
Course Category	:	ESC			
Stream	:	Common to all Branches	CIE	:	50 Marks
Teaching hours/ week (L:T:P:S)	:	2:0:2:0	SEE	:	50 Marks
Total Hours	:	40 Hrs Theory	SEE Duration	:	03 Hours
Credits	:	03			

**Course Learning Objectives:** Students will be taught

Sl.No	Course Objectives
1	To understand the basic principles and conventions of engineering drawing
2	To visualize and generate pictorial views of engineering components using CAD software
3	To employ drawing as a communication mode

## Teaching-Learning Process

### Pedagogy (General Instructions):

These are sample Strategies; which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecture method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Show Video/animation films to explain the infrastructures and the mechanism involved in the principle.
3. Encourage collaborative (Group) Learning in the class.
4. Ask at least three HOT (Higher-order Thinking) questions in the class, which promotes critical thinking.
5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize and analyse information rather than simply recall it.
6. Topics will be introduced in multiple representations.
7. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.
9. Individual teachers can devise innovative pedagogy to improve teaching-learning.



DSATM

Scheme of Teaching and Examinations for BE Programme -2023-24  
Outcome Based Education and Choice Based Credit System (CBCS)  
(Effective from the Academic Year 2023-24)

**COURSE SYLLABUS**

Module No.	Contents of the Module	Hours
1	<b>Introduction to Computer Aided Sketching:</b> Significance of Engineering drawing, Introduction to Computer Aided Drafting software, Co-ordinate system and reference planes. Definitions of HP, VP, RPP & LPP. <b>Orthographic Projections of points, Straight lines:</b> Introduction, Definitions - Planes of projection, reference line and conventions employed, Projections of points in all the four quadrants. Projections of straight lines (located in First quadrant/first angle only), True and apparent lengths, True and apparent inclinations to reference planes (No application problems)	8
Pedagogy	Chalk & Talk Use of Models and Software	
2	<b>Orthographic Projections of Planes (First Angle of Projection only):</b> Introduction, Definitions – projections of plane surfaces–triangle, square, rectangle, square, pentagon, hexagon and circle, planes in different positions by change of position method only (No problems on side views)	8
Pedagogy	Chalk & Talk Use of Models and Software	
3	<b>Projections of Solids (First Angle of Projection only):</b> Introduction, Definitions – Projections of right regular tetrahedron, hexahedron (cube), prisms, pyramids, cylinders and cones in different positions (No problems on freely suspended solids and combination of solids)	8
Pedagogy	Chalk & Talk Use of Models and Software	
4	<b>Isometric Projections (Using Isometric Scale Only):</b> Introduction, Isometric scale, Isometric projection of simple plane figures, Isometric projection of tetrahedron, hexahedron(cube), right regular prisms, pyramids, cylinders, cones, spheres, hemispheres and combination of two simple solids	8
Pedagogy	Chalk & Talk Use of Models and Software	
5	<b>Development of Lateral surfaces:</b> Development of lateral surfaces of above solids, their frustums and truncations. (No problems on lateral surfaces of trays, tetrahedrons, spheres and transition pieces)	8
Pedagogy	Chalk & Talk Use of Models and Software	

**Reference Books**

**Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)**

1	K. R. Gopalakrishna, & Sudhir Gopalakrishna: Textbook of Computer Aided Engineering Drawing, 39th Edition, Subash Stores, Bangalore, 2017
2	Bhatt, N.D., Engineering Drawing: Plane and Solid Geometry, 53rd edition, Charotar Publishing House Pvt. Limited, 2019.

**Course Outcomes: At the end of the course, the student will be able to:**

CO	Course Outcomes	RBT Level	Level Indicator
CO1	Develop the Orthographic Projections of points, Straight lines and Planes using concepts of First Angle of Projections	C	L6
CO2	Develop the Orthographic Projections of various solids using concepts of First Angle of Projections	C	L6
CO3	Develop the Isometric Projections of solids, development drawings of lateral surfaces of solids	C	L6
CO4	Develop the Orthographic projections of solids by manual sketching	C	L6
CO5	Develop the isometric projections of solids by manual sketching	C	L6

**Mapping of Course Outcomes to Program Outcomes:**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	--	--	--	3	--	--	--	--	--	--	--
CO2	3	--	--	--	3	--	--	--	--	--	--	--
CO3	3	--	--	--	3	--	--	--	--	--	--	--
CO4	3	--	--	--	--	--	--	--	--	--	--	--
CO5	3	--	--	--	--	--	--	--	--	--	--	--

**Weblinks and Video Lectures (e-Resources)**

1	<a href="https://youtu.be/1gDmNDJ9SHc">https://youtu.be/1gDmNDJ9SHc</a>
2	<a href="https://youtu.be/cQHDAfrptUc">https://youtu.be/cQHDAfrptUc</a>
3	<a href="https://youtu.be/GFulyqgB5g0">https://youtu.be/GFulyqgB5g0</a>

Assessment Pattern (both CIE and SEE)

Engineering Science Course (ESC) / Emerging Technology Course (ETC) / Programming Language Course (PLC)

3 credits - Theory

Assessment Method	Component	Type of Assessments	Syllabus Coverage	Maximum Marks	Average	Reduced Marks	Minimum Passing Marks	Evaluation Details
<b>Total CIE Theory + Practical</b>				<b>50</b>			<b>20</b>	
<b>CIE</b>	<b>Theory</b>	Internal Assessment Test (IAT) - I	Module - 1 & 2	50	$(50+50+50) / 3$	<b>25</b>	10	Average of Three Internal test each of 50 Marks scale down the marks to 25 Marks
		Internal Assessment Test (IAT) - II	Module - 3	50				
		Internal Assessment Test (IAT) - III	Module - 4 & 5	50				
	<b>Continuous Comprehensive Assessment (CCA)</b>	CCA-1- Pedagogical Initiatives	Considering all the Modules	50	$(50+50) / 2$	<b>25</b>	10	Two CCA methods as per VTU Clause 22OB4.2 of regulations to be adopted. If CCA chosen is Project Based Learning, then one assessment method may be adopted
		CCA-2- Pedagogical Initiatives		50				
<b>Total CIE Theory</b>						<b>50</b>	20	Scale down Marks of IAT and CCA to 50

SEE		Theory exam	Entire theory syllabus including questions from lab component	100	---	50	18	SEE Exam is theory Exam conducted for 100 Marks, scored Marks are scaled down to 50 Marks
CIE + SEE				100	---	---	40	
				<ul style="list-style-type: none"> <li>• The Minimum Marks to be secured in CIE to appear for SEE shall be 10 (40% of Maximum Marks – 25) in the Theory Component and 10 (40% of Maximum Marks – 25) in the Practical component.</li> <li>• The Laboratory Component for the IPCC shall be for CIE only.</li> <li>• However, in SEE, the Questions from the Laboratory Component shall be included in the respective Modules only.</li> </ul>				

#### 4 Credit Course – IPCC

**The Minimum Marks to be secured in CIE to appear for SEE shall be 10marks (40% of Maximum Marks – 25) in the Theory Component and 10 (40% of Maximum Marks -25) in the Practical Component. The Laboratory Component of the IPCC shall be for CIE only. However, in SEE the questions from the Laboratory Component shall be included in the respective Modules only.**

#### **Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum Marks (20 Marks out of 50).

The minimum passing mark for the SEE is 35% of the maximum Marks (18 Marks out of 50).

A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 Marks out of 100) in the total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

#### **Possible continuous and comprehensive assessment:**

Project based, Problem Based, Building Models, Lab-to-Land, Mobile Studio, Design and Programming Contest, Certification, Concept Map (Collage presentation/poster presentation), Case studies, Think-Pair-Share, Flipped classroom, storytelling. The assessment of these techniques can be either based on Quiz or rubrics.

The faculty can adopt any other CCA method of implementation and its assessment with prior approval of Program Assessment Committee (PAC).

#### **Continuous Internal Evaluation (CIE):**

The CIE Marks for the theory component of the IPCC shall be **25 Marks** and for the laboratory component **25 Marks**.

#### **CIE for the theory component of the IPCC**

##### **Internal Assessment Test (IAT):**

**The IA test questions are to be framed to map the Course Outcomes(COs), Program Outcomes(POs) and the Blooms RBT Levels. Emphasis to be given for higher order RBT levels**

#### **Three Tests each of 50 Marks**

- First test after 6<sup>th</sup> week of the semester (syllabus completion of 35 – 40%)
- Second test after 10<sup>th</sup> week of semester (syllabus completion of 65 – 70%)
- Third test after 14<sup>th</sup> week of semester (syllabus completion of 90 – 100%)

The average score of three test is taken and scaled down to **15 Marks**.

#### **Continuous and Comprehensive Assessment (CCA):**

Two of continuous and comprehensive assessment (CCA) to be conducted to attain COs and POs, evaluated each for **50 Marks**. Total Marks scored will be CCA1+CCA2 and scaled down to **10 Marks**.

- CCA1 after 4<sup>th</sup> week and CCA2 after 9<sup>th</sup> week. The evaluation includes either through quiz or rubrics
- CCA as project-based learning,
  - CCA is evaluated for **50 Marks** with review 1 of **20 Marks** after and review 2 of **30 Marks** includes project demonstration/competition and report submission.
  - The evaluation of review 1 after 6<sup>th</sup> weeks of semester and review 2 after 12<sup>th</sup> week of semester with project demonstration and submission of the report

Total score for CCA is **10 Marks**

Total Marks scored for theory component of CIE (IAT+ CCA) is **25 Marks**

#### **CIE for the practical component of the IPCC**

- On completion of every experiment/program in the laboratory, the students shall be evaluated and Marks shall be awarded on the same day. The **10 Marks** are for conducting the experiment and preparation of the laboratory record, the other **10 Marks shall be for the test** conducted at the end of the semester and **5 Marks** for conducting Open Ended Experiments.
- The CIE Marks awarded in the case of the practical component shall be based on the continuous evaluation of the laboratory report and the conduction. Each experiment report can be evaluated for 05 Marks conduction(Observation Book) and 5 Marks for Record Book. Marks of all experiments' write-ups and conduction are added and scaled to **10 Marks**.
- The Practical laboratory test (**duration 03 hours**) at the end of the 15<sup>th</sup> week of the semester/after completion of all the experiments (whichever is early) shall be conducted for **50 Marks** and scaled down to **10 Marks**.
- Open Ended Experiments are conducted after the completion of regular Experiments/Programs for 20 Marks and scaled down to **5 Marks**
- Scaled-down Marks of write-up, evaluations and tests, will be added as CIE Marks for the laboratory component of IC/IPCC for **25 Marks**.
- The minimum Marks to be secured in CIE to appear for SEE shall be 10 (40% of maximum Marks) in the theory component and 10 (40% of maximum Marks) in the practical component.
- The laboratory component of the IC/IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included. The maximum of 05 questions is to be set from the practical component of IC/IPCC, the total Marks of all questions should not be more than 25 Marks.

The theory component of the IC shall be for both CIE and SEE.

#### **Semester End Examination (SEE):**

- Theory SEE will be conducted as per the scheduled timetable, with common question papers for the subject
- The question paper shall be set for 100 Marks. The medium of the question paper shall be English. **The duration of SEE is 03 hours.**
- The question paper will have 10 questions. Two questions per module. Each question is set for 20 Marks. The student has to answer 5 full questions, selecting one full question from each module summing up to maximum score of 100 Marks. Marks **scored out of 100 shall proportionally be reduced to 50 Marks**.
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module. The two questions shall be of same course outcome, program outcome and Blooms RBT level. Emphasis to be given for higher order RBT levels

### **3 Credit Course – Theory**

**Note: A few of the Courses of 3 Credit are Integrated Course Type, for such courses the method suggested for 4 Credit IPCC shall be followed.**

#### **Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%.

The minimum passing mark for the CIE is 40% of the maximum Marks (20 Marks out of 50).

The minimum passing mark for the SEE is 35% of the maximum Marks (18 Marks out of 50).

A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 Marks out of 100) in the total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

**Possible continuous and comprehensive assessment:**

Project based, Problem Based, Building Models, Lab-to-Land, Mobile Studio, Design and Programming Contest, Group Problem Solving, Certification, Concept Map (Collage presentation/poster presentation), Case studies, Think-Pair-Share, Flipped classroom, storytelling. The assessment of these techniques can be either based on Quiz or rubrics.

The faculty may adopt any other CCA method of implementation and its assessment with prior approval of Program Assessment Committee (PAC).

**Continuous Internal Evaluation (CIE):**

The CIE Marks for the internal assessment test shall be **25 Marks** and for the continuous and comprehensive assessment (CCA) shall be **25 Marks**.

**Internal Assessment test:**

**The IA test questions are to be framed to map the course outcomes, program outcomes and the Blooms RBT Levels. Emphasis to be given for higher order RBT levels**

Three Tests each of **50 Marks** scaled down to **25 Marks**

- First test after 6<sup>th</sup> week of the semester (syllabus completion of 35 – 40%)
- Second test after 10<sup>th</sup> week of semester (syllabus completion of 65 – 70%)
- Third test after 14<sup>th</sup> week of semester (syllabus completion of 90 – 100%)

The average score of three test is taken and scaled down to **25 Marks**.

**Continuous and Comprehensive Assessment (CCA):**

Two of continuous and comprehensive assessment (CCA) to be conducted to attain COs and POs, evaluated each for **50 Marks**. Total Marks scored will be CCA1+CCA2 and scaled down to **25 Marks**.

- CCA1 after 4<sup>th</sup> week and CCA2 after 9<sup>th</sup> week. The evaluation includes either through quiz or rubrics
- CCA as project-based learning,
  - CCA is evaluated for **50 Marks** with review 1 of **20 Marks** after and review 2 of **30 Marks** includes project demonstration/competition and report submission.
  - The evaluation of review 1 after 6<sup>th</sup> weeks of semester and review 2 after 12<sup>th</sup> week of semester with project demonstration and submission of the report

Total score for CCA is **25 Marks**

Total Marks scored for theory component of CIE (IAT + CCA) is **50 Marks**

**Semester End Examination (SEE):**

- Theory SEE will be conducted as per the scheduled timetable, with common question papers for the subject
- The question paper shall be set for 100 Marks. The medium of the question paper shall be English. **The duration of SEE is 03 hours.**
- The question paper will have 10 questions. Two questions per module. Each question is set for 20 Marks. The student must answer 5 full questions, selecting one full question from each module summing up to maximum score of 100 Marks. **Marks scored out of 100 shall proportionally be reduced to 50 Marks.**



There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module. The two questions shall be of same course outcome, program outcome and Blooms RBT level. Emphasis to be given for higher order RBT levels

### CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Theory					Practical
	Continuous Assessment Tests			Continuous Comprehensive Assessment (CCA)		Practical Test
	IAT-1	IAT-2	IAT-3	CCA-1	CCA-2	
	50 Marks	50 Marks	50 Marks	50 Marks	50 Marks	50 Marks
Remember	-	-	-	-	-	-
Understand	-	-	-	-	-	-
Apply	-	-	-	-	-	-
Analyse	-	-	-	-	-	-
Evaluate	-	-	-	-	-	-
Create	50	50	50	50	50	-

### CIE Course Assessment Plan

CO's	Marks Distribution					Total Marks	Weightage
	Test-1		Test-2	Test-3			
	Module-1	Module-2	Module-3	Module-4	Module-5		
CO1	50	50	-	-	-	50	33.33
CO2	-	-	50	-	-	50	33.33
CO3	-	-	-	50	50	50	33.33
CO4	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-
<b>Total</b>	50	50	50	50	50	150	100

### SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (in % Questions)
Remember	--
Understand	--
Apply	--
Analyse	--
Evaluate	--
Create	100

**Note:** Full marks can be awarded for computer printouts provide student answers all the questions completely

## Scheme of Evaluation for SEE

Question No.	Module	Marks
1	Module 1 or Module 2	30
2	Module 3	40
3	Module 4 or Module 5	30
<b>Note:</b> SEE marks will be reduced to 50 marks		

## SEE Course Plan

CO's	Marks Distribution					Total Marks	Weightage
	Module-1	Module-2	Module-3	Module-4	Module-5		
CO1	30	30	-	-	-	30	30
CO2	-	-	40	-	-	40	40
CO3	-	-	-	30	30	30	30
CO4	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-
<b>Total</b>	30	30	40	30	30	100	100

## Course Contents and Lecture Schedule

Module No.	Topics	No. of Lectures
1	<b>Introduction:</b> Significance of Engineering drawing, Introduction to Computer Aided Drafting software, Co-ordinate system and reference planes HP, VP, RPP & LPP of 2D/3D environment.	2
1	<b>Orthographic Projections of Points, Straight Lines:</b> Introduction to Orthographic projections: Orthographic projections of points in 1st and 3rd quadrants	2
1	Orthographic projections of lines (Placed in First quadrant only)	2
2	<b>Orthographic Projections of Planes (First Angle of Projection only):</b> Understanding Orthographic projections of planes viz triangle, square (Placed in First quadrant only)	2
2	Orthographic projections of planes viz rectangle, pentagon (Placed in First quadrant only)	2
2	Orthographic projections of planes viz pentagon, hexagon, and circular laminae (Placed in First quadrant only)	2
2	Orthographic projections of planes viz pentagon, hexagon, and circular laminae (Placed in First quadrant only)	2
3	<b>Projections of Solids (First Angle of Projection only):</b> Orthographic projection of right regular solids (Solids Resting on HP only)	2
3	Prisms & Pyramids (triangle, square)	2
3	Prisms & Pyramids (rectangle, pentagon)	2
3	Prisms & Pyramids (hexagon & cylinders)	2
3	Cones, Cubes & Tetrahedron.	2
3	Development of Solid models –A Group work	2
4	<b>Isometric Projections:</b> Isometric scale, Isometric projection of hexahedron, right regular prisms	2

4	Isometric projection of hexahedron, right regular prisms	2
4	Isometric projection of pyramids, cylinders	2
4	Isometric projection of cones, spheres and combination of two simple solids	2
5	<b>Development of lateral surfaces:</b> Development of lateral surfaces of right regular pyramids and cones resting with base on HP only.	2
5	Development of their frustums and truncations.	2
5	Development of their frustums and truncations.	2
<b>Total</b>		<b>40 Hrs</b>



# Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	1 <sup>st</sup> and 2 <sup>nd</sup>		
Course Title	:	Applied Chemistry for Computer Science Stream		
Course Code	:	23CHES12/23CHES22		
Course Type (Theory/ Practical/ Integrated)	:	Integrated		
Course Category	:	ASC		
Stream	:	Common to CSE branches	CIE	: 50 Marks
Teaching hours/ week (L:T:P:S)	:	(2:2:2:0)	SEE	: 50 Marks
Total Hours	:	60 Hrs	SEE Duration	: 3 Hours
Credits	:	04		

**Course Learning Objectives:** Students will be taught

Sl.No	Course Objectives
1	To enable students to acquire knowledge on electrochemistry and corrosion chemistry.
2	To understand the mechanism of corrosion, thermodynamics and sensors to solve the societal problems.
3	To learn the significance of green chemistry, analytical techniques and nano materials.
4	To provide in-depth knowledge of Engineering materials.

### Teaching-Learning Process

#### Pedagogy (General Instructions):

These are sample Strategies; which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecture method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Show Video/animation films to explain the infrastructures and the mechanism involved in the principle.
3. Encourage collaborative (Group) Learning in the class.
4. Ask at least three HOT (Higher-order Thinking) questions in the class, which promotes critical thinking.
5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyse information rather than simply recall it.
6. Topics will be introduced in multiple representations.
7. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.
9. Individual teachers can device innovative pedagogy to improve teaching-learning.



**Scheme of Teaching and Examinations for BE Programme -2023-24**  
**Outcome Based Education and Choice Based Credit System (CBCS)**  
**(Effective from the Academic Year 2023-24)**

**COURSE SYLLABUS**

Module No.	Contents of the Module	Hours
1	<p style="text-align: center;"><b>ELECTROCHEMISTRY AND ENERGY STORAGE SYSTEMS</b></p> <p><b>Electrochemistry:</b> Basic concepts of electrochemistry; Electrode system: types of electrodes, Ion selective electrode – definition, construction, working and applications of glass electrode. Determination of pH using glass electrode. Reference electrode: Construction, working and applications of Calomel electrode. Concentration cells and Numerical problems.</p> <p><b>Energy Storage Systems:</b> Introduction, Classification of batteries. Battery characteristics (Energy density, Shelf life, Life cycle) Construction, working and applications of: Sodium-Ion battery, vanadium redox flow battery.</p> <p><b>Fuel Cells-</b> Introduction, Classification of fuel cells based on the type of fuel, electrolyte and temperature. Differences between the Conventional cell and fuel cell, Construction, working and applications of CH<sub>3</sub>OH-O<sub>2</sub> fuel cell.</p>	8
<b>Pedagogy</b>	Animated videos on battery and fuel cells, PPT on reference electrodes, Student's presentation on fuel cells and numerical problems.	
2	<p style="text-align: center;"><b>CORROSION AND ITS CONTROL</b></p> <p><b>Corrosion:</b> Introduction, Electrochemical theory, types: differential aeration (waterline and pitting), differential metal and stress corrosion. Factors affecting rate of corrosion (Anodic to cathodic area ratio, Nature of corrosion product, Nature of medium-PH, temperature, conductance). Corrosion control: Metal coating-galvanization and tinning, surface conversion coating - anodizing. Cathodic protection - sacrificial anode method and impressed current method. Corrosion penetration rate (CPR), numerical problems.</p> <p><b>Metal finishing:</b> Introduction, Technological importance. Electroplating: Introduction, Conditions for electroplating, electroplating of chromium, Electroless plating: Introduction, electroless plating of copper, distinction between electroplating and electroless plating processes.</p>	8
<b>Pedagogy</b>	Field visit to identify different types of corrosion, Animated videos and PPTs on electroplating and electroless plating, PPT on reference electrodes, Student's presentation on corrosion control and numerical problems.	

3	<p><b>GREEN CHEMISTRY AND NANOMATERIALS</b></p> <p><b>Green Chemistry:</b> Introduction, 12 principles with real life examples, green synthesis of paracetamol. Introduction, construction, working and application of P V cell.</p> <p><b>Nanomaterials:</b> Introduction, size-dependent properties, Synthesis of nanomaterials: Top-down and bottom-up approaches, Synthesis by Sol-gel and precipitation, Nanoscale materials: Fullerenes, Carbon nanotubes, and graphene's – properties and applications.</p>	8
Pedagogy	Videos on nanomaterial synthesis, PPT on nanoscale materials, Student's group discussion on green route synthesis of drugs.	
4	<p><b>SENSORS AND DISPLAY SYSTEMS</b></p> <p><b>Sensors:</b> Introduction, working, principle and applications of Conductometric sensors, Electrochemical sensors, Thermometric sensors and Optical sensors. Sensors for the measurement of dissolved O<sub>2</sub> (DO). Electrochemical gas sensors for SO<sub>x</sub> and NO<sub>x</sub>.</p> <p><b>Display Systems:</b> Photoactive and electro active materials, Nanomaterials and organic materials used in optoelectronic devices. Liquid crystals: Introduction, classification, properties and application. Liquid Crystal Displays (LCD's). Properties and application of Organic Light Emitting Diodes (OLED's) and Quantum Light Emitting Diodes (QLED's).</p>	8
Pedagogy	Animated videos on sensors and display systems, PPT on Display system, Assignment and student's presentation on sensors applications.	
5	<p><b>THERMODYNAMICS AND CHEMICAL KINETICS:</b></p> <p><b>Thermodynamics:</b> I and II Laws of thermodynamics – spontaneous and non-spontaneous processes, entropy, Free energy and chemical equilibrium – significance of entropy. Electrochemical Equilibrium, Application of thermodynamics to real world problems.</p> <p><b>Chemical Kinetics:</b> Rate of a chemical reaction, factors affecting rate of reaction, Law of mass action – Le Chatelier's principle. Rate expression, order, and molecularity of reactions, zero order, first order and pseudo first order reaction – half-life period. Determination of rate constant and order of reaction. Temperature dependence of rate constant – Arrhenius equation, activation energy and its calculation; elementary concept of collision theory of bimolecular gaseous reactions.</p>	8
Pedagogy	PPT on thermodynamics, videos on chemical Kinetics. Presentation on Free energy.	

### List of Experiments or Programs

Expt. No.	Volumetric Experiments (Any 4)
1	Estimation of total hardness of water by EDTA method
2	Determination of COD of waste water.

3	Estimation of Iron in steel using standard $K_2Cr_2O_7$ solution by using external indicator method
4	Determination of percentage of copper in brass using standard sodium thiosulphate solution
5	Determination of amount of chlorine present in Bleaching powder (Iodometry)
<b>Instrumental Experiments (Any 4)</b>	
1	Potentiometric estimation of FAS using standard $K_2Cr_2O_7$ solution.
2	Conductometric estimation of acid mixture using strong base.
3	Determination of viscosity of given organic liquid using Oswald's Viscometer.
4	Determination of pKa of the given weak acid using pH meter.
5	Colorimetric estimation of copper.
<b>Open Ended Experiment (Any 2)</b>	
1	Estimation of Sodium present in soil/effluent sample using flame photometry
2	Chemical Structure drawing using software: ChemDraw or ACD/ChemSketch
3	Synthesis of Iron oxide nanomaterials
4	Estimation of CaO present in the given cement sample by EDTA method

### Reference Books

#### Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)

1	Chemistry for Engineers, Teh Fu Yen, Imperial college press, 2008, ISBN: 97818609747742.
2	Advances in corrosion science and technology, M.G. Fontana, R.W. Staettle, Springer publications, 2012, ISBN: 9781461590620.
3	Fundamentals of analytical chemistry, Douglas A. Skoog et.al., 8th edition, 2004, Thomson Asia pvt Ltd. ISBN: 978-0-495-55828-6
4	Engineering chemistry, Shubha Ramesh et.al., Wiley India, 1 st Edition, 2011, ISBN: 9788126519880.
5	Energy storage and conversion devices, Anurag Gaur, A. L. Sharma, Anil Arya, 2021, CRC Press, Taylor and Francis Group, 1 st Edition, ISBN: 9781003141761.
6	P. Atkins and J. de Paula, Atkins Physical Chemistry, Oxford University Press, 8th edition, 2006.

**Course Outcomes: At the end of the course, the student will be able to:**

CO	Course Outcomes	RBT Level	Level Indicator
CO1	Understand the basic concepts of chemistry to explain the scientific engineering concepts.	L1	Understand
CO2	Apply the concepts of chemistry to describe various engineering processes.	L2	Apply
CO3	Analyse chemical processes and instrumentation techniques to explain the properties and applications of engineering materials.	L2	Analyse
CO4	Design different types of engineering materials based on the concepts of chemistry.	L3	Design
CO5	Evaluate the concepts of chemistry for energy production and multidisciplinary application.	L4	Evaluate
CO6	Conduct/Perform the quantitative analysis of a given substance using various experimental techniques.	L4	Conduct

**Mapping of Course Outcomes to Program Outcomes:**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	3	--	--	--	2	--	--	--	--	1	--	--
CO2	3	2	2	--	--	--	2	--	--	--	--	--	--	--
CO3	3	2	2	--	--	--	2	--	--	--	--	1	--	--
CO4	3	2	1	--	--	--	2	--	--	--	--	--	--	--
CO5	3	2	--	--	--	--	2	--	--	--	--	--	--	--
CO6	3	3					2							

**Weblinks and Video Lectures (e-Resources)**

1	<a href="https://archive.nptel.ac.in/courses/113/104/113104082/">https://archive.nptel.ac.in/courses/113/104/113104082/</a> , <a href="https://ehs.stanford.edu/topic/hazardous-materials/nanomaterials">https://ehs.stanford.edu/topic/hazardous-materials/nanomaterials</a>
2	<a href="https://www.youtube.com/watch?v=EoE_NkF8N8k">https://www.youtube.com/watch?v=EoE_NkF8N8k</a> , <a href="https://www.youtube.com/watch?v=EZ8P5Dp1j2g">https://www.youtube.com/watch?v=EZ8P5Dp1j2g</a>
3	<a href="https://www.youtube.com/watch?v=3XpuoVVzT1A">https://www.youtube.com/watch?v=3XpuoVVzT1A</a> , <a href="https://chemistnotes.com/all-nanochemistry-notes/">https://chemistnotes.com/all-nanochemistry-notes/</a>
4	<a href="https://www.youtube.com/watch?v=T4pSufI09fk">https://www.youtube.com/watch?v=T4pSufI09fk</a> , <a href="https://www.youtube.com/watch?v=4HCsBMI7nSg">https://www.youtube.com/watch?v=4HCsBMI7nSg</a>



## Applied Science Courses

### 4 credits – (IPCC) - Theory and Practical

Assessment Method	Component	Type of Assessments	Syllabus Coverage	Maximum Marks	Average	Reduced Marks	Minimum Passing Marks	Evaluation Details
<b>Total CIE Theory + Practical</b>				<b>50</b>			<b>20</b>	
<b>CIE</b>	<b>Theory</b>	Internal Assessment Test (IAT) - I	Module - 1 & 2	50	$(50+50+50) / 3$	<b>15</b>	<b>6</b>	Average of Three Internal test each of 50 Marks scale down the marks to 15 Marks
		Internal Assessment Test (IAT) - II	Module - 3 & 4	50				
		Internal Assessment Test (IAT) - III	Module - 5	50				
	<b>Continuous Comprehensive Assessment (CCA)</b>	CCA-1- Pedagogical Initiatives	Considering all the Modules	50	$(50+50) / 2$	<b>10</b>	<b>4</b>	Two CCA methods as per VTU Clause 22OB4.2 of regulations to be adopted. If CCA chosen is Project Based Learning, then one assessment method may be adopted
		CCA-2- Pedagogical Initiatives		50				
<b>Total CIE Theory</b>						<b>25</b>	<b>10</b>	Scale down Marks of IAT and CCA to 25

CIE	Practical	Conduction of Experiments	Continuous Evaluation of each experiment			Average of all Experiments	10	4	Performance of the Experiment (On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. 20 marks are for conducting the experiment and calculations/observations/output)
			Record	05	10				
			Observation book	05					
		Practical Test	Write up	15	50	----	10	4	One Internal Practical Test after conduction of all Experiments for 50 Marks
			Execution	25					
			Viva-voce	10					
		Open Ended Experiment	Write up	05	20	----	5	2	One experiment for 20 marks.  20 marks reduced to 05 marks
			Execution	10					
			Viva-voce	05					
		<b>Total CIE Practical</b>						25	10

								Open-Ended Experiment
<b>SEE</b>		Theory exam	Entire theory syllabus including questions from lab component	100	----	50	18	SEE Exam is theory Exam conducted for 100 Marks, scored Marks are scaled down to 50 Marks
<b>CIE + SEE</b>				100	----	----	40	
<b>CIE + SEE</b>				<ul style="list-style-type: none"> <li>• The Minimum Marks to be secured in CIE to appear for SEE shall be 10 (40% of Maximum Marks – 25) in the Theory Component and 10 (40% of Maximum Marks – 25) in the Practical component.</li> <li>• The Laboratory Component for the IPCC shall be for CIE only.</li> <li>• However, in SEE, the Questions from the Laboratory Component shall be included in the respective Modules only.</li> </ul>				

#### 4 Credit Course – IPCC

**The Minimum Marks to be secured in CIE to appear for SEE shall be 10marks (40% of Maximum Marks – 25) in the Theory Component and 10 (40% of Maximum Marks -25) in the Practical Component. The Laboratory Component of the IPCC shall be for CIE only. However, in SEE the questions from the Laboratory Component shall be included in the respective Modules only.**

#### **Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum Marks (20 Marks out of 50).

The minimum passing mark for the SEE is 35% of the maximum Marks (18 Marks out of 50).

A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 Marks out of 100) in the total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

#### **Possible continuous and comprehensive assessment:**

Project based, Problem Based, Building Models, Lab-to-Land, Mobile Studio, Design and Programming Contest, Certification, Concept Map (Collage presentation/poster presentation), Case studies, Think-Pair-Share, Flipped classroom, storytelling. The assessment of these techniques can be either based on Quiz or rubrics.

The faculty can adopt any other CCA method of implementation and its assessment with prior approval of Program Assessment Committee (PAC).

#### **Continuous Internal Evaluation (CIE):**

The CIE Marks for the theory component of the IPCC shall be **25 Marks** and for the laboratory component **25 Marks**.

#### **CIE for the theory component of the IPCC**

##### **Internal Assessment Test (IAT):**

**The IA test questions are to be framed to map the Course Outcomes(COs), Program Outcomes(POs) and the Blooms RBT Levels. Emphasis to be given for higher order RBT levels**

Three Tests each of **50 Marks**

- First test after 6<sup>th</sup> week of the semester (syllabus completion of 35 – 40%)
- Second test after 10<sup>th</sup> week of semester (syllabus completion of 65 – 70%)
- Third test after 14<sup>th</sup> week of semester (syllabus completion of 90 – 100%)

The average score of three test is taken and scaled down to **15 Marks**.

#### **Continuous and Comprehensive Assessment (CCA):**

Two of continuous and comprehensive assessment (CCA) to be conducted to attain COs and POs, evaluated each for **50 Marks**. Total Marks scored will be CCA1+CCA2 and scaled down to **10 Marks**.

- CCA1 after 4<sup>th</sup> week and CCA2 after 9<sup>th</sup> week. The evaluation includes either through quiz or rubrics
- CCA as project-based learning,
  - CCA is evaluated for **50 Marks** with review 1 of **20 Marks** after and review 2 of **30 Marks** includes project demonstration/competition and report submission.

- The evaluation of review 1 after 6<sup>th</sup> weeks of semester and review 2 after 12<sup>th</sup> week of semester with project demonstration and submission of the report

Total score for CCA is **10 Marks**

Total Marks scored for theory component of CIE (IAT+ CCA) is **25 Marks**

#### **CIE for the practical component of the IPCC**

- On completion of every experiment/program in the laboratory, the students shall be evaluated and Marks shall be awarded on the same day. The **10 Marks** are for conducting the experiment and preparation of the laboratory record, the other **10 Marks shall be for the test** conducted at the end of the semester and **5 Marks** for conducting Open Ended Experiments.
- The CIE Marks awarded in the case of the practical component shall be based on the continuous evaluation of the laboratory report and the conduction. Each experiment report can be evaluated for 05 Marks conduction(Observation Book) and 5 Marks for Record Book. Marks of all experiments' write-ups and conduction are added and scaled to **10 Marks**.
- The Practical laboratory test (**duration 03 hours**) at the end of the 15<sup>th</sup> week of the semester/after completion of all the experiments (whichever is early) shall be conducted for **50 Marks** and scaled down to **10 Marks**.
- Open Ended Experiments are conducted after the completion of regular Experiments/Programs for 20 Marks and scaled down to **5 Marks**
- Scaled-down Marks of write-up, evaluations and tests, will be added as CIE Marks for the laboratory component of IC/IPCC for **25 Marks**.
- The minimum Marks to be secured in CIE to appear for SEE shall be 10 (40% of maximum Marks) in the theory component and 10 (40% of maximum Marks) in the practical component.
- The laboratory component of the IC/IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included. The maximum of 05 questions is to be set from the practical component of IC/IPCC, the total Marks of all questions should not be more than 25 Marks.

The theory component of the IC shall be for both CIE and SEE.

#### **Semester End Examination (SEE):**

- Theory SEE will be conducted as per the scheduled timetable, with common question papers for the subject
- The question paper shall be set for 100 Marks. The medium of the question paper shall be English. **The duration of SEE is 03 hours.**
- The question paper will have 10 questions. Two questions per module. Each question is set for 20 Marks. The student has to answer 5 full questions, selecting one full question from each module summing up to maximum score of 100 Marks. **Marks scored out of 100 shall proportionally be reduced to 50 Marks.**
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module. The two questions shall be of same course outcome, program outcome and Blooms RBT level. Emphasis to be given for higher order RBT levels

### **3 Credit Course – Theory**

**Note: A few of the Courses of 3 Credit are Integrated Course Type, for such courses the method suggested for 4 Credit IPCC shall be followed.**

**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum Marks (20 Marks out of 50).

The minimum passing mark for the SEE is 35% of the maximum Marks (18 Marks out of 50).

A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 Marks out of 100) in the total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

**Possible continuous and comprehensive assessment:**

Project based, Problem Based, Building Models, Lab-to-Land, Mobile Studio, Design and Programming Contest, Group Problem Solving, Certification, Concept Map (Collage presentation/poster presentation), Case studies, Think-Pair-Share, Flipped classroom, storytelling. The assessment of these techniques can be either based on Quiz or rubrics.

The faculty may adopt any other CCA method of implementation and its assessment with prior approval of Program Assessment Committee (PAC).

**Continuous Internal Evaluation (CIE):**

The CIE Marks for the internal assessment test shall be **25 Marks** and for the continuous and comprehensive assessment (CCA) shall be **25 Marks**.

**Internal Assessment test:**

**The IA test questions are to be framed to map the course outcomes, program outcomes and the Blooms RBT Levels. Emphasis to be given for higher order RBT levels**

Three Tests each of **50 Marks** scaled down to **25 Marks**

- First test after 6<sup>th</sup> week of the semester (syllabus completion of 35 – 40%)
- Second test after 10<sup>th</sup> week of semester (syllabus completion of 65 – 70%)
- Third test after 14<sup>th</sup> week of semester (syllabus completion of 90 – 100%)

The average score of three test is taken and scaled down to **25 Marks**.

**Continuous and Comprehensive Assessment (CCA):**

Two of continuous and comprehensive assessment (CCA) to be conducted to attain COs and POs, evaluated each for **50 Marks**. Total Marks scored will be CCA1+CCA2 and scaled down to **25 Marks**.

- CCA1 after 4<sup>th</sup> week and CCA2 after 9<sup>th</sup> week. The evaluation includes either through quiz or rubrics
- CCA as project-based learning,
  - CCA is evaluated for **50 Marks** with review 1 of **20 Marks** after and review 2 of **30 Marks** includes project demonstration/competition and report submission.
  - The evaluation of review 1 after 6<sup>th</sup> weeks of semester and review 2 after 12<sup>th</sup> week of semester with project demonstration and submission of the report

Total score for CCA is **25 Marks**

Total Marks scored for theory component of CIE (IAT + CCA) is **50 Marks**

**Semester End Examination (SEE):**

- Theory SEE will be conducted as per the scheduled timetable, with common question papers for the subject
- The question paper shall be set for 100 Marks. The medium of the question paper shall be English.  
**The duration of SEE is 03 hours.**

- The question paper will have 10 questions. Two questions per module. Each question is set for 20 Marks. The student must answer 5 full questions, selecting one full question from each module summing up to maximum score of 100 Marks. Marks **scored out of 100 shall proportionally be reduced to 50 Marks**.

There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module. The two questions shall be of same course outcome, program outcome and Blooms RBT level. Emphasis to be given for higher order RBT levels

### CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Theory					Practical
	Continuous Assessment Tests			Continuous Comprehensive Assessment (CCA)		Practical Test
	IAT-1	IAT-2	IAT-3	CCA-1	CCA-2	
	50 Marks	50 Marks	50 Marks	50 Marks	50 Marks	50 Marks
Remember	15	15	15	--	--	--
Understand	25	20	20	--	--	--
Apply	5	10	10	20	20	20
Analyse	5	5	5	10	10	10
Evaluate	--	--	--	20	20	20
Create	--	--	--	--	--	--

### CIE Course Assessment Plan

CO's	Marks Distribution						Total Marks	Weightage
	Test-1		Test-2		Test-3			
	Module-1	Module-2	Module-3	Module-4	Module-4	Module-5		
CO1	8	8	6	4	6	6	38	26%
CO2	10	10	16	8	8	16	68	46%
CO3	4	2	4	4	4	4	22	14%
CO4	4	4	4	4	2	4	22	14%
CO5	--	--	--	--	--	--	--	--
CO6	--	--	--	--	--	--	--	--
<b>Total</b>	<b>26</b>	<b>24</b>	<b>30</b>	<b>20</b>	<b>20</b>	<b>30</b>	<b>150</b>	<b>100</b>

**SEE- Semester End Examination (50 Marks)**

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	16
Understand	28
Apply	32
Analyse	24
Evaluate	--
Create	--

**SEE Course Plan**

CO's	Marks Distribution					Total Marks	Weightage
	Module-1	Module-2	Module-3	Module-4	Module-5		
CO1	4	4	4	2	2	16	16%
CO2	8	8	4	4	4	28	28%
CO3	4	4	8	8	8	32	32%
CO4	4	4	4	6	6	24	24%
CO5	--	--	--	--	--	--	--
CO6	--	--	--	--	--	--	--
Total	20	20	20	20	20	100	100%



## Course Contents and Lecture Schedule

Module No.	Topics	No. of Lectures
1	<b>ELECTROCHEMISTRY AND ENERGY STORAGE SYSTEMS</b>	
	<b>Electrochemistry:</b> Basic concepts of electrochemistry; Electrode system: Introduction, types of electrodes	1
	Ion selective electrode – definition, construction, working and applications of glass electrode. Determination of pH using glass electrode.	1
	Reference electrode: Introduction, calomel electrode – construction, working and applications of calomel electrode.	1
	Concentration cell – Definition, construction and Numerical problems.	1
	<b>Energy Storage Systems:</b> Classification of batteries, with examples. Battery characteristics, cycle life and shelf life.	1
	Construction, working and applications of: Sodium-Ion battery, vanadium redox flow battery	1
	<b>Fuel Cells-</b> Introduction, Classification of fuel cells based on the type of fuel, electrolyte and temperature.	1
2	Differences between the Conventional cell and fuel cell, Construction, working and applications of methanol -oxygen.	1
	<b>CORROSION AND ITS CONTROL: Corrosion:</b> Introduction, Electrochemical theory.	1
	Types: differential aeration (waterline and pitting), differential metal and stress corrosion	1
	Factors affecting rate of corrosion. Corrosion control: Metal coating-galvanization and tinning,	1
	Surface conversion coating - anodizing and phosphating. Cathodic protection - sacrificial anode method.	1
	Impressed current method. corrosion penetration rate (CPR), numerical problems.	1
	<b>Metal finishing:</b> Introduction, Technological importance. Electroplating: Introduction, conditions for electroplating.	1
	<b>Electroplating of Chromium, Electroless plating: Introduction,</b> distinction between electroplating and electroless plating processes.	1
3	Electroless plating: Introduction, electroless plating of copper.	1
	<b>GREEN CHEMISTRY AND NANOMATERIALS</b>	
	<b>Green Chemistry:</b> Introduction, 12 principles with real life examples	1
	validation of greenness, industrial application of green chemistry	1
	Introduction, construction, working and application of P V cell.	1
	<b>Nanomaterials:</b> Introduction, size-dependent properties (Surface area, Electrical, Optical, and Catalytic properties).	1
	Synthesis of nanomaterials: Top-down and bottom-up approaches, Synthesis by Sol-gel method.	1
	Precipitation and chemical vapor deposition	1
4	Nanoscale materials: Fullerenes, Carbon nanotubes	1
	graphene's – properties and applications.	1
	<b>SENSORS AND DISPLAY SYSTEMS:</b>	
	<b>Sensors:</b> Introduction, working, principle and applications of Conductometric sensors, Electrochemical sensors	1
Thermometric sensors (Flame photometry) and Optical sensors (colorimetry).	1	
Sensors for the measurement of dissolved oxygen (DO). Electrochemical sensors for the pharmaceuticals. Electrochemical gas sensors for SO <sub>x</sub> and NO <sub>x</sub> .	1	

	Disposable sensors in the detection of biomolecules and pesticides.	1
	<b>Display Systems:</b> Photoactive and electro active materials.	1
	Nanomaterials and organic materials used in optoelectronic devices. Liquid crystals (LC's) - Introduction, classification, properties and application.	1
	Introduction, classification, properties and application in Liquid Crystal Displays (LCD's). Properties and application of Organic Light Emitting Diodes (OLED's)	1
	Quantum Light Emitting Diodes (QLED's).	1
5	<b>THERMODYNAMICS AND CHEMICAL KINETICS:</b>	
	<b>Thermodynamics:</b> I and II Laws of thermodynamics – spontaneous and non-spontaneous processes.	1
	Entropy, Free energy(Gibbs free energy – Standard Gibbs free energy change) and chemical equilibrium – significance of entropy.	1
	Electrochemical Equilibrium. Application of thermodynamics to real world problems.	1
	<b>Chemical Kinetics:</b> Rate of a chemical reaction, factors affecting rates of reaction,	1
	Law of mass action – Le Chatelier's principle. Rate expression, order, and molecularity of reactions, zero order, first order reactions.	1
	Pseudo first order reaction – half-life period. Determination of rate constant and order of reaction.	1
	Temperature dependence of rate constant – Arrhenius equation, activation energy and its calculation;	1
Elementary concept of collision theory of bimolecular gaseous reactions.	1	
<b>Total</b>		<b>40 Hrs</b>



# Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	1 <sup>st</sup>			
Course Title	:	Communicative English			
Course Code	:	23CENC16			
Course Type (Theory/ Practical/ Integrated)	:	Theory			
Course Category	:	HSSC			
Stream	:	Common to All Branches	CIE	:	50 Marks
Credits (L:T:P:S)	:	1:0:0:0	SEE	:	50 Marks
Total Hours	:	15 Hrs	SEE Duration	:	2 Hours
Credits	:	1			

**Course Learning Objectives:** Students will be taught.

Sl.No	Course Objectives
1	To know about Fundamentals of Communicative English and Communication Skills in general.
2	To train to identify the nuances of phonetics, intonation and enhance pronunciation skills for better Communication skills.
3	To impart basic English grammar and essentials of important language skills.
4	To enhance with English vocabulary and language proficiency for better communication skills.
5	To learn about Techniques of Information Transfer through presentation.

## Teaching-Learning Process

### Pedagogy (General Instructions):

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecture method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Show Video/animation films to explain the infrastructures and the mechanism involved in the principle.
3. Encourage collaborative (Group) Learning in the class.
4. Ask at least three HOT (Higher-order Thinking) questions in the class, which promotes critical thinking.
5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyse information rather than simply recall it.
6. Topics will be introduced in multiple representations.
7. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.
9. Individual teachers can device innovative pedagogy to improve teaching-learning.



DSATM

**Scheme of Teaching and Examinations for BE Programme -2023-24**  
**Outcome Based Education and Choice Based Credit System (CBCS)**  
**(Effective from the Academic Year 2023-24)**

**COURSE SYLLABUS**

<b>Module No.</b>	<b>Contents of the Module</b>	<b>Hours</b>
1	<b>Introduction to Communicative English:</b> Communicative English, Fundamentals of Communicative English, Process of Communication, Barriers to Effective Communicative English, Different styles and levels in Communicative English. Interpersonal and Intrapersonal Communication Skills.	03
<b>Pedagogy</b>	(i) Direct instructional method (Low/Old Technology) (ii) Enquiry and evaluation-based learning (iii) Personalized learning (iv) Problems based learning through discussion (v) Chalk & Talk, Interaction, Live examples & Videos	
2	<b>Introduction to Phonetics:</b> Phonetic Transcription, English Pronunciation, Pronunciation Guidelines to consonants and vowels, Sounds Mispronounced, Silent and Non silent Letters, Syllables and Structure. Word Accent, Stress Shift and Intonation, Spelling Rules and Words often Misspelt. Common Errors in Pronunciation.	03
<b>Pedagogy</b>	(i) Direct instructional method (Low/Old Technology) (ii) Enquiry and evaluation-based learning (iii) Personalized learning (iv) Problems based learning through discussion (v) Chalk & Talk, Interaction, Live examples & Videos	
3	<b>Basic English Communicative Grammar and Vocabulary PART- I:</b> Grammar: Basic English Grammar and Parts of Speech, Articles and Preposition. Question Tags, One Word Substitutes, Strong and Weak forms of words, Introduction to Vocabulary, All Types of Vocabulary – Exercises on it.	03
<b>Pedagogy</b>	(i) Direct instructional method (Low/Old Technology) (ii) Enquiry and evaluation-based learning (iii) Personalized learning (iv) Problems based learning through discussion (v) Chalk & Talk, Interaction, Live examples & Videos	

4	<b>Basic English Communicative Grammar and Vocabulary PART - II:</b> Words formation - Prefixes and Suffixes, Contractions and Abbreviations. Word Pairs (Minimal Pairs) – Exercises, Tense and Types of tenses, The Sequence of Tenses (Rules in use of Tenses) and Exercises on it.	03
<b>Pedagogy</b>	(i) Direct instructional method (Low/Old Technology) (ii) Enquiry and evaluation-based learning (iii) Personalized learning (iv) Problems based learning through discussion (v) Chalk & Talk, Interaction, Live examples & Videos	
5	<b>Communication Skills for Employment:</b> Information Transfer: Oral Presentation and its Practice. Difference between Extempore/Public Speaking, Communication Guidelines. Mother Tongue Influence (MTI), Various Techniques for Neutralization of Mother Tongue Influence. Reading and Listening Comprehensions – Exercises.	03
<b>Pedagogy</b>	(i) Direct instructional method (Low/Old Technology) (ii) Enquiry and evaluation-based learning (iii) Personalized learning (iv) Problems based learning through discussion (v) Chalk & Talk, Interaction, Live examples & Videos	

<b>Reference Books</b>	
<b>Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)</b>	
1	Communication Skills by Sanjay Kumar & Pushp Lata, Oxford University Press India Pvt Ltd - 2019.
2	A Textbook of English Language Communication Skills, (ISBN-978-81-955465-2-7), Published by Infinite Learning Solutions, Bengaluru - 2022.
3	Technical Communication: Principals & Practice (Third edition) Meenakshi Raman & Sangeeta Sharma Oxford University Press
4	Technical Communication by Gajendra Singh Chauhan and Et al, (ISBN-978-93-5350-050-4), Cengage learning India Pvt Limited [Latest Revised Edition] - 2019.
5	English Language Communication Skills – Lab Manual cum Workbook, Cengage learning India Pvt Limited [Latest Revised Edition] – (ISBN-978-93-86668-45-5), 2019.
6	A Course in Technical English – D Praveen Sam, KN Shoba, Cambridge University Press – 2020.
7	Practical English Usage by Michael Swan, Oxford University Press – 2016.

**Course Outcomes: At the end of the course, the student will be able to:**

CO	Course Outcomes	RBT Level	Level Indicator
CO1	Understand and apply the Fundamentals of Communication Skills in their communication skills.	Understand	L-2
CO2	Identify the nuances of phonetics, intonation and enhance pronunciation skills.	Remember	L-1
CO3	To impart basic English grammar and essentials of language skills as per present requirement.	Understand	L-2
CO4	Understand and use all types of English vocabulary and language proficiency.	Understand	L-2
CO5	Adopt the Techniques of Information Transfer through presentation.	Remember	L-1

**Mapping of Course Outcomes to Program Outcomes:**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	--	--	--	--	--	--	--	--	2	2	--	2	--	--
CO2	--	--	--	--	--	--	--	--	1	1	--	1	--	--
CO3	--	--	--	--	--	--	--	--	1	2	--	2	--	--
CO4	--	--	--	--	--	--	--	--	2	2	--	1	--	--
CO5	--	--	--	--	--	--	--	--	2	1	--	2	--	--

**Weblinks and Video Lectures (e-Resources)**

1	<a href="https://drive.google.com/drive/folders/1rqloQbY2HWu7xbFSmaGU3YAc7Tbhc3b1">https://drive.google.com/drive/folders/1rqloQbY2HWu7xbFSmaGU3YAc7Tbhc3b1</a>
2	<a href="https://drive.google.com/file/d/1UbpXJBcZNFyCxMEK0KqpR6NjpNfd4e1n/view?usp=drive_link">https://drive.google.com/file/d/1UbpXJBcZNFyCxMEK0KqpR6NjpNfd4e1n/view?usp=drive_link</a>
3	<a href="https://drive.google.com/file/d/11GUI1amPCq75n8mHoGnc9qzv_OJFzCHM/view?usp=drive_link">https://drive.google.com/file/d/11GUI1amPCq75n8mHoGnc9qzv_OJFzCHM/view?usp=drive_link</a>
4	<a href="https://drive.google.com/file/d/1RbPsNDA_ATiTXP_Tn8y2Udpc2NZTcvoy/view?usp=drive_link">https://drive.google.com/file/d/1RbPsNDA_ATiTXP_Tn8y2Udpc2NZTcvoy/view?usp=drive_link</a>
5	<a href="https://drive.google.com/file/d/1brLXNdwbFugdZJ1B4_TtzN43_KhhZvZI/view?usp=drive_link">https://drive.google.com/file/d/1brLXNdwbFugdZJ1B4_TtzN43_KhhZvZI/view?usp=drive_link</a>

Assessment Pattern (both CIE and SEE)

Constitution of India / Samskruthika Kannada / Communicative English / Professional writing skills in English

1 Credit Courses – Theory

Assessment Method	Component	Type of Assessments	Syllabus Coverage	Maximum Marks	Average	Reduced Marks	Minimum Passing Marks	Evaluation Details
<b>Total CIE Theory</b>				<b>50</b>	----	----	<b>20</b>	
<b>CIE</b>	<b>Theory</b>	Internal Assessment Test (IAT) – I (MCQ)	Module - 1 & 2	50	$(50+50+50) / 3$	<b>15</b>	<b>6</b>	Average of Three Internal test each of 50 Marks scale down the marks to 15 Marks
		Internal Assessment Test (IAT) – II (MCQ)	Module - 3 & 4	50				
		Internal Assessment Test (IAT) – III (QUIZ)	Module - 5	50				
	<b>Continuous Comprehensive Assessment (CCA)</b>	CCA-1- Pedagogical Initiatives	Considering all the Modules	50	$(50+50) / 2$	<b>10</b>	<b>4</b>	Two CCA methods as per VTU Clause 22OB4.2 of regulations to be adopted. If CCA chosen is Project Based Learning, then one assessment method may be adopted
		CCA-2- Pedagogical Initiatives		50				
<b>Total CIE Theory</b>								

						25	10	Scale down Marks of IAT and CCA to 25
SEE		Theory exam – (MCQ Type)	Entire syllabus	50	---	50	18	SEE Exam is theory Exam with MCQ type Question Papers of 50 Questions with each question 1 Mark each. Examination duration is 1 Hour
<b>CIE + SEE</b>				100	---	---	40	

- The Minimum Marks to be secured in CIE to appear for SEE shall be 10 (40% of Maximum Marks – 25) in the Theory Component and 10 (40% of Maximum Marks – 25) in the Practical component.
- The Laboratory Component for the IPCC shall be for CIE only.
- However, in SEE, the Questions from the Laboratory Component shall be included in the respective Modules only.



## 1 Credit Course – Theory

### **Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum Marks (20 Marks out of 50).

The minimum passing mark for the SEE is 35% of the maximum Marks (18 Marks out of 50).

A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 Marks out of 100) in the total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

### **Possible continuous and comprehensive assessment:**

Crossword, Maize, Debate, Role Play, Community Service, Mind Map, Concept Map, Case Study, Group Discussions, Ideations

The faculty may adopt any other CCA method of implementation and its assessment with prior approval of Program Assessment Committee (PAC).

### **Continuous Internal Evaluation (CIE):**

The CIE Marks for the internal assessment test shall be **25 Marks** and for the continuous and comprehensive assessment (CCA) shall be **25 Marks**.

### **Internal Assessment test:**

**The IA test questions are to be framed to map the course outcomes, program outcomes and the Blooms RBT Levels. Emphasis to be given for higher order RBT levels.**

Three Tests (MCQ) each of **50 Marks**

- First test after 6<sup>th</sup> week of the semester (syllabus completion of 35 – 40%)
- Second test after 10<sup>th</sup> week of semester (syllabus completion of 65 – 70%)
- Third test after 14<sup>th</sup> week of semester (syllabus completion of 90 – 100%)

The average score of three test is taken and scaled down to **25 Marks**.

### **Continuous and Comprehensive Assessment (CCA):**

Two of continuous and comprehensive assessment (CCA) to be conducted to attain COs and POs, evaluated each for **50 Marks**. Total Marks scored will be CCA1+CCA2 and scaled down to **25 Marks**.

- CCA1 to be conducted after 4<sup>th</sup> week
- CCA2 to be conducted after 9<sup>th</sup> week.
- The evaluation of CCAs includes either through quiz or rubrics

Total score for CCA is **25 Marks**

Total Marks scored for theory component of CIE (IAT + CCA) is **50 Marks**

### **Semester End Examination (SEE):**

- Theory SEE will be conducted as per the scheduled timetable, with common question papers for the subject .
- The question paper shall be set for 50 Marks. The medium of the question paper shall be English. **The duration of SEE is 01 hours.**
- The question paper will have 50 MCQs **covering all modules**. The questions shall map with the course outcome, program outcome and Blooms RBT level.

### CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Theory				
	Continuous Assessment Tests			Continuous Comprehensive Assessment (CCA)	
	IAT-1	IAT-2	IAT-3	CCA-1	CCA-2
	50 Marks	50 Marks	50 Marks	50 Marks	50 Marks
Remember	18	17	18	17	18
Understand	16	15	13	15	17
Apply	8	10	9	8	7
Analyse	8	8	10	10	8
Evaluate	--	--	--	--	--
Create	--	--	--	--	--

### CIE Course Assessment Plan

CO's	Marks Distribution					Total Marks	Weightage
	Test-1		Test-2		Test-3		
	Module-1	Module-2	Module-3	Module-4	Module-5		
CO1	18	6	--	--	2	26	20%
CO2	7	19	--	--	2	28	25%
CO3	--	--	17	7	8	32	20%
CO4	--	--	8	18	8	34	20%
CO5	--	--	--	--	30	30	15%
<b>Total</b>	<b>25</b>	<b>25</b>	<b>25</b>	<b>25</b>	<b>50</b>	<b>--</b>	<b>--</b>

### SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	35%
Understand	30%
Apply	20%
Analyse	15%
Evaluate	--
Create	--

## SEE Course Plan

CO's	Marks Distribution					Total Marks	Weightage
	Module-1	Module-2	Module-3	Module-4	Module-5		
CO1	3	2	2	2	1	10	20%
CO2	4	3	2	3	3	15	30%
CO3	2	1	2	3	2	10	20%
CO4	2	3	2	1	2	10	20%
CO5	2	1	1	1	0	5	10%
<b>Total</b>	<b>13</b>	<b>10</b>	<b>09</b>	<b>10</b>	<b>8</b>	<b>50</b>	<b>100%</b>

## Course Contents and Lecture Schedule

Module No.	Topics	No. of Lectures
1	Communicative English, Fundamentals of Communicative English, Process of Communication	1
1	Barriers to Effective Communicative English,	1
1	Different styles and levels in Communicative English. Interpersonal and Intrapersonal Communication Skills.	1
2	Phonetic Transcription, English Pronunciation, Pronunciation Guidelines to consonants and vowels	1
2	Sounds Mispronounced, Silent and Non silent Letters, Syllables and Structure. Word Accent	1
2	Stress Shift and Intonation, Spelling Rules and Words often Misspelt. Common Errors in Pronunciation	1
3	Grammar: Basic English Grammar and Parts of Speech, Articles and Preposition	1
3	Question Tags, One Word Substitutes,	1
3	Strong and Weak forms of words, Introduction to Vocabulary, All Types of Vocabulary– Exercises on it	1
4	Words formation - Prefixes and Suffixes	1
4	Contractions and Abbreviations. Word Pairs (Minimal Pairs) – Exercises,	1
4	Tense and Types of tenses, The Sequence of Tenses (Rules in use of Tenses) and Exercises on it.	1
5	Information Transfer: Oral Presentation and its Practice. Difference between Extempore/Public Speaking	1
5	Communication Guidelines. Mother Tongue Influence (MTI), Various Techniques for Neutralization of Mother Tongue Influence	1
5	Reading and Listening Comprehensions – Exercises	1
	<b>Revision</b>	
<b>Total</b>		<b>15 Hrs</b>



# Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	1 <sup>st</sup>			
Course Title	:	Engineering Mathematics - I			
Course Code	:	23MATC11			
Course Type (Theory/ Practical/ Integrated)	:	Theory			
Course Category	:	ASC			
Stream	:	Common to all branches	CIE	:	50 Marks
Teaching hour/week (L:T:P:S)	:	3:2:0:0	SEE	:	50 Marks
Total Hours	:	50 Hrs	SEE Duration	:	3 Hours
Credits:	:	4			

**Course Learning Objectives:** Students will be taught

Sl.No	Course Objectives
1	Acquire basic knowledge of Mathematical concepts for understanding Engineering problems
2	Use concepts of multivariate calculus, differential equations and numerical methods in solving problems
3	Analyze problems using concepts of multivariate calculus, differential equations and numerical methods
4	Analysis of various real time problems using the skills acquired

## Teaching-Learning Process

### Pedagogy (General Instructions):

These are sample Strategies; which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecture method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Show Video/animation films to explain the infrastructures and the mechanism involved in the principle.
3. Encourage collaborative (Group) Learning in the class.
4. Ask at least three HOT (Higher-order Thinking) questions in the class, which promotes critical thinking.
5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
6. Topics will be introduced in multiple representations.
7. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.
9. Individual teachers can devise innovative pedagogy to improve teaching-learning.



DSATM

Scheme of Teaching and Examinations for BE Programme -2023-24  
Outcome Based Education and Choice Based Credit System (CBCS)  
(Effective from the Academic Year 2023-24)

**COURSE SYLLABUS**

Module No.	Contents of the Module	Hours
1	<b>MODULE – I: Partial differentiation</b> Partial derivatives, Total derivatives-differentiation of composite functions, Maxima and minima for a function two variables, Jacobians, Hessian matrix.	10
Pedagogy	<b>Chalk and board, group discussion, ppt, videos</b>	
2	<b>MODULE-II: Ordinary Differential Equations of first order</b> Linear Differential equation, Bernoulli's equation, exact differential equation, reducible to exact differential equation, solvable for p, Clairaut's equation, equations reducible to Clairaut's form, Newton's law of cooling- problems.	10
Pedagogy	<b>Chalk and board, group discussion, ppt, videos</b>	
3	<b>MODULE-III: Ordinary Differential Equations of second and higher order</b> Second and higher order differential equations, inverse differential operator, Cauchy's and Legendre's differential equations, method of variation of parameters.	10
Pedagogy	<b>Chalk and board, group discussion, ppt, videos</b>	
4	<b>MODULE-IV: Numerical solution of Ordinary Differential Equations</b> Introduction to Taylor's series, Taylor's series method, Modified Euler's method, Runge-Kutta method of fourth order, Milne's predictor and corrector method, Runge-Kutta method for second order differential equations, Milne's method for second order differential equations.	10
Pedagogy	<b>Chalk and board, group discussion, ppt, videos</b>	
5	<b>MODULE-V: Partial differential equations</b> Formation of Partial Differential Equation, solution of PDE by direct integration, solution of Lagrange's Linear PDE, solution of one-dimensional heat and wave equations by variable separable method, solution of two-dimensional Laplace equation, numerical solution of	10

	Laplace equation using standard five-point formula, numerical solution of heat equation by Schmidt explicit formula, numerical solution of the wave equation.	
<b>Pedagogy</b>	<b>Chalk and board, group discussion, ppt, videos</b>	

#### List of Experiments or Programs

Sl.No	Experiments/Programs	COs
	NIL	

#### Reference Books

##### Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)

1	Erwin Kreyzig, "Advanced Engineering Mathematics", 10 <sup>th</sup> Edition, Wiley Publications, 2018.
2	Theory and problems of Differential and integral calculus by Frank Ayres and Elliott Mendelson, Schaum's outline series, third edition, McGraw Hill publications.
3	Numerical Methods for Scientific and Engg. Computation, M K Jain, S R K Iyengar, R K Jain, 6th edition, New Age, 2012.
4	Advanced mathematics for Engineers and Scientists by Murray R Spiegel, Schaum's outline series, edition, McGraw Hill publications.

**Course Outcome: At the end of the course, the student will be able to:**

CO	Course Outcomes	RBT Level	Level Indicator
CO1	Understand the basic concepts of multivariate calculus and differential equations	<b>Understand</b>	L2
CO2	Apply techniques of multivariate calculus, differential equations and numerical methods to solve Engineering Problems	<b>Apply</b>	L3
CO3	Analyze Engineering problems using multivariate calculus and differential equations.	<b>Analyse</b>	L4
CO4	Investigate problems arising in real life using the overall knowledge acquired	<b>Evaluate</b>	L5

**Mapping of Course Outcomes to Program Outcomes:**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CO2	3	--	--	--	--	--	--	--	--	--	--	--	--	--
CO3	--	1	--	--	--	--	--	--	--	--	--	--	--	--
CO4	--	--	--	2	--	--	--	--	1	1	--	--	--	--

**Weblinks and Video Lectures (e-Resources)**

1	<a href="https://youtube.com/playlist?list=PLKS7ZMKnbPrQukeSraYiel-cNtwscFtlQ">https://youtube.com/playlist?list=PLKS7ZMKnbPrQukeSraYiel-cNtwscFtlQ</a>
2	<a href="https://youtube.com/playlist?list=PLNKD1qB9ppttgKvBIC0cpPbBBL0CgLT1g">https://youtube.com/playlist?list=PLNKD1qB9ppttgKvBIC0cpPbBBL0CgLT1g</a>
3	<a href="https://youtube.com/playlist?list=PLKS7ZMKnbPrRvROmpyKXIBRQusRx_fw_L">https://youtube.com/playlist?list=PLKS7ZMKnbPrRvROmpyKXIBRQusRx_fw_L</a>
4	<a href="https://youtu.be/MAAXfC5nfXs">https://youtu.be/MAAXfC5nfXs</a>
5	<a href="https://youtu.be/SrDyuEH3rHA">https://youtu.be/SrDyuEH3rHA</a>
6	<a href="https://youtu.be/io8-qdx1gic">https://youtu.be/io8-qdx1gic</a>

Assessment Pattern (both CIE and SEE)

**Applied Science Courses**

**4 credits - Theory**

Assessment Method	Component	Type of Assessments	Syllabus Coverage	Maximum Marks	Average	Reduced Marks	Minimum Passing Marks	Evaluation Details
<b>Total CIE Theory + Practical</b>				<b>50</b>			<b>20</b>	
<b>CIE</b>	<b>Theory</b>	Internal Assessment Test (IAT) - I	Module - 1 & 2	50	$(50+50+50) / 3$	<b>25</b>	10	Average of Three Internal test each of 50 Marks scale down the marks to 25 Marks
		Internal Assessment Test (IAT) - II	Module - 3 & 4	50				
		Internal Assessment Test (IAT) - III	Module - 5	50				
	<b>Continuous Comprehensive Assessment (CCA)</b>	CCA-1- Pedagogical Initiatives	Considering all the Modules	50	$(50+50) / 2$	<b>25</b>	10	Two CCA methods as per VTU Clause 22OB4.2 of regulations to be adopted. If CCA chosen is Project Based Learning, then one assessment method may be adopted
		CCA-2- Pedagogical Initiatives		50				
<b>Total CIE Theory</b>						<b>50</b>	<b>20</b>	Scale down Marks of IAT and CCA to 50



SEE		Theory exam	Entire theory syllabus including questions from lab component	100	---	50	20	SEE Exam is theory Exam conducted for 100 Marks, scored Marks are scaled down to 50 Marks
CIE + SEE				100	---	---	40	
				<ul style="list-style-type: none"> <li>• The Minimum Marks to be secured in CIE to appear for SEE shall be 10 (40% of Maximum Marks – 25) in the Theory Component and 10 (40% of Maximum Marks – 25) in the Practical component.</li> <li>• The Laboratory Component for the IPCC shall be for CIE only.</li> <li>• However, in SEE, the Questions from the Laboratory Component shall be included in the respective Modules only.</li> </ul>				

**The Minimum Marks to be secured in CIE to appear for SEE shall be 10 (40% of Maximum Marks – 25) in the Theory Component and 10 (40% of Maximum Marks -25) in the Practical Component. The Laboratory Component of the IPCC shall be for CIE only. However, in SEE the questions from the Laboratory Component shall be included in the respective Modules only.**

**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum Marks (20 Marks out of 50).

The minimum passing mark for the SEE is 35% of the maximum Marks (18 Marks out of 50).

A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 Marks out of 100) in the total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

**Possible continuous and comprehensive assessment:**

Project based, Problem Based, Building Models, Lab-to-Land, Mobile Studio, Design and Programming Contest, Certification, Concept Map (Collage presentation/poster presentation), Case studies, Think-Pair-Share, Flipped classroom, storytelling. The assessment of these techniques can be either based on Quiz or rubrics.

The faculty can adopt any other CCA method of implementation and its assessment with prior approval of Program Assessment Committee (PAC).

**Continuous Internal Evaluation (CIE):**

The CIE Marks for the theory component of the IC shall be **25 Marks** and for the laboratory component **25 Marks**.

**CIE for the theory component of the IC**

**Internal Assessment test:**

**The IA test questions are to be framed to map the Course Outcomes (COs), Program Outcomes (POs) and the Blooms RBT Levels. Emphasis to be given for higher order RBT levels**

Three Tests each of **50 Marks** scaled down to **25 Marks**

- First test after 6<sup>th</sup> week of the semester (syllabus completion of 35 – 40%)
- Second test after 10<sup>th</sup> week of semester (syllabus completion of 65 – 70%)
- Third test after 14<sup>th</sup> week of semester (syllabus completion of 90 – 100%)

The average score of three test is taken and scaled down to **15 Marks**.

**Continuous and Comprehensive Assessment (CCA):**

Two of continuous and comprehensive assessment (CCA) to be conducted to attain COs and POs, evaluated each for **50 Marks**. Total Marks scored will be CCA1+CCA2 and scaled down to **10 Marks**.

- CCA1 after 4<sup>th</sup> week and CCA2 after 9<sup>th</sup> week. The evaluation includes either through quiz or rubrics
- CCA as project-based learning,
  - CCA is evaluated for **50 Marks** with review 1 of **20 Marks** after and review 2 of **30 Marks** includes project demonstration/competition and report submission.
  - The evaluation of review 1 after 6<sup>th</sup> weeks of semester and review 2 after 12<sup>th</sup> week of semester with project demonstration and submission of the report

Total score for CCA is **10 Marks**

Total Marks scored for theory component of CIE (IAT+ CCA) is **25 Marks**

**CIE for the practical component of the IC**

- On completion of every experiment/program in the laboratory, the students shall be evaluated and Marks shall be awarded on the same day. The **10 Marks** are for conducting the experiment and preparation of the laboratory record, the other **10 Marks shall be for the test** conducted at the end of the semester and **5 Marks** for conducting Open Ended Experiments.
- The CIE Marks awarded in the case of the practical component shall be based on the continuous evaluation of the laboratory report and the conduction. Each experiment report can be evaluated for 05 Marks conduction(Observation Book) and 5 Marks for Record Book. Marks of all experiments' write-ups and conduction are added and scaled to **10 Marks**.
- The Practical laboratory test (**duration 03 hours**) at the end of the 15<sup>th</sup> week of the semester/after completion of all the experiments (whichever is early) shall be conducted for **50 Marks** and scaled down to **10 Marks**.
- Open Ended Experiments are conducted after the completion of regular Experiments/Programs for 20 Marks and scaled down to **5 Marks**
- Scaled-down Marks of write-up, evaluations and tests, will be added as CIE Marks for the laboratory component of IC/IPCC for **25 Marks**.
- The minimum Marks to be secured in CIE to appear for SEE shall be 10 (40% of maximum Marks) in the theory component and 10 (40% of maximum Marks) in the practical component.
- The laboratory component of the IC/IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included. The maximum of 05 questions is to be set from the practical component of IC/IPCC, the total Marks of all questions should not be more than 25 Marks.

The theory component of the IC shall be for both CIE and SEE.

**Semester End Examination (SEE):**

- Theory SEE will be conducted as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)
- The question paper shall be set for 100 Marks. The medium of the question paper shall be English. The duration of SEE is 03 hours.
- The question paper will have 10 questions. Two questions per module. Each question is set for 20 Marks. The student has to answer 5 full questions, selecting one full question from each module summing up to maximum score of 100 Marks. Marks **scored out of 100 shall proportionally be reduced to 50 Marks**.
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module. The two questions should be of same course outcome, program outcome and Blooms RBT level. Emphasis to be given for higher order RBT levels

### CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Theory					Practical
	Continuous Assessment Tests			Continuous Comprehensive Assessment (CCA)		Practical Test
	IAT-1	IAT-2	IAT-3	CCA-1	CCA-2	
	50 Marks	50 Marks	50 Marks	50 Marks	50 Marks	50 Marks
Remember	--	--	--	30	--	--
Understand	10	10	10	20	--	--
Apply	30	30	30	--	--	--
Analyse	10	10	10	--	--	--
Evaluate	--	--	--	--	50	--
Create	--	--	--	--	--	--

### CIE Course Assessment Plan

CO's	Marks Distribution					Total Marks	Weightage
	Test-1		Test-2		Test-3		
	Module-1	Module-2	Module-3	Module-4	Module-5		
CO1	5	5	5	5	10	30	20%
CO2	15	15	15	15	30	90	60%
CO3	5	5	5	5	10	30	20%
CO4	--	--	--	--	--	--	--
CO5	--	--	--	--	--	--	--
CO6	--	--	--	--	--	--	--
<b>Total</b>	<b>25</b>	<b>25</b>	<b>25</b>	<b>25</b>	<b>50</b>	<b>150</b>	

### SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	--
Understand	5
Apply	35
Analyse	10
Evaluate	--
Create	--

## SEE Course Plan

CO's	Marks Distribution					Total Marks	Weightage
	Module-1	Module-2	Module-3	Module-4	Module-5		
CO1	5	--	--	--	--	5	10%
CO2	5	5	10	5	10	35	70%
CO3	--	5	--	5	--	10	20%
CO4	--	--	--	--	--	--	--
CO5	--	--	--	--	--	--	--
CO6	--	--	--	--	--	--	--
<b>Total</b>	<b>10</b>	<b>10</b>	<b>10</b>	<b>10</b>	<b>10</b>	<b>50</b>	<b>100%</b>

## Course Contents and Lecture Schedule

Module No.	Topics	No. of Lectures
1	Partial derivatives- Definition and problems	1
1	Problems continued on above	1
1	Total Derivatives- problems	1
1	Partial Differentiation of Composite functions	1
1	Problems continued on above	1
1	Jacobians – Definition and problems	1
1	Problems on Implicit functions	1
1	Maxima and Minima for a function of two variables	1
1	Problems continued on above	1
1	Hessian matrix and problems	1
2	Linear differential equations of first order and first degree and problems	1
2	Problems continued on the above	1
2	Bernoulli's equation and problems	1
2	Exact equations and reducible to exact	1
2	Problems continued on the above	1
2	Equations solvable for p	1
2	Problems continued on the above	1
2	Clairaut's equation and problems	1
2	Equations reducible to Clairaut's form	1
2	Newton's law of cooling and problems	1
3	Second and higher order differential equations	1
3	Problems continued on the above	1
3	Problems continued on the above	1
3	Inverse differential operator, three types	1
3	Problems continued on the above	1
3	Problems continued on the above	1

3	Problems continued on the above	1
3	Cauchy's differential equation and problems	1
3	Legendre's differential equation and problems	1
3	Method of variation of parameters	1
4	Formation of PDE	1
4	Method of elimination of arbitrary constants and functions	1
4	Solution of PDE by direct integration	1
4	Solution of Lagrange's linear PDE and problems	1
4	Solution of one-dimensional heat equation	1
4	Solution of one-dimensional wave equation	1
4	Solution of two-dimensional Laplace equation	1
4	Numerical solution of Laplace equation	1
4	Numerical solution of heat equation	1
4	Numerical solution of wave equation	1
5	Introduction to Taylor's series	1
5	Numerical solution of ODE by Taylor's series method	1
5	Modified Euler's method and problems	1
5	Problems continued on the above	1
5	Runge-Kutta method of fourth order	1
5	Problems continued on the above	1
5	Milne's predictor and corrector method and problems	1
5	Runge-Kutta method for second order differential equations	1
5	Problems continued on the above	1
5	Milne's method for second order differential equations	1
	<b>Total</b>	<b>50 Hrs</b>



## Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

<b>Semester</b>	:	1 <sup>st</sup>			
<b>Course Title</b>	:	INNOVATION and DESIGN THINKING			
<b>Course Code</b>	:	23IDTC18			
<b>Course Type (Theory/Practical/Integrated)</b>	:	Theory			
<b>Course Category</b>	:	AEC/SDC			
<b>Stream</b>	:	Common to all Branches	<b>CIE</b>	:	50 Marks
<b>Teaching hours/ week (L:T:P:S)</b>	:	1:0:0:0	<b>SEE</b>	:	50 Marks
<b>Total Hours</b>	:	15 Hrs T	<b>SEE</b>	:	01 Hour
<b>Credits</b>	:	01	<b>Duration</b>	:	

**Course Learning Objectives:** Students will be taught

CLO's	Course Objectives
CLO1	Inculcate the fundamental concepts of design thinking.
CLO2	Enable students as a good designer by imparting creativity and problem-solving ability.
CLO3	Involve students to conceive, conceptualize, design and demonstrate their innovative ideas.
CLO4	Emphasize project-based learning for real time applications.

### Teaching-Learning Process

#### Pedagogy (General Instructions):

These are sample Strategies; which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecture method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Show Video/animation films to explain the infrastructures and the mechanism involved in the principle.
3. Encourage collaborative (Group) Learning in the class.
4. Ask at least three HOT (Higher-order Thinking) questions in the class, which promotes critical thinking.
5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
6. Topics will be introduced in multiple representations.
7. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.
9. Individual teachers can devise innovative pedagogy to improve teaching-learning.



DSATM

**Scheme of Teaching and Examinations for BE Programme -2023-24**  
**Outcome Based Education and Choice Based Credit System (CBCS)**  
**(Effective from the Academic Year 2023-24)**

**COURSE SYLLABUS**

<b>Module No.</b>	<b>Contents of the Module</b>	<b>Hours</b>
<b>1</b>	Design process: Traditional design, Design thinking, Existing sample design projects, Study on designs around us, Compositions/structure of a design, Innovative design: Breaking of patterns, reframe existing design problems, Principles of creativity Empathy: Customer Needs, Shared model in team-based design – Theory and practice in Design thinking – Explore presentation signers across globe – MVP or Prototyping	<b>3</b>
<b>Pedagogy</b>	Lecture: Introduction to design thinking process. Presentation and Videos.	
<b>2</b>	Idea generation and Conceptualization: Visual thinking, Drawing/sketching, new concept thinking, Concept Generation Methodologies, Concept Selection, Concept Testing, Opportunity identification, Empathy for design – Collaboration in distributed Design	<b>3</b>
<b>Pedagogy</b>	Ideate the problem and analysis through Journey mapping, customer mapping	
<b>3</b>	<b>Analyze Phase: 5-Whys and 1How</b> Recognize the difference between symptoms and root cause, overcoming common challenges during “5Whys” process. Understanding the purpose “1How” technique. Connecting 1How to the insights from the 5Whys analysis. Creating a problem-solving framework using both techniques, align problem solving with user needs and empathy	<b>3</b>
<b>Pedagogy</b>	Group Activity: Conducting a collaborative activity “5Whys Analysis” on the Identified problem. Brainstorming potential solution using “1How” approach.	
<b>4</b>	<b>Project Management Fundamentals and Prototyping</b> Project management terms, Approaches: Waterfall, Agile, Hybrid. Roles and Responsibilities and competencies of project manager, phases of project-Initiate and plan, execute, close. Rapid prototyping, Strategy and Organization – Business Model design.	<b>3</b>
<b>Pedagogy</b>	Design a solution combining insights from “5Whys and 1How” technique and project Canva for the identified problem.	
<b>5</b>	<b>Finding Solution Through IDEATION</b> Apply ideation, critical thinking and problem-solving skills, to real-world problems and overcome barriers and find innovative solutions.	<b>3</b>
<b>Pedagogy</b>	Presentation by Team	



<b>Reference Books</b>	
<b>Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)</b>	
1	John.R.Karsnitz, Stephen O'Brien and John P. Hutchinson, "Engineering Design", Cengage learning (International edition) Second Edition, 2013.
2	Roger Martin, "The Design of Business: Why Design Thinking is the Next Competitive Advantage", Harvard Business Press , 2009.
3	Idris Mootee, "Design Thinking for Strategic Innovation: What They Can't Teach You at Business or Design School", John Wiley & Sons 2013
4	Yousef Haik and Tamer M.Shahin, "Engineering Design Process", Cengage Learning, Second Edition, 2011..
5	Garg, B.L., Karadia, R., Agarwal, F. and Agarwal, U.K., 2002. An introduction to Research Methodology, RBSA Publishers..
6	Gavin Ambrose, Paul Harris, "Basics Design - 8: Design Thinking", illustrated, reprint, AVA Publishing, 2010
7	Christian Müller-Roterberg, "Handbook of Design Thinking", Kindle Direct Publishing ISBN: 978-1790435371, November 2018
8	Stuart Pugh, Total Design: Integrated Methods for Successful Product Engineering, Bjarki Hallgrimsson, Prototyping and model making for product design, 2012, Laurence King Publishing Ltd.
9	Kevin Henry, Drawing for Product designers, 2012, Laurence King Publishing Ltd

**Course Outcomes: At the end of the course, the student will be able to:**

CO	Course Outcomes	RBT Level	Level Indicator
CO1	Understand the different methods employed in design thinking and establish a framework to use in their practices	Understand	L2
CO2	Apply the different steps of design thinking to ideate the problem.	Apply	L3
CO3	Develop creative solution using the tools/model-based approach and strategies of design thinking.	Apply	L3
CO4	Analyse and validate the devised solution for real time problem	Analyse	L4

**Mapping of Course Outcomes to Program Outcomes:**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	2	2	-	-	-	-	-
CO3	-	-	3	-	2	-	-	-	2	-	-	-
CO4	-	-	-	3	-	2	2	-	-	2	2	2

<b>Weblinks and Video Lectures (e-Resources)</b>	
1	What is design thinking, Daylight design firm <a href="https://www.youtube.com/watch?v=Ee4CKIPkIik&amp;list=PLo2Y_6-IlgFXbyOjTcTg_IJQ0fZghjjQw&amp;index=3">https://www.youtube.com/watch?v=Ee4CKIPkIik&amp;list=PLo2Y_6-IlgFXbyOjTcTg_IJQ0fZghjjQw&amp;index=3</a>
2	Design thinking, 3 major stages HBR <a href="https://www.youtube.com/watch?v=z3IbHLfcyWo&amp;list=PLo2Y_6-IlgFXbyOjTcTg_IJQ0fZghjjQw&amp;index=23">https://www.youtube.com/watch?v=z3IbHLfcyWo&amp;list=PLo2Y_6-IlgFXbyOjTcTg_IJQ0fZghjjQw&amp;index=23</a>
3	The Importance of Empathy <a href="https://www.youtube.com/watch?v=UzPMMSKfKZQ&amp;list=PLo2Y_6-IlgFXbyOjTcTg_IJQ0fZghjjQw&amp;index=21">https://www.youtube.com/watch?v=UzPMMSKfKZQ&amp;list=PLo2Y_6-IlgFXbyOjTcTg_IJQ0fZghjjQw&amp;index=21</a>
4	How to create a customer journey map <a href="https://www.youtube.com/watch?v=mSxpVRo3BLg&amp;list=PLo2Y_6-IlgFXbyOjTcTg_IJQ0fZghjjQw&amp;index=6">https://www.youtube.com/watch?v=mSxpVRo3BLg&amp;list=PLo2Y_6-IlgFXbyOjTcTg_IJQ0fZghjjQw&amp;index=6</a>
5	Personas - Design Thinking Book <a href="https://www.youtube.com/watch?v=W1kw5xK1C30&amp;list=PLo2Y_6-IlgFXbyOjTcTg_IJQ0fZghjjQw&amp;index=8">https://www.youtube.com/watch?v=W1kw5xK1C30&amp;list=PLo2Y_6-IlgFXbyOjTcTg_IJQ0fZghjjQw&amp;index=8</a>
6	How to build your creative confidence, David Kelley <a href="https://www.youtube.com/watch?v=16p9YRF0l-g&amp;list=PLo2Y_6-IlgFXbyOjTcTg_IJQ0fZghjjQw&amp;index=20">https://www.youtube.com/watch?v=16p9YRF0l-g&amp;list=PLo2Y_6-IlgFXbyOjTcTg_IJQ0fZghjjQw&amp;index=20</a>
7	Apply Design Thinking in Your Work <a href="https://www.youtube.com/watch?v=U499U4TcyY8&amp;list=PLo2Y_6-IlgFXbyOjTcTg_IJQ0fZghjjQw&amp;index=4">https://www.youtube.com/watch?v=U499U4TcyY8&amp;list=PLo2Y_6-IlgFXbyOjTcTg_IJQ0fZghjjQw&amp;index=4</a>
8	Brainstorming <a href="https://www.mindtools.com/acv0de1/brainstorming">https://www.mindtools.com/acv0de1/brainstorming</a>
9	Design Thinking 101 <a href="https://www.nngroup.com/articles/design-thinking/">https://www.nngroup.com/articles/design-thinking/</a>
10	The 5 Stages in the Design Thinking Process <a href="https://www.interaction-design.org/literature/article/5-stages-in-the-design-thinking-process">https://www.interaction-design.org/literature/article/5-stages-in-the-design-thinking-process</a>
11	Tools for taking action <a href="https://dschool.stanford.edu/resources">https://dschool.stanford.edu/resources</a>
12	Design Thinking - A Primer <a href="https://onlinecourses.nptel.ac.in/noc19_mg60/preview">https://onlinecourses.nptel.ac.in/noc19_mg60/preview</a>

Assessment Pattern (both CIE and SEE)

**Constitution of India / Samskruthika Kannada / Communicative English / Professional writing skills in English/Innovation and Design Thinking**

**1 Credit Courses – Theory**

Assessment Method	Component	Type of Assessments	Syllabus Coverage	Maximum Marks	Average	Reduced Marks	Minimum Passing Marks	Evaluation Details
<b>Total CIE Theory</b>				<b>50</b>	----	----	<b>20</b>	
<b>CIE</b>	<b>Theory</b>	Internal Assessment Test (IAT) – I (MCQ)	Module - 1 & 2	50	(50+50+50) / 3	<b>25</b>	10	Average of Three Internal test each of 50 Marks scale down the marks to 25 Marks
		Internal Assessment Test (IAT) – II (MCQ)	Module - 3 & 4	50				
		Internal Assessment Test (IAT) – III (MCQ)	Module - 5	50				
	<b>Continuous Comprehensive Assessment (CCA)</b>	CCA-1- Pedagogical Initiatives	Considering all the Modules	50	(50+50) / 2	<b>25</b>	10	Two CCA methods as per VTU Clause 22OB4.2 of regulations to be adopted. If CCA chosen is Project Based Learning, then one assessment method may be adopted
		CCA-2- Pedagogical Initiatives		50				

	<b>Total CIE Theory</b>				<b>50</b>	20	Scale down Marks of IAT and CCA to 25	
<b>SEE</b>		Theory exam – (MCQ Type)	Entire syllabus	50	----	50	18	SEE Exam is theory Exam with MCQ type Question Papers of 50 Questions with each question 1 Mark each. Examination duration is 1 Hour
<b>CIE + SEE</b>				100	----	----	40	

**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%.

The minimum passing mark for the CIE is 40% of the maximum Marks (20 Marks out of 50).

The minimum passing mark for the SEE is 35% of the maximum Marks (18 Marks out of 50).

A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 Marks out of 100) in the total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

**Possible continuous and comprehensive assessment:**

Crossword, Maize, Debate, Role Play, Community Service, Mind Map, Concept Map, Case Study, Group Discussions, Ideathon

The faculty may adopt any other CCA method of implementation and its assessment with prior approval of Program Assessment Committee (PAC).

**Continuous Internal Evaluation (CIE):**

The CIE Marks for the internal assessment test shall be **25 Marks** and for the continuous and comprehensive assessment (CCA) shall be **25 Marks**.

**Internal Assessment test:**

**The IA test questions are to be framed to map the course outcomes, program outcomes and the Blooms RBT Levels. Emphasis to be given for higher order RBT levels**

Three Tests (MCQ) each of **50 Marks**

- First test after 6<sup>th</sup> week of the semester (syllabus completion of 35 – 40%)
- Second test after 10<sup>th</sup> week of semester (syllabus completion of 65 – 70%)
- Third test after 14<sup>th</sup> week of semester (syllabus completion of 90 – 100%)

The average score of two test is taken and scaled down to **25 Marks**.

**Continuous and Comprehensive Assessment (CCA):**

Two of continuous and comprehensive assessment (CCA) to be conducted to attain COs and POs, evaluated each for **50 Marks**. Total Marks scored will be CCA1+CCA2 and scaled down to **25 Marks**.

- CCA1 to be conducted after 4<sup>th</sup> week
- CCA2 to be conducted after 9<sup>th</sup> week.
- The evaluation of CCAs includes either through quiz or rubrics

Total score for CCA is **25 Marks**

Total Marks scored for theory component of CIE (IAT + CCA) is **50 Marks**

**Semester End Examination (SEE):**

- Theory SEE will be conducted as per the scheduled timetable, with common question papers for the subject
- The question paper shall be set for 50 Marks. The medium of the question paper shall be English. The duration of SEE is 01 hours.  
The question paper will have 50 MCQs **covering all modules**. The questions should map with the course outcome, program outcome and Blooms RBT level.

### CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Theory					Practical
	Continuous Assessment Tests			Continuous Comprehensive Assessment (CCA)		Practical Test
	IAT-1	IAT-2	IAT-3	CCA-1	CCA-2	
	50 Marks	50 Marks	50 Marks	50 Marks	50 Marks	50 Marks
Remember	-	-	-	-	-	-
Understand	20	20	10	20	-	-
Apply	30	30	20	20	20	-
Analyse	-	-	20	10	20	-
Evaluate	-	-	-	-	10	-
Create	-	-	-	-	-	-

### CIE Course Assessment Plan

CO's	Marks Distribution					Total Marks	Weightage (%)
	Test-1		Test-2		Test-3		
	Module-1	Module-2	Module-3	Module-4	Module-5		
CO1	10	10	10	10	10	50	33
CO2	10	10	10	10	10	50	33
CO3	-	10	-	10	10	30	20
CO4	-	-	-	-	20	20	14
<b>Total</b>	<b>20</b>	<b>30</b>	<b>20</b>	<b>30</b>	<b>50</b>	<b>150</b>	<b>100</b>

### SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (100% Theory)
Remember	-
Understand	20%
Apply	60%
Analyse	20%
Evaluate	-
Create	-

## SEE Course Plan

CO's	Marks Distribution					Total Marks	Weightage (%)
	Module-1	Module-2	Module-3	Module-4	Module-5		
CO1	05	-	05	-	-	10	20
CO2	05	05	05	-	-	15	30
CO3	-	05	-	05	05	15	30
CO4	-	-	-	05	05	10	20
<b>Total</b>	<b>10</b>	<b>10</b>	<b>10</b>	<b>10</b>	<b>10</b>	<b>50</b>	<b>100</b>

## Course Contents and Lecture Schedule

Module No.	Topics	No. of Lectures
1	Design process: Traditional design, Design thinking, Existing sample design projects, Study on designs around us, Compositions/structure of a design.	1
1	Innovative design: Breaking of patterns, reframe existing design problems, Principles of creativity Empathy.	1
1	Customer Needs, Shared model in team-based design – Theory and practice in Design thinking – Explore presentation signers across globe – MVP or Prototyping	1
2	Idea generation and Conceptualization: Visual thinking, Drawing/sketching, new concept thinking.	1
2	Patents and Intellectual Property, Concept Generation Methodologies.	1
2	Concept Selection, Concept Testing, Opportunity identification, Empathy for design – Collaboration in distributed Design	1
3	<b>Analyze Phase: 5-Whys and 1How</b> Recognize the difference between symptoms and root cause, overcoming common challenges during “5Whys” process.	1
3	Understanding the purpose “1How” technique. Connecting 1How to the insights from the 5Whys analysis.	1
3	Creating a problem-solving framework using both techniques, align problem solving with user needs and empathy	1
4	<b>Project Management Fundamentals and Prototyping</b> Project management terms, Approaches: Waterfall, Agile, Hybrid.	1
4	Roles and Responsibilities and competencies of project manager, phases of project-Initiate and plan, execute, close.	1
4	Rapid prototyping, Strategy and Organization – Business Model design..	1
5	<b>Finding Solution Through IDEATION</b> Apply ideation, critical thinking and problem-solving skills, to real-world problems and overcome barriers and find innovative solutions.	3
<b>Total</b>		<b>15 Hrs</b>



# Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	1 <sup>st</sup> / 2 <sup>nd</sup>		
Course Title	:	Introduction to Electrical Engineering		
Course Code	:	23CECE13 / 23CECE 23		
Course Type (Theory/ Practical/ Integrated)	:	Theory		
Category	:	CEC-1/CEC-2		
Stream	:	Non-Electrical Branches	CIE	: 50 Marks
Teaching hours/ week (L:T:P:S)	:	2:2:0:0	SEE	: 50 Marks
Total Hours	:	40 Hrs	SEE Duration	: 3 Hours
Credits	:	03		

**Course Learning Objectives:** Students will be taught

Sl. No.	Course Objectives
1	To provide the knowledge on the basic concepts, working principle and operation of different power systems electrical machines, and electrical installations.
2	To introduce the basic laws and theorems to solve the basic electrical engineering problems.
3	To explain the analysis of DC & AC circuit.

## Teaching-Learning Process

### Pedagogy (General Instructions):

These are sample Strategies; which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecture method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Show Video/animation films to explain the infrastructures and the mechanism involved in the principle.
3. Encourage collaborative (Group) Learning in the class.
4. Ask at least three HOT (Higher-order Thinking) questions in the class, which promotes critical thinking.
5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyse information rather than simply recall it.
6. Topics will be introduced in multiple representations.
7. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.
9. Individual teachers can device innovative pedagogy to improve teaching-learning.





DSATM

Scheme of Teaching and Examinations for BE Programme -2023-24  
Outcome Based Education and Choice Based Credit System (CBCS)  
(Effective from the Academic Year 2023-24)

COURSE SYLLABUS

Module No.	Contents of the Module	Hours
1	<p><b>Power Generation, Transmission ,Distribution and D.C. Circuits:</b></p> <p><b>Power Generation:</b> Conventional and non-conventional energy resources. Hydel, Nuclear, Thermal, Solar &amp; wind power generation. Introduction to Green H2</p> <p><b>Transmission &amp; Distribution :</b> Types of transmission lines, Power transmission and Distribution system using single line diagram approach</p> <p><b>DC Circuits:</b> Active and passive elements, Ohm's Law. KCL &amp; KVL, series, parallel, series-parallel circuits. Mesh analysis and nodal analysis. Superposition and Thevenin's theorem (resistive load). Time domain analysis of first order R-L and R-C circuits. Numerical examples</p>	08
Pedagogy	1. Chalk and talk 2. Animated/NPTEL videos 3. Problem Based Learning 4. Experiential Learning	
2	<p><b>A.C Circuits:</b></p> <p><b>Single phase:</b> Study and representation of sinusoidal waveform, analysis of single phase AC circuits (R,L,C,R-L, R-C, R-L-C Series), Concepts of Power &amp; Power factor , Numerical examples.</p> <p><b>Three Phase:</b> Analysis of three phase Balanced circuit, Voltage and current relation in star and delta connection, Numerical examples.</p>	08
Pedagogy	1. Chalk and talk 2. Animated/NPTEL videos 3. Problem Based Learning 4. Experiential Learning 5. Demonstration	
3	<p><b>AC Machines:</b></p> <p><b>Transformers:</b> Electromagnetism, Types of transformers, Construction and principle of operation, EMF equation of transformer, regulation, efficiency calculations, working of single-phase Auto transformer, Applications of transformers, Numerical examples on EMF &amp; efficiency of transformer.</p> <p><b>Single phase and Three phase Induction Motor:</b> Types of 3-phase Induction Motors, Construction and working principle of three phase Induction Motor, Slip and its significance. applications of 3-phase induction motors.</p> <p>Types of 1-phase induction motors, Constructional, working, principle of operation of single-phase induction motor and applications of 1-phase induction motors.</p>	08
Pedagogy		

	1. Chalk and talk 2. Animated/NPTEL videos 3. Problem Based Learning 4. Experiential Learning 5. Cut sections	
4	<p><b>DC Motors and Special Motors:</b></p> <p><b>DC Motors:</b> Types of DC motors, Construction and working principle of DC motor, concept of back EMF, characteristics and applications of DC motors</p> <p><b>Special motors-</b> Constructional features, working and applications of stepper motor, BLDC, PMSM and servo motor.</p>	08
<b>Pedagogy</b>	1. Chalk and talk 2. Animated/NPTEL videos 3. Problem Based Learning 4. Experiential Learning 5. Cut sections.	
5	<p><b>Switchgears &amp; Electrical Installation:</b></p> <p>Components of LT switch gear-switch fuse unit, MCB, ELCB, RCCB. Types of wiring, house/building wiring and its estimation, types and ratings of Cables Two way and three-way control of load. Electric Shock, earthing and its types, Safety Precautions to avoid shock,. Demonstration of Energy meter and Smart meter, Elementary calculation of energy consumption and power factor improvement</p>	08
<b>Pedagogy</b>	1. Chalk and talk 2. Animated/NPTEL videos 3. Demonstration 4. Experiential Learning	

#### Reference Books

##### Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)

1.	D. P. Kothari and I. J. Nagarth "Basic Electrical Engineering", 3 <sup>rd</sup> edition Tata Mc Graw Hill 2017
2.	Allen R Hambley, "Electrical Engineering Principles & Applications", 2019 6 <sup>th</sup> edition Pearson Education
3.	D. C. Kulshreshtha, "Basic Electrical Engineering" , First Edition 2019.Tata McGraw Hill,
4.	B.L. Theraja, , " A text book of Electrical Technology" reprint edition 2014. S Chand and Company

**Course Outcomes: At the end of the course, the student will be able to:**

CO	Course Outcomes	RBT Level	Level Indicator
CO1	Understand the concept, working principle operation of different power systems, electrical machines, and the electrical installations.	Remember and Understand	L1, L2
CO2	Apply the basic laws and theorems to the solve basic electrical engineering problems.	Apply	L3
CO3	To analyse the basic DC & AC circuits	Analyse	L4
CO4	Solve the different electrical circuit problems using modern tools.	Evaluate	L5 & L6

**Mapping of Course Outcomes to Program Outcomes:**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C02	3	--	--	--	--	--	--	--	--	--	--	--	--	--
C03	--	3	--	--	--	--	--	--	--	--	--	--	--	--
C04	--	--	3	3	3	--	--	--	2	2	--	--	2	2

Assessment Pattern (both CIE and SEE)

Engineering Science Course (ESC) / Emerging Technology Course (ETC) / Programming Language Course (PLC)

3 credits - Theory

Assessment Method	Component	Type of Assessments	Syllabus Coverage	Maximum Marks	Average	Reduced Marks	Minimum Passing Marks	Evaluation Details
<b>Total CIE Theory + Practical</b>				<b>50</b>			<b>20</b>	
<b>CIE</b>	<b>Theory</b>	Internal Assessment Test (IAT) - I	Module - 1 & 2	50	$(50+50+50) / 3$	<b>25</b>	10	Average of Three Internal test each of 50 Marks scale down the marks to 25 Marks
		Internal Assessment Test (IAT) - II	Module - 3 & half of module-4. (1 ½ Module)	50				
		Internal Assessment Test (IAT) - III	Half of module-4 & Module - 5. (1 ½ Module)	50				
	<b>Continuous Comprehensive Assessment (CCA)</b>	CCA-1- Pedagogical Initiatives	Considering all the Modules	50	$(50+50) / 2$	<b>25</b>	10	Two CCA methods as per VTU Clause 22OB4.2 of regulations to be adopted. If CCA chosen is Project Based Learning, then one assessment method may be adopted
		CCA-2- Pedagogical Initiatives		50				

	<b>Total CIE Theory</b>				<b>50</b>	20	Scale down Marks of IAT and CCA to 50	
<b>SEE</b>		Theory exam	Entire theory syllabus including questions from lab component	100	----	50	18	SEE Exam is theory Exam conducted for 100 Marks, scored Marks are scaled down to 50 Marks
<b>CIE + SEE</b>				100	----	----	40	
				<ul style="list-style-type: none"> <li>• The Minimum Marks to be secured in CIE to appear for SEE shall be 10 (40% of Maximum Marks – 25) in the Theory Component and 10 (40% of Maximum Marks – 25) in the Practical component.</li> <li>• The Laboratory Component for the IPCC shall be for CIE only.</li> <li>• However, in SEE, the Questions from the Laboratory Component shall be included in the respective Modules only.</li> </ul>				

#### 4 Credit Course - IPCC

**The Minimum Marks to be secured in CIE to appear for SEE shall be 10marks (40% of Maximum Marks - 25) in the Theory Component and 10 (40% of Maximum Marks -25) in the Practical Component. The Laboratory Component of the IPCC shall be for CIE only. However, in SEE the questions from the Laboratory Component shall be included in the respective Modules only.**

##### **Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%.

The minimum passing mark for the CIE is 40% of the maximum Marks (20 Marks out of 50).

The minimum passing mark for the SEE is 35% of the maximum Marks (18 Marks out of 50).

A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 Marks out of 100) in the total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

##### **Possible continuous and comprehensive assessment:**

Project based, Problem Based, Building Models, Lab-to-Land, Mobile Studio, Design and Programming Contest, Certification, Concept Map (Collage presentation/poster presentation), Case studies, Think-Pair-Share, Flipped classroom, storytelling. The assessment of these techniques can be either based on Quiz or rubrics.

The faculty can adopt any other CCA method of implementation and its assessment with prior approval of Program Assessment Committee (PAC).

##### **Continuous Internal Evaluation (CIE):**

The CIE Marks for the theory component of the IPCC shall be **25 Marks** and for the laboratory component **25 Marks**.

##### **CIE for the theory component of the IPCC**

###### **Internal Assessment test:**

**The IA test questions are to be framed to map the Course Outcomes(COs), Program Outcomes(POs) and the Blooms RBT Levels. Emphasis to be given for higher order RBT levels**

###### **Three Tests each of 50 Marks**

- First test after 6<sup>th</sup> week of the semester (syllabus completion of 35 - 40%)
- Second test after 10<sup>th</sup> week of semester (syllabus completion of 65 - 70%)
- Third test after 14<sup>th</sup> week of semester (syllabus completion of 90 - 100%)

The average score of three test is taken and scaled down to **15 Marks**.

##### **Continuous and Comprehensive Assessment (CCA):**

Two of continuous and comprehensive assessment (CCA) to be conducted to attain COs and POs, evaluated each for **50 Marks**. Total Marks scored will be CCA1+CCA2 and scaled down to **10 Marks**.

- CCA1 after 4<sup>th</sup> week and CCA2 after 9<sup>th</sup> week. The evaluation includes either through quiz or rubrics
- CCA as project-based learning,
  - CCA is evaluated for **50 Marks** with review 1 of **20 Marks** after and review 2 of **30 Marks** includes project demonstration/competition and report submission.
  - The evaluation of review 1 after 6<sup>th</sup> weeks of semester and review 2 after 12<sup>th</sup> week of semester with project demonstration and submission of the report

Total score for CCA is **10 Marks**

Total Marks scored for theory component of CIE (IAT+ CCA) is **25 Marks**

##### **CIE for the practical component of the IPCC**

- On completion of every experiment/program in the laboratory, the students shall be evaluated and Marks shall be awarded on the same day. The **15 Marks** are for conducting the experiment and preparation of the laboratory record, the other **10 Marks shall be for the test** conducted at the end of the semester.
- The CIE Marks awarded in the case of the practical component shall be based on the continuous evaluation of the laboratory report and the conduction. Each experiment report can be evaluated for 05 Marks and conduction for 10Marks. Marks of all experiments' write-ups and conduction are added and averaged to 15 Marks.
- The laboratory test (**duration 03 hours**) at the end of the 15<sup>th</sup> week of the semester/after completion of all the experiments (whichever is early) shall be conducted for 50 Marks and scaled down to **05 Marks**.
- Scaled-down Marks of write-up, evaluations and tests, will be added as CIE Marks for the laboratory component of IC/IPCC for **25 Marks**.
- The minimum Marks to be secured in CIE to appear for SEE shall be 10 (40% of maximum Marks) in the theory component and 10 (40% of maximum Marks) in the practical component.
- The laboratory component of the IC/IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included. The maximum of 05 questions is to be set from the practical component of IC/IPCC, the total Marks of all questions should not be more than 25 Marks.

The theory component of the IPCC shall be for both CIE and SEE.

**Semester End Examination (SEE):**

- Theory SEE will be conducted as per the scheduled timetable, with common question papers for the subject
- The question paper shall be set for 100 Marks. The medium of the question paper shall be English. **The duration of SEE is 03 hours.**
- The question paper will have 10 questions. Two questions per module. Each question is set for 20 Marks. The student has to answer 5 full questions, selecting one full question from each module summing up to maximum score of 100 Marks. **Marks scored out of 100 shall proportionally be reduced to 50 Marks.**
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module. The two questions shall be of same course outcome, program outcome and Blooms RBT level. Emphasis to be given for higher order RBT levels

**3 Credit Course - Theory**

**Note: A few of the Courses of 3 Credit are Integrated Course Type, for such courses the method suggested for 4 Credit IPCC shall be followed.**

**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%.

The minimum passing mark for the CIE is 40% of the maximum Marks (20 Marks out of 50).

The minimum passing mark for the SEE is 35% of the maximum Marks (18 Marks out of 50).

A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 Marks out of 100) in the total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

**Possible continuous and comprehensive assessment:**

Project based, Problem Based, Building Models, Lab-to-Land, Mobile Studio, Design and Programming Contest, Group Problem Solving, Certification, Concept Map (Collage presentation/poster presentation), Case studies, Think-Pair-Share, Flipped classroom, storytelling. The assessment of these techniques can be either based on Quiz or rubrics.

The faculty may adopt any other CCA method of implementation and its assessment with prior approval of Program Assessment Committee (PAC).

**Continuous Internal Evaluation (CIE):**

The CIE Marks for the internal assessment test shall be **25 Marks** and for the continuous and comprehensive assessment (CCA) shall be **25 Marks**.

**Internal Assessment test:**

**The IA test questions are to be framed to map the course outcomes, program outcomes and the Blooms RBT Levels. Emphasis to be given for higher order RBT levels**

Three Tests each of **50 Marks** scaled down to **25 Marks**

- First test after 6<sup>th</sup> week of the semester (syllabus completion of 35 – 40%)
- Second test after 10<sup>th</sup> week of semester (syllabus completion of 65 – 70%)
- Third test after 14<sup>th</sup> week of semester (syllabus completion of 90 – 100%)

The average score of three test is taken and scaled down to **25 Marks**.

**Continuous and Comprehensive Assessment (CCA):**

Two of continuous and comprehensive assessment (CCA) to be conducted to attain COs and POs, evaluated each for **50 Marks**. Total Marks scored will be CCA1+CCA2 and scaled down to **25 Marks**.

- CCA1 after 4<sup>th</sup> week and CCA2 after 9<sup>th</sup> week. The evaluation includes either through quiz or rubrics
- CCA as project-based learning,
  - CCA is evaluated for **50 Marks** with review 1 of **20 Marks** after and review 2 of **30 Marks** includes project demonstration/competition and report submission.
  - The evaluation of review 1 after 6<sup>th</sup> weeks of semester and review 2 after 12<sup>th</sup> week of semester with project demonstration and submission of the report

Total score for CCA is **25 Marks**

Total Marks scored for theory component of CIE (IAT + CCA) is **50 Marks**

**Semester End Examination (SEE):**

- Theory SEE will be conducted as per the scheduled timetable, with common question papers for the subject
- The question paper shall be set for 100 Marks. The medium of the question paper shall be English. **The duration of SEE is 03 hours.**
- The question paper will have 10 questions. Two questions per module. Each question is set for 20 Marks. The student must answer 5 full questions, selecting one full question from each module summing up to maximum score of 100 Marks. **Marks scored out of 100 shall proportionally be reduced to 50 Marks.**

There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module. The two questions shall be of same course outcome, program outcome and Blooms RBT level. Emphasis to be given for higher order RBT levels



### CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Theory					Practical
	Continuous Assessment Tests			Continuous Comprehensive Assessment (CCA)		Practical Test
	IAT-1	IAT-2	IAT-3	CCA-1	CCA-2	
	50 Marks	50 Marks	50 Marks	50 Marks	50 Marks	50 Marks
Remember	10	10	20	-	-	NA
Understand	15	15	20	-	-	NA
Apply	15	20	10	20	10	NA
Analyse	10	5	-	20	10	NA
Evaluate	-	-	-	10	10	NA
Create	-	-	-	-	20	NA

### CIE Course Assessment Plan

CO's	Marks Distribution					Total Marks	Weightage
	Test-1		Test-2		Test-3		
	Module-1	Module-2	Module-3	Module-4	Module-5		
CO1	15	10	10	15	40	90	60%
CO2	10	5	10	10	10	45	30%
CO3	5	5	-	5	-	15	10%
CO4	-	-	-	-	-	-	
<b>Total</b>	<b>25</b>	<b>20</b>	<b>20</b>	<b>25</b>	<b>50</b>	<b>150</b>	<b>100</b>

### SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks
Remember	10
Understand	20
Apply	15
Analyse	5
Evaluate	--
Create	--

### SEE Course Plan

CO's	Marks Distribution					Total Marks	Weightage
	Module-1	Module-2	Module-3	Module-4	Module-5		
CO1	8	12	18	12	10	60	60%
CO2	--	12	12	10	--	34	34%
CO3	--	--	6	--	--	6	6%
CO4	--	--	--	--	--	--	--
<b>Total</b>	8	24	36	22	10	100	100%

### Course Contents and Lecture Schedule

Module No.	Topics	No. of Lectures
1.	<b>Power Generation:</b> Conventional and non-conventional energy resources.	1
	Hydel, Nuclear power generation.	1
	Thermal, Solar & wind power generation. Introduction to Green H2	1
	Power transmission and Distribution system using single line diagram approach	1
	<b>DC Circuits:</b> Active and passive elements, Ohm's Law. KCL & KVL	1
	series-parallel circuits by Mesh analysis and nodal analysis method	1
	Superposition theorem. Thevenin's theorem.	1
	Time domain analysis of first order R-L and R-C circuits	1
2.	<b>Single phase AC circuits:</b> Study and representation of sinusoidal waveform,	1
	analysis of single- phase AC circuits (R, L, C circuit)	1
	analysis of single-phase AC circuits (R-L, R-C, R-L-C Series),	1
	Numerical examples on R-L-C circuits	1
	Concepts of Power & Power factor	1
	<b>Three Phase:</b> Analysis of three phase Balanced circuit	1
	Voltage and current relation in star and delta connection,	1
	Numerical examples of three phase circuits	1
3.	<b>Transformers:</b> Electromagnetism basic principle	1
	Construction and principle of operation of Transformers	1
	EMF, regulation, efficiency calculations of Transformers with Numerical examples	1
	working of single-phase Auto transformer, applications	1
	<b>Induction Motor:</b> Types, Construction and working principle of three phase Induction Motor and applications of three phase Induction Motor, Slip and its significance.	1
	<b>single-phase induction motor</b> - Types of 1-phase induction motors, Constructional feature and working	1
	principle of operation and applications of single-phase induction motor	1
	4.	<b>DC Motors:</b> Types of DC motors. Construction
working principle. torque equation of DC motors		1
characteristics and applications of DC motors		1
Numerical examples on DC motor		1
<b>Special motors-</b> Constructional features, working and application of stepper motor		1
Constructional features, working and application of BLDC		1
Constructional features, working and application of PMSM		1
Constructional features, working and application of servo motor.		1

5.	Components of LT switch gear-switch fuse unit,	1
	Working of MCB, ELCB, RCCB	1
	Types of wiring	1
	house/building wiring and its estimation	1
	types and ratings of Cables ,Two way and three-way control of load.	1
	Earthing and its types.	1
	Electric Shock, Safety Precautions to avoid shock,	1
	elementary calculation of energy consumption and power factor improvement	1
<b>Total</b>	<b>40 Hrs</b>	



# Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	1 <sup>st</sup>			
Course Title	:	Principles of Programming Using C			
Course Code	:	23ESCS11			
Course Type (Theory/ Practical/ Integrated)	:	Integrated			
Category	:	ESC			
Stream	:	Common to all branches	CIE	:	50 Marks
Teaching hours/ week (L:T:P:S)	:	2:0:2:0	SEE	:	50 Marks
Total Hours	:	28+12=40 Hrs	SEE	:	3 Hours
Credits	:	03	Duration		

**Course Learning Objectives:** Students will be able to:

Sl. No	Course Objectives
1	Understand the basics of computers and C programming.
2	Learn the concepts of Functions, and Strings using C programming.
3	Study different Searching, Sorting techniques, and File handling in C.
4	Explore user-defined data structures such as Arrays, Pointers, and Structures in implementing solutions to problems.
5	Design and develop solutions to problems using a structured programming approach.

### Teaching-Learning Process

#### Pedagogical Initiatives:

Some sample strategies to accelerate the attainment of various course outcomes are listed below:

1. Adopt different teaching methods to attain the course outcomes.
2. Include videos to demonstrate various concepts in C.
3. Encourage collaborative (Group) Learning to encourage team building.
4. Ask at least three **HOTS (Higher-order Thinking Skills)** module-wise questions to promote critical thinking.
5. Adopt **Problem-Based Learning (PBL)**, which fosters students' analytical skills, and develops thinking skills such as evaluating, generalizing, and analyzing information rather than simply recalling it.
6. Show different ways to solve a problem and encourage the students to come up with creative and optimal solutions.
7. Discuss various case studies to map with real-world scenarios and improve the understanding.
8. Devise innovative pedagogy to improve **Teaching-Learning Process (TLP)**.



DSATM

**Scheme of Teaching and Examinations for BE Programme -2023-24**  
**Outcome Based Education and Choice Based Credit System (CBCS)**  
**(Effective from the Academic Year 2023-24)**

**COURSE CURRICULUM**

Module No.	Topics	Hours
1	<b>Introduction to C:</b> Fundamentals of computing, Flowcharts, Pseudocodes, Algorithm, Data types, Variables, Constants, Pre-processors, Introduction to C, Structure of C program, Files used in a C program, Compilers, Compiling and executing C programs, Types of Errors, Applications of C language.	5
2	<b>Operators and expressions in C:</b> Operators in C: arithmetic, relational, equality, logical, assignment, unary, conditional, bitwise operator, Increment and decrement operator, Conditional Operator, operator precedence, keywords and identifiers, type conversion and typecasting. <b>Decision control and Looping statements:</b> Introduction to decision control, Conditional branching statements, Iterative statements, Nested loops, break and continue statements, goto statement.	5
3	<b>Functions:</b> Basics of functions, function call, return statement, passing parameters to functions, scope of variables, storage classes, recursive and non-recursive functions. <b>Arrays:</b> Declaration of arrays, accessing the elements of an array, storing values in arrays, operations on arrays, one-dimensional array, multidimensional arrays, passing arrays to functions, applications of arrays	6
4	<b>Strings:</b> Introduction, String taxonomy, operations on strings, miscellaneous string and character functions, arrays of strings: <b>Pointers:</b> Introduction to pointers, Declaring pointer variables, Pointer to pointer, passing arguments to functions using pointers, Array of pointers, Dynamic memory allocation functions malloc/realloc/free. <b>Structure and Union:</b> Introduction, Structures and functions, Unions, Unions inside structures, Self-referential structures.	6
5	<b>Searching algorithm:</b> Linear search, Binary search. <b>Sorting algorithm:</b> Selection sort, Insertion sort, Bubble sort. <b>File Handling:</b> Introduction, Using files, Read and Write Operations on files	6

**Pedagogical Initiatives (Not limited to):**

- **Think Pair and Share (Blended Learning):** provides an opportunity for students to learn from one another
- **Problem Solving:** encourages cognitive thinking and enables creative problem solving
- **Poster Presentation:** allows students to represent the concepts visually in order to understand the topics easily.
- **Case studies:** maps different domains in real time applications
- **Demonstration:** exhibits the implementation process

**List of Programs:**

Sl. No.	Experiments/Programs	COs
1	Write a C program to implement a Simple Calculator.	CO1
2	a) Compute the roots of a quadratic equation by accepting the coefficients. Print appropriate messages. b) Write a C program to print Pyramid of stars patterns using Looping	CO1
3	Implement Matrix multiplication and validate the rules of multiplication using C Program.	CO1
4	Write a C program for the following condition using Functions, Assume a Car servicing Center. Every service request by the Car Service Center the given charges are levied along with taxes. a. Car water wash - Rs. 500 + 10% tax b. Oil in the Engine must be at least 300 ml. If it goes below 300 ml (Ask the user to input the current level of oil in the engine), top up is done by the agency (the value of top up is given by the user so that level is at least 300 ml). Cost of 1 ml is Rs. 5 + 12.5% tax. 1. Define suitable variables to capture the above 2 parameters and corresponding taxes 2. Compute the total amount to be paid. 3. Display the total with 17 places which includes 7 places for fraction. The integer part of the total must be prefixed with 0's and a sign, if required.	CO2
5	Write a program in C using functions to swap two numbers using global variables concept and call by reference concept.	CO2
6	Implement a C program to read the values from the user today's date and your Date of birth in the format dd-mm-yyyy. Consider your sleeping time 8 hours a day, read 12 hours and spend 1.5 hours a day for eating. Calculate how many minutes have you spent as of this date for Sleeping and Eating. The number of years you have spent for reading as of this date (amount of time spent for reading in years).	CO2
7	a) Write functions to implement string operations such as compare, concatenate, and find string length. Use the parameter passing techniques. b) Implement a C Program to check String is a Palindrome or Not	CO2

8	Write a C Program to Implement linear search and binary search.	CO3
9	Write a C Program to Implement Bubble Sort.	CO3
10	Write a C program to read employee information (Name, Designation, Salary) from the user and write it to a file.	CO3
11	Write a C Program to input even & odd elements of an array in two separate arrays. The program first finds the odd and even elements of the array. Then the odd elements of an array are stored in one array and even elements of an array is stored in another array	CO4
12	Write a C program to define a structure to represent a cricketer's information (name, runs, average). Read the data corresponding to N Cricketer's in a structure array. The space for the array of structures should be determined at run-time by user input.	CO4
<b>Open ended Programs</b>		
1	Develop a 'C' program to calculate the gravitational pull between two objects.	CO1
2	Demonstrate a simple units convertor for distance, temperature, and liquid volume.	CO1
3	Calculate the displacement for an automobile using pointers.	CO4
4	Demonstrate the use of an array of pointers.	CO4

#### **CIE for Principles of Programming Using C (Integrated Professional Core Course (IPCC)):**

This Course refers to professional theory core course integrated with practical. Credit for this course can be 03 and its Teaching Learning hours (L : T : P: PJ) can be considered as (2 : 0 : 2 : 0).

**15 marks** for the conduction of practical experiment and preparation of the Laboratory record, and **10 marks** for the test to be conducted after the completion of all the laboratory sessions.

On completion of every program in the laboratory, the student shall be evaluated including viva-voce and marks shall be awarded on the same day.

Each program report can be evaluated for **15 marks** (Write-up – 3 marks, Execution – 8 marks .and Viva – 4 marks)

The Laboratory test (duration 2 hours / 3 hours) after completion of all the programs shall be conducted for 50 marks and scaled down to **10 marks**.

The theory part of the IPCC shall be evaluated both by CIE and SEE. The practical part shall be evaluated by only CIE (no SEE). However, questions from the practical part of IPCC shall be included in the SEE question paper.

This course is common to all branches of first year B.E/B.Tech. 2023-24 regulation.

**Note:** L- Theory Lecture, T- Tutorial, P-Practical, PJ-Project, IPCC: Integrated Professional Core Course, CIE: Continuous Internal Evaluation, SEE: Semester End Examination.

#### **Text Books**

Sl. No.	Title of the Book/Name of the author/Name of the publisher/Edition and Year
1	Computer Fundamentals and Programming in C, Reema Thareja, Oxford University, Second Edition, ISBN-13: 978-0-19-946373-2, 2017.
2	C, The Complete Reference is a book on computer programming, Herbert Schildt, McGraw Hill Education, 4th Edition, ISBN-13: 978-0070411838, 2017.

#### **Reference Books**

1	C: How to program, H. M. Deitel, P. J. Deitel, Pearson Education, 7 <sup>th</sup> Edition, ISBN-13. 978-9332555310, 2010.
2	Programming in ANSI C, E. Balaguruswamy, Tata McGraw-Hill, 7 <sup>th</sup> Edition, ISBN 1-874152-02-0, 2019.
3	C Programming for Dummies, Dan Hookin, John Wiley & Sons, 2nd Edition, ISBN-13: 978-1119740247, 2021.

**Course Outcomes: At the end of the course, the student will be able to:**

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	<b>Understand</b> the basics of programming in C	U	L2
CO2	<b>Apply</b> the knowledge of Functions, Strings using C Programming	A	L3
CO3	<b>Analyse</b> the user-defined data structures such as Arrays, Pointers and Structures in implementing solutions to problems.	An	L4
CO4	<b>Implement</b> different searching, sorting techniques, and file handling operations.	C	L5
CO5	<b>Develop</b> solutions to problems using structured programming approach	C	L5

#### Weblinks and Video Lectures (e-Resources)

1	<a href="https://archive.nptel.ac.in/courses/106/105/106105171/">https://archive.nptel.ac.in/courses/106/105/106105171/</a> (12 Weeks NPTEL Course Videos)
2	<a href="https://researchcomputing.princeton.edu/education/external-online-resources/cplusplus">https://researchcomputing.princeton.edu/education/external-online-resources/cplusplus</a>
3	<a href="https://www.w3schools.com/c/">https://www.w3schools.com/c/</a>
4	<a href="https://ocw.mit.edu/courses/6-087-practical-programming-in-c-january-iap-2010/">https://ocw.mit.edu/courses/6-087-practical-programming-in-c-january-iap-2010/</a>
5	<a href="https://sanfoundry.com/c-programming-examples-linked-list/">https://sanfoundry.com/c-programming-examples-linked-list/</a>
6	<a href="https://onlinecourses.swayam2.ac.in/cec20_cs02/preview">https://onlinecourses.swayam2.ac.in/cec20_cs02/preview</a>
7	<a href="https://www.youtube.com/watch?v=_MF8L7ZxwRE">https://www.youtube.com/watch?v=_MF8L7ZxwRE</a>
8	<a href="https://www.youtube.com/watch?v=0Sg6QHmIFJE">https://www.youtube.com/watch?v=0Sg6QHmIFJE</a>



<b>9</b>	<a href="https://www.newtondesk.com/c-programming-handwritten-study-notes-pdf/">https://www.newtondesk.com/c-programming-handwritten-study-notes-pdf/</a>
<b>10</b>	<a href="https://www.eskimo.com/~scs/cclass/notes/top.html">https://www.eskimo.com/~scs/cclass/notes/top.html</a>
<b>11</b>	<a href="https://www.javatpoint.com/c-programming-language-tutorial">https://www.javatpoint.com/c-programming-language-tutorial</a>
<b>12</b>	<a href="https://www.tutorialspoint.com/cprogramming/index.htm">https://www.tutorialspoint.com/cprogramming/index.htm</a>

**Engineering Science Course (ESC) / Emerging Technology Course (ETC) / Programming Language Course (PLC)**

**3 Credits & 2 Credits Courses – Theory (if Integrated)**

Assessment Method	Component	Type of Assessments	Syllabus Coverage	Maximum Marks	Average	Reduced Marks	Minimum Passing Marks	Evaluation Details
<b>Total CIE Theory + Practical</b>				<b>50</b>	----	----	<b>20</b>	
<b>CIE</b>	<b>Theory</b>	Internal Assessment Test (IAT) - I	Module - 1 & 2	50	$(50+50+50) / 3$	<b>15</b>	6	Average of Three Internal test each of 50 Marks scale down the marks to 15 Marks
		Internal Assessment Test (IAT) - II	Module - 3 & 4	50				
		Internal Assessment Test (IAT) - III	Module - 5	50				
	<b>Continuous Comprehensive Assessment (CCA)</b>	CCA-1- Pedagogical Initiatives	Considering all the Modules	50	$(50+50) / 2$	<b>10</b>	4	Two CCA methods as per VTU Clause 22OB4.2 of regulations to be adopted. If CCA chosen is Project Based Learning, then one assessment method may be adopted
		CCA-2- Pedagogical Initiatives		50				
	<b>Total CIE Theory</b>						<b>25</b>	10

CIE	Practical	Conduction of Experiments	Continuous Evaluation of each experiment			Average of all Experiments	10	4	Performance of the Experiment (On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. 20 marks are for conducting the experiment and calculations/observations/output)
			Record	05	10				
			Observation book	05					
		Practical Test	Write up	15	50	----	10	4	One Internal Practical Test after conduction of all Experiments for 50 Marks
			Execution	25					
			Viva-voce	10					
		Open Ended Experiment	Write up	05	20	----	5	2	One experiment for 20 marks. 20 marks reduced to 05 marks
			Execution	10					
			Viva-voce	05					
		<b>Total CIE Practical</b>						25	10

<b>SEE</b>		Theory exam	Entire theory syllabus including questions from lab Component in respective Modules	100	----	50	20	SEE Exam is theory Exam conducted for 100 Marks, scored Marks are scaled down to 50 Marks
<b>CIE + SEE</b>				100	----	----	40	

- The Minimum Marks to be secured in CIE to appear for SEE shall be 10 (40% of Maximum Marks – 25) in the Theory Component and 10 (40% of Maximum Marks – 25) in the Practical component.
- The Laboratory Component for the IPCC shall be for CIE only.
- However, in SEE, the Questions from the Laboratory Component shall be included in the respective Modules only.

Note: If few of the 3 Credit Courses are Integrated course type, for such courses the method suggested for 4 Credit IPCC Course shall be followed

**The Minimum Marks to be secured in CIE to appear for SEE shall be 10 (40% of Maximum Marks – 25) in the Theory Component and 10 (40% of Maximum Marks -25) in the Practical Component. The Laboratory Component of the IPCC shall be for CIE only. However, in SEE the questions from the Laboratory Component shall be included in the respective Modules only.**

**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum Marks (20 Marks out of 50).

The minimum passing mark for the SEE is 40% of the maximum Marks (20 Marks out of 50).

A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 40% (20 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 Marks out of 100) in the total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

**Possible continuous and comprehensive assessment:**

Project based, Problem Based, Building Models, Lab-to-Land, Mobile Studio, Design and Programming Contest, Certification, Concept Map (Collage presentation/poster presentation), Case studies, Think-Pair-Share, Flipped classroom, storytelling. The assessment of these techniques can be either based on Quiz or rubrics.

The faculty can adopt any other CCA method of implementation and its assessment with prior approval of Program Assessment Committee (PAC).

**Continuous Internal Evaluation (CIE):**

The CIE Marks for the theory component of the IC shall be **25 Marks** and for the laboratory component **25 Marks**.

**CIE for the theory component of the IC  
Internal Assessment test:**

**The IA test questions are to be framed to map the Course Outcomes (COs), Program Outcomes (POs) and the Blooms RBT Levels. Emphasis to be given for higher order RBT levels**

Three Tests each of **50 Marks** scaled down to **25 Marks**

- First test after 6<sup>th</sup> week of the semester (syllabus completion of 35 – 40%)
- Second test after 10<sup>th</sup> week of semester (syllabus completion of 65 – 70%)
- Third test after 14<sup>th</sup> week of semester (syllabus completion of 90 – 100%)

The average score of three test is taken and scaled down to **15 Marks**.

**Continuous and Comprehensive Assessment (CCA):**

Two of continuous and comprehensive assessment (CCA) to be conducted to attain COs and POs, evaluated each for **50 Marks**. Total Marks scored will be CCA1+CCA2 and scaled down to **10 Marks**.

- CCA1 after 4<sup>th</sup> week and CCA2 after 9<sup>th</sup> week. The evaluation includes either through quiz or rubrics
- CCA as project-based learning,
  - CCA is evaluated for **50 Marks** with review 1 of **20 Marks** after and review 2 of **30 Marks** includes project demonstration/competition and report submission.
  - The evaluation of review 1 after 6<sup>th</sup> weeks of semester and review 2 after 12<sup>th</sup> week of semester with project demonstration and submission of the report

Total score for CCA is **10 Marks**

Total Marks scored for theory component of CIE (IAT+ CCA) is **25 Marks**

### **CIE for the practical component of the IC**

- On completion of every experiment/program in the laboratory, the students shall be evaluated and Marks shall be awarded on the same day. The **10 Marks** are for conducting the experiment and preparation of the laboratory record, the other **10 Marks shall be for the test** conducted at the end of the semester and **5 Marks** for conducting Open Ended Experiments.
- The CIE Marks awarded in the case of the practical component shall be based on the continuous evaluation of the laboratory report and the conduction. Each experiment report can be evaluated for 05 Marks conduction(Observation Book) and 5 Marks for Record Book. Marks of all experiments' write-ups and conduction are added and scaled to **10 Marks**.
- The Practical laboratory test (**duration 03 hours**) at the end of the 15<sup>th</sup> week of the semester/after completion of all the experiments (whichever is early) shall be conducted for **50 Marks** and scaled down to **10 Marks**.
- Open Ended Experiments are conducted after the completion of regular Experiments/Programs for 20 Marks and scaled down to **5 Marks**
- Scaled-down Marks of write-up, evaluations and tests, will be added as CIE Marks for the laboratory component of IC/IPCC for **25 Marks**.
- The minimum Marks to be secured in CIE to appear for SEE shall be 10 (40% of maximum Marks) in the theory component and 10 (40% of maximum Marks) in the practical component.
- The laboratory component of the IC/IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included. The maximum of 05 questions is to be set from the practical component of IC/IPCC, the total Marks of all questions should not be more than 25 Marks.

The theory component of the IC shall be for both CIE and SEE.

### **Semester End Examination (SEE):**

- Theory SEE will be conducted as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)
- The question paper shall be set for 100 Marks. The medium of the question paper shall be English. The duration of SEE is 03 hours.
- The question paper will have 10 questions. Two questions per module. Each question is set for 20 Marks. The student has to answer 5 full questions, selecting one full question from each module summing up to maximum score of 100 Marks. Marks **scored out of 100 shall proportionally be reduced to 50 Marks**.
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module. The two questions should be of same course outcome, program outcome and Blooms RBT level. Emphasis to be given for higher order RBT levels

### CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Theory					Practical
	Continuous Assessment Tests			Continuous Comprehensive Assessment (CCA)		Practical Test
	IAT-1	IAT-2	IAT-3	CCA-1	CCA-2	
	50 Marks	50 Marks	50 Marks	50 Marks	50 Marks	50 Marks
Remember	10	-	-			-
Understand	20	10	-			-
Apply	20	20	10			20
Analyse	-	20	20			-
Evaluate	-	-	20			-
Create	-	-	-			30

### CIE Course Assessment Plan

CO's	Marks Distribution					Total Marks	Weightage
	Test-1		Test-2		Test-3		
	Module-1	Module-2	Module-3	Module-4	Module-5		
CO1	25	25				50	33.3%
CO2			25			25	16.6%
CO3				25		25	16.6%
CO4					50	50	33.3%
CO5	5	5	5	5	5	25	25% (Lab)
<b>Total</b>	<b>25</b>	<b>25</b>	<b>25</b>	<b>25</b>	<b>50</b>	<b>150</b>	<b>100%</b>

### SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	--
Understand	10
Apply	15
Analyse	15
Evaluate	--
Create	10

**SEE Course Plan**

CO's	Marks Distribution					Total Marks	Weightage
	Module-1	Module-2	Module-3	Module-4	Module-5		
CO1	10	10	--	--	--	20	20%
CO2	10	10	10	--	--	30	30%
CO3	--	--	10	10	--	20	20%
CO4	--	--	--	--	20	20	20%
CO5	--	3	2	3	2	10	10%
<b>Total</b>	<b>20</b>	<b>23</b>	<b>22</b>	<b>13</b>	<b>22</b>	<b>100</b>	<b>100%</b>





**Dayananda Sagar Academy of Technology & Management**  
(Autonomous Institute under VTU)

Semester	:	1 <sup>st</sup> ಸೆಮಿಸ್ಟರ್			
Course Title	:	ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ			
Course Code	:	23SBKC17			
Course Type (Theory/Practical/Integrated)	:	Theory			
Course Category	:	HSSC			
Stream	:	Common to all	CIE	:	50 Marks
Teaching hr/week (L: T:P:S)	:	1:0:0:0	SEE	:	50 Marks
Total Hours	:	15 Hrs	SEE Duration	:	2 Hours
Credits	:	1			

**Course Learning Objectives:** Students will be taught

Sl.No	Course Objectives
1	ವೃತ್ತಿಪರ ಪದವಿ ವಿದ್ಯಾರ್ಥಿಗಳಾಗಿರುವುದರಿಂದ ಕನ್ನಡ ಭಾಷೆ ಸಾಹಿತ್ಯ ಮತ್ತು ಕನ್ನಡ ಸಂಸ್ಕೃತಿಯ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು.
2	ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಪ್ರಧಾನ ಭಾಗವಾದ ಆಧುನಿಕ ಪೂರ್ವ ಮತ್ತು ಆಧುನಿಕ ಕಾವ್ಯಗಳನ್ನು ಸಾಂಕೇತಿಕವಾಗಿ ಪರಿಚಯಿಸುವುದು.
3	ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಸಾಹಿತ್ಯ ಮತ್ತು ಸಂಸ್ಕೃತಿಯ ಬಗ್ಗೆ ಅರಿವು ಹಾಗೂ ಆಸಕ್ತಿಯನ್ನು ಮೂಡಿಸುವುದು.
4	ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿಗಳ ಪರಿಚಯವನ್ನು ಹಾಗೂ ಅವರುಗಳು ಸಾಧಿಸಿದ ವಿಷಯಗಳನ್ನು ಪರಿಚಯಿಸುವುದು.
5	ಸಾಂಸ್ಕೃತಿಕ ಜನಪದ ಹಾಗೂ ಪ್ರವಾಸ ಕಥನಗಳ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು.

**Teaching-Learning Process**

**Pedagogy (General Instructions):**

These are sample Strategies; which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecture method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Show Video/animation films to explain the infrastructures and the mechanism involved in the principle.
3. Encourage collaborative (Group) Learning in the class.
4. Ask at least three HOT (Higher-order Thinking) questions in the class, which promotes critical thinking.
5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
6. Topics will be introduced in multiple representations.
7. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.
9. Individual teachers can devise innovative pedagogy to improve teaching-learning.



DSATM

**Scheme of Teaching and Examinations for BE Programme -2023-24**  
**Outcome Based Education and Choice Based Credit System (CBCS)**  
**(Effective from the Academic Year 2023-24)**

**COURSE SYLLABUS**

Module No.	Contents of the Module	Hours
1	<ol style="list-style-type: none"><li>1) ಕರ್ನಾಟಕ ಸಂಸ್ಕೃತಿ - ಹಂಪ ನಾಗರಾಜಯ್ಯ</li><li>2) ಕರ್ನಾಟಕ ಏಕೀಕರಣ : ಒಂದು ಅಪೂರ್ವ ಚರಿತ್ರೆ - ಜಿ. ವೆಂಕಟ ಸುಬ್ಬಯ್ಯ</li><li>3) ಆಡಳಿತ ಭಾಷೆಯಾಗಿ ಕನ್ನಡ - ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ ಮತ್ತು ಪ್ರೊಫಸರ್ ವಿ ಕೇಶವಮೂರ್ತಿ</li></ol>	
Pedagogy	<ol style="list-style-type: none"><li>1) ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡವನ್ನು ಭೋಧಿಸಲು ತರಗತಿಯಲ್ಲಿ ಶಿಕ್ಷಕರು ಪ್ರಸ್ತುತ ಪುಸ್ತಕ ಆಧರಿಸಿ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನವನ್ನು ಅನುಸರಿಸುವುದು. ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್‌ಗಳನ್ನು ತಯಾರಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ಪ್ರೇರೇಪಿಸುವುದು ಮತ್ತು ತರಗತಿಗಳಲ್ಲಿ ಅವುಗಳನ್ನು ಚರ್ಚಿಸಲು ಅವಕಾಶ ಮಾಡಿಕೊಡುವುದು.</li><li>2) ಇತ್ತೀಚಿನ ತಂತ್ರಜ್ಞಾನದ ಅನುಕೂಲಗಳನ್ನು ಬಳಸಿಕೊಳ್ಳುವುದು ಅಂದರೆ ಕವಿ ಕಾವ್ಯಪರಿಚಯದಲ್ಲಿ ಕವಿಗಳ ಚಿತ್ರಣ ಮತ್ತು ಲೇಖನಗಳು ಮತ್ತು ಕಥೆ ಕಾವ್ಯಗಳ ಮೂಲ ಅಂಶಗಳಿಗೆ ಸಂಬಂಧಪಟ್ಟ ಧ್ವನಿ ಚಿತ್ರಣಗಳು, ಸಂಭಾಷಣೆಗಳು, ಈಗಾಗಲೇ ಇತರ ವಿಮರ್ಶಕರು ಬರೆದಿರುವ ವಿಮರ್ಶಾತ್ಮಕ ವಿಷಯಗಳನ್ನು ಟಿಪಿಟಿ, ಡಿಗಿಟಲ್ ಮಾಧ್ಯಮಗಳ ಮುಖಾಂತರ ವಿಶ್ಲೇಷಿಸುವುದು.</li><li>3) ನವೀನ ಮಾದರಿಯ ಸಾಹಿತ್ಯ ಭೋಧನೆಗೆ ಸಂಬಂಧಪಟ್ಟ ವಿಧಾನಗಳನ್ನು ಶಿಕ್ಷಕರು ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಅನುಕೂಲವಾಗುವ ರೀತಿಯಲ್ಲಿ ಅಳವಡಿಸಿಕೊಳ್ಳಬಹುದು.</li></ol>	
2	<ol style="list-style-type: none"><li>1) ವಚನಗಳು : ಬಸವಣ್ಣ , ಅಕ್ಕಮಹಾದೇವಿ, ಅಲ್ಲಮ ಪ್ರಭು, ಆಯ್ಕಿ ಮಾರಯ್ಯ, ಜೇಡರ ದಾಸಿಮಯ್ಯ, ಆಯ್ಕಿ ಲಕ್ಕಮ್ಮ.</li><li>2) ಕೀರ್ತನೆಗಳು : ಅದರಿದೇನು ಫಲ ಇದರಿದೇನು ಫಲ - ಪುರಂದರ ದಾಸರು, ತಲ್ಲಣಿಸದಿರು ಕಂಡ್ಯ ತಾಳು ಮನವೇ - ಕನಕದಾಸರು.</li><li>3) ತತ್ವಪದಗಳು - ಸಾವಿರ ಕೊಡಗಳ ಸುಟ್ಟು - ಶಿಶುನಾಳ ಶರೀಫ.</li></ol>	
Pedagogy	<ol style="list-style-type: none"><li>1) ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡವನ್ನು ಭೋಧಿಸಲು ತರಗತಿಯಲ್ಲಿ ಶಿಕ್ಷಕರು ಪ್ರಸ್ತುತ ಪುಸ್ತಕ ಆಧರಿಸಿ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನವನ್ನು ಅನುಸರಿಸುವುದು. ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್‌ಗಳನ್ನು ತಯಾರಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ಪ್ರೇರೇಪಿಸುವುದು ಮತ್ತು ತರಗತಿಗಳಲ್ಲಿ ಅವುಗಳನ್ನು ಚರ್ಚಿಸಲು ಅವಕಾಶ ಮಾಡಿಕೊಡುವುದು.</li><li>2) ಇತ್ತೀಚಿನ ತಂತ್ರಜ್ಞಾನದ ಅನುಕೂಲಗಳನ್ನು ಬಳಸಿಕೊಳ್ಳುವುದು ಅಂದರೆ ಕವಿ ಕಾವ್ಯಪರಿಚಯದಲ್ಲಿ ಕವಿಗಳ ಚಿತ್ರಣ ಮತ್ತು ಲೇಖನಗಳು ಮತ್ತು ಕಥೆ ಕಾವ್ಯಗಳ ಮೂಲ ಅಂಶಗಳಿಗೆ ಸಂಬಂಧಪಟ್ಟ ಧ್ವನಿ ಚಿತ್ರಣಗಳು, ಸಂಭಾಷಣೆಗಳು, ಈಗಾಗಲೇ ಇತರ ವಿಮರ್ಶಕರು ಬರೆದಿರುವ ವಿಮರ್ಶಾತ್ಮಕ ವಿಷಯಗಳನ್ನು ಟಿಪಿಟಿ, ಡಿಗಿಟಲ್ ಮಾಧ್ಯಮಗಳ ಮುಖಾಂತರ ವಿಶ್ಲೇಷಿಸುವುದು.</li><li>3) ನವೀನ ಮಾದರಿಯ ಸಾಹಿತ್ಯ ಭೋಧನೆಗೆ ಸಂಬಂಧಪಟ್ಟ ವಿಧಾನಗಳನ್ನು ಶಿಕ್ಷಕರು ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಅನುಕೂಲವಾಗುವ ರೀತಿಯಲ್ಲಿ ಅಳವಡಿಸಿಕೊಳ್ಳಬಹುದು.</li></ol>	

3	<ol style="list-style-type: none"> <li>1) ಡಿ.ವಿ.ಜಿ ಯವರ ಮಂಕುತಿಮ್ಮನ ಕಗ್ಗದಿಂದ ಆಯ್ದು ಕೆಲವು ಭಾಗಗಳು.</li> <li>2) ಕುರುಡು ಕಾಂಚಾಣ - ದಾ.ರಾ.ಬೇಂದ್ರೆ.</li> <li>3) ಹೊಸಬಾಳಿನ ಗೀತೆ - ಕುವೆಂಪು.</li> </ol>	
Pedagogy	<ol style="list-style-type: none"> <li>1) ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡವನ್ನು ಭೋಧಿಸಲು ತರಗತಿಯಲ್ಲಿ ಶಿಕ್ಷಕರು ಪ್ರಸ್ತುತ ಪುಸ್ತಕ ಆಧರಿಸಿ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನವನ್ನು ಅನುಸರಿಸುವುದು. ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್‌ಗಳನ್ನು ತಯಾರಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ಪ್ರೇರೇಪಿಸುವುದು ಮತ್ತು ತರಗತಿಗಳಲ್ಲಿ ಅವುಗಳನ್ನು ಚರ್ಚಿಸಲು ಅವಕಾಶ ಮಾಡಿಕೊಡುವುದು.</li> <li>2) ಇತ್ತೀಚಿನ ತಂತ್ರಜ್ಞಾನದ ಅನುಕೂಲಗಳನ್ನು ಬಳಸಿಕೊಳ್ಳುವುದು ಅಂದರೆ ಕವಿ ಕಾವ್ಯಪರಿಚಯದಲ್ಲಿ ಕವಿಗಳ ಚಿತ್ರಣ ಮತ್ತು ಲೇಖನಗಳು ಮತ್ತು ಕಥೆ ಕಾವ್ಯಗಳ ಮೂಲ ಅಂಶಗಳಿಗೆ ಸಂಬಂಧಪಟ್ಟ ಧ್ವನಿ ಚಿತ್ರಣಗಳು, ಸಂಭಾಷಣೆಗಳು, ಈಗಾಗಲೇ ಇತರ ವಿಮರ್ಶಕರು ಬರೆದಿರುವ ವಿಮರ್ಶಾತ್ಮಕ ವಿಷಯಗಳನ್ನು ಟಿಪಿಟಿ, ಡಿಗಿಟಲ್ ಮಾಧ್ಯಮಗಳ ಮುಖಾಂತರ ವಿಶ್ಲೇಷಿಸುವುದು.</li> <li>3) ನವೀನ ಮಾದರಿಯ ಸಾಹಿತ್ಯ ಭೋಧನೆಗೆ ಸಂಬಂಧಪಟ್ಟ ವಿಧಾನಗಳನ್ನು ಶಿಕ್ಷಕರು ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಅನುಕೂಲವಾಗುವ ರೀತಿಯಲ್ಲಿ ಅಳವಡಿಸಿಕೊಳ್ಳಬಹುದು.</li> </ol>	
4	<ol style="list-style-type: none"> <li>1) ಡಾ. ಸರ್.ಎಮ್.ವಿಶ್ವೇಶ್ವರಯ್ಯ : ವ್ಯಕ್ತಿ ಮತ್ತು ಐತಿಹ್ಯ - ಎ ಎನ್ ಮೂರ್ತಿ ರಾವ್.</li> <li>2) ಕರಕುಶಲ ಕಲೆಗಳು ಮತ್ತು ಪರಂಪರೆಯ ವಿಜ್ಞಾನ - ಕರೀಗೌಡ ಬೀಚನಹಳ್ಳಿ.</li> </ol>	
Pedagogy	<ol style="list-style-type: none"> <li>1) ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡವನ್ನು ಭೋಧಿಸಲು ತರಗತಿಯಲ್ಲಿ ಶಿಕ್ಷಕರು ಪ್ರಸ್ತುತ ಪುಸ್ತಕ ಆಧರಿಸಿ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನವನ್ನು ಅನುಸರಿಸುವುದು. ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್‌ಗಳನ್ನು ತಯಾರಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ಪ್ರೇರೇಪಿಸುವುದು ಮತ್ತು ತರಗತಿಗಳಲ್ಲಿ ಅವುಗಳನ್ನು ಚರ್ಚಿಸಲು ಅವಕಾಶ ಮಾಡಿಕೊಡುವುದು.</li> <li>2) ಇತ್ತೀಚಿನ ತಂತ್ರಜ್ಞಾನದ ಅನುಕೂಲಗಳನ್ನು ಬಳಸಿಕೊಳ್ಳುವುದು ಅಂದರೆ ಕವಿ ಕಾವ್ಯಪರಿಚಯದಲ್ಲಿ ಕವಿಗಳ ಚಿತ್ರಣ ಮತ್ತು ಲೇಖನಗಳು ಮತ್ತು ಕಥೆ ಕಾವ್ಯಗಳ ಮೂಲ ಅಂಶಗಳಿಗೆ ಸಂಬಂಧಪಟ್ಟ ಧ್ವನಿ ಚಿತ್ರಣಗಳು, ಸಂಭಾಷಣೆಗಳು, ಈಗಾಗಲೇ ಇತರ ವಿಮರ್ಶಕರು ಬರೆದಿರುವ ವಿಮರ್ಶಾತ್ಮಕ ವಿಷಯಗಳನ್ನು ಟಿಪಿಟಿ, ಡಿಗಿಟಲ್ ಮಾಧ್ಯಮಗಳ ಮುಖಾಂತರ ವಿಶ್ಲೇಷಿಸುವುದು.</li> <li>3) ನವೀನ ಮಾದರಿಯ ಸಾಹಿತ್ಯ ಭೋಧನೆಗೆ ಸಂಬಂಧಪಟ್ಟ ವಿಧಾನಗಳನ್ನು ಶಿಕ್ಷಕರು ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಅನುಕೂಲವಾಗುವ ರೀತಿಯಲ್ಲಿ ಅಳವಡಿಸಿಕೊಳ್ಳಬಹುದು.</li> </ol>	
5	<ol style="list-style-type: none"> <li>1) ಯುಗಾದಿ - ವಸುಧೇಂದ್ರ.</li> <li>2) ಮೆಗಾನೆ ಎಂಬ ಗಿರಿಜನ ಪರ್ವತ - ಡಾ. ಹಿ.ಚಿ. ಬೋರಲಿಂಗಯ್ಯ</li> </ol>	
Pedagogy	<ol style="list-style-type: none"> <li>1) ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡವನ್ನು ಭೋಧಿಸಲು ತರಗತಿಯಲ್ಲಿ ಶಿಕ್ಷಕರು ಪ್ರಸ್ತುತ ಪುಸ್ತಕ ಆಧರಿಸಿ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನವನ್ನು ಅನುಸರಿಸುವುದು. ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್‌ಗಳನ್ನು ತಯಾರಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ಪ್ರೇರೇಪಿಸುವುದು ಮತ್ತು ತರಗತಿಗಳಲ್ಲಿ ಅವುಗಳನ್ನು ಚರ್ಚಿಸಲು ಅವಕಾಶ ಮಾಡಿಕೊಡುವುದು.</li> <li>2) ಇತ್ತೀಚಿನ ತಂತ್ರಜ್ಞಾನದ ಅನುಕೂಲಗಳನ್ನು ಬಳಸಿಕೊಳ್ಳುವುದು ಅಂದರೆ ಕವಿ ಕಾವ್ಯಪರಿಚಯದಲ್ಲಿ ಕವಿಗಳ ಚಿತ್ರಣ ಮತ್ತು ಲೇಖನಗಳು ಮತ್ತು ಕಥೆ ಕಾವ್ಯಗಳ ಮೂಲ ಅಂಶಗಳಿಗೆ ಸಂಬಂಧಪಟ್ಟ ಧ್ವನಿ ಚಿತ್ರಣಗಳು, ಸಂಭಾಷಣೆಗಳು, ಈಗಾಗಲೇ ಇತರ ವಿಮರ್ಶಕರು ಬರೆದಿರುವ ವಿಮರ್ಶಾತ್ಮಕ ವಿಷಯಗಳನ್ನು ಟಿಪಿಟಿ, ಡಿಗಿಟಲ್ ಮಾಧ್ಯಮಗಳ ಮುಖಾಂತರ ವಿಶ್ಲೇಷಿಸುವುದು.</li> <li>3) ನವೀನ ಮಾದರಿಯ ಸಾಹಿತ್ಯ ಭೋಧನೆಗೆ ಸಂಬಂಧಪಟ್ಟ ವಿಧಾನಗಳನ್ನು ಶಿಕ್ಷಕರು ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಅನುಕೂಲವಾಗುವ ರೀತಿಯಲ್ಲಿ ಅಳವಡಿಸಿಕೊಳ್ಳಬಹುದು.</li> </ol>	

**Reference Books**

Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)

1	ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ- ಡಾ.ಹಿ.ಚಿ. ಬೋರಲಿಂಗಯ್ಯ ಮತ್ತು ಡಾ. ಎಲ್.ತಿಮ್ಮೇಶ್ (
2	ಶ್ರೀ ಆರ್ ಮಂಜುನಾಥ್ ಹಾಗೂ ಪಿ. ನಾಗರಾಜ
3	ಡಾ. ಪ್ರಾಶಾಂತ್ ಜಿ ನಾಯಕ ಮತ್ತು ಶ್ರೀ ಟಿ.ಎಲ್. ರವೀಂದ್ರ

Course Outcomes: At the end of the course, the student will be able to:

CO	Course Outcomes	RBT Level	Level Indicator
C01	ಕನ್ನಡ ಭಾಷೆ ಸಾಹಿತ್ಯ ಮತ್ತು ಕನ್ನಡದ ಸಂಸ್ಕೃತಿಯ ಕುರಿತು ಅರಿವು ಮೂಡಿರುತ್ತದೆ.	ಸ್ಮರಿಸುವುದು	L-2
C02	ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಪ್ರಧಾನ ಭಾಗವಾದ ಆಧುನಿಕ ಪೂರ್ವ ಮತ್ತು ಆಧುನಿಕ ಕಾವ್ಯಗಳನ್ನು ಸಾಂಕೇತಿಕವಾಗಿ ಕಲಿತು ಹೆಚ್ಚಿನ ಓದಿಗೆ ಮತ್ತು ಜ್ಞಾನಕ್ಕೆ ಸ್ಪೂರ್ತಿ ಮೂಡುತ್ತದೆ.	ಅರ್ಥೈಸಿಕೊಳ್ಳುವುದು	L-2
C03	ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಸಾಹಿತ್ಯ ಮತ್ತು ಸಂಸ್ಕೃತಿಯ ಬಗ್ಗೆ ಅರಿವು ಹಾಗೂ ಆಸಕ್ತಿ ಹೆಚ್ಚಾಗುತ್ತದೆ.	ಸ್ಮರಿಸುವುದು	L-1
C04	ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿಗಳ ಪರಿಚಯ ಹಾಗೂ ಅವರುಗಳು ಸಾಧಿಸಿದ ವಿಷಯಗಳನ್ನು ತಿಳಿದುಕೊಂಡು ನಾಡಿನ ಇನ್ನಿತರ ವ್ಯಕ್ತಿಗಳ ಬಗ್ಗೆ ತಿಳಿದುಕೊಳ್ಳಲು ಕೌತುಕತೆ ಹೆಚ್ಚಾಗುತ್ತದೆ .	ಅರ್ಥೈಸಿಕೊಳ್ಳುವುದು	L-1
C05	ಸಾಂಸ್ಕೃತಿಕ, ಜನಪದ ಹಾಗೂ ಪ್ರವಾಸ ಕಥನಗಳ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು.	ಅರ್ಥೈಸಿಕೊಳ್ಳುವುದು	L-2

**Mapping of Course Outcomes to Program Outcomes:**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	--	--	--	--	--	--	--	--	1	2	--	2	--	--
C02	--	--	--	--	--	--	--	--	2	2	--	2	--	--
C03	--	--	--	--	--	--	--	--	2	1	--	1	--	--
C04	--	--	--	--	--	--	--	--	2	1	--	1	--	--
C05	--	--	--	--	--	--	--	--	1	2	--	2	--	--

**Weblinks and Video Lectures (e-Resources)**

1	<a href="https://youtu.be/S4w3FLZxY_A">https://youtu.be/S4w3FLZxY_A</a>
2	<a href="https://youtu.be/XEMiYE3E3i8">https://youtu.be/XEMiYE3E3i8</a>
3	<a href="https://youtu.be/RboxwA8KerM">https://youtu.be/RboxwA8KerM</a>
4	<a href="https://youtu.be/3eE8XTePzTI">https://youtu.be/3eE8XTePzTI</a>
5	<a href="https://youtu.be/YzS26-ezxO8">https://youtu.be/YzS26-ezxO8</a>

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**1 Credit Courses – Theory**

Assessment Method	Component	Type of Assessments	Syllabus Coverage	Maximum Marks	Average	Reduced Marks	Minimum Passing Marks	Evaluation Details
<b>Total CIE Theory</b>				<b>50</b>	----	----	<b>20</b>	
<b>CIE</b>	<b>Theory</b>	Internal Assessment Test (IAT) – I (MCQ)	Module - 1 & 2	50	$(50+50+50) / 3$	<b>15</b>	6	Average of Three Internal test each of 50 Marks scale down the marks to 15
		Internal Assessment Test (IAT) – II (MCQ)	Module - 3 & 4	50				
		Internal Assessment Test (IAT) – III (QUIZ)	Module - 5	50				
	<b>Continuous Comprehensive Assessment (CCA)</b>	CCA-1- Pedagogical Initiatives	Considering all the Modules	50	$(50+50) / 2$	<b>10</b>	4	
		CCA-2- Pedagogical Initiatives		50				
Two CCA methods as per VTU Clause 22OB4.2 of regulations to be adopted. If CCA chosen is Project Based Learning, then one assessment method may be adopted								

	<b>Total CIE Theory</b>				<b>25</b>	10	Scale down Marks of IAT and CCA to 25	
<b>SEE</b>		Theory exam – (MCQ Type)	Entire syllabus	50	----	50	18	SEE Exam is theory Exam with MCQ type Question Papers of 50 Questions with each question 1 Mark each. Examination duration is 1 Hour
<b>CIE + SEE</b>				100	----	----	40	

- The Minimum Marks to be secured in CIE to appear for SEE shall be 10 (40% of Maximum Marks – 25) in the Theory Component and 10 (40% of Maximum Marks – 25) in the Practical component.
- The Laboratory Component for the IPCC shall be for CIE only.
- However, in SEE, the Questions from the Laboratory Component shall be included in the respective Modules only.

## 1 Credit Course - Theory

### **Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum Marks (20 Marks out of 50).

The minimum passing mark for the SEE is 35% of the maximum Marks (18 Marks out of 50).

A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 Marks out of 100) in the total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

### **Possible continuous and comprehensive assessment:**

Crossword, Maize, Debate, Role Play, Community Service, Mind Map, Concept Map, Case Study, Group Discussions, Ideathon

The faculty may adopt any other CCA method of implementation and its assessment with prior approval of Program Assessment Committee (PAC).

### **Continuous Internal Evaluation (CIE):**

The CIE Marks for the internal assessment test shall be **25 Marks** and for the continuous and comprehensive assessment (CCA) shall be **25 Marks**.

### **Internal Assessment test:**

**The IA test questions are to be framed to map the course outcomes, program outcomes and the Blooms RBT Levels. Emphasis to be given for higher order RBT levels**

Three Tests (MCQ) each of **50 Marks**

- First test after 6<sup>th</sup> week of the semester (syllabus completion of 35 – 40%)
- Second test after 10<sup>th</sup> week of semester (syllabus completion of 65 – 70%)
- Third test after 14<sup>th</sup> week of semester (syllabus completion of 90 – 100%)

The average score of three test is taken and scaled down to **25 Marks**.

### **Continuous and Comprehensive Assessment (CCA):**

Two of continuous and comprehensive assessment (CCA) to be conducted to attain COs and POs, evaluated each for **50 Marks**. Total Marks scored will be CCA1+CCA2 and scaled down to **25 Marks**.

- CCA1 to be conducted after 4<sup>th</sup> week
- CCA2 to be conducted after 9<sup>th</sup> week.
- The evaluation of CCAs includes either through quiz or rubrics

Total score for CCA is **25 Marks**

Total Marks scored for theory component of CIE (IAT + CCA) is **50 Marks**

### **Semester End Examination (SEE):**

- Theory SEE will be conducted as per the scheduled timetable, with common question papers for the subject .
- The question paper shall be set for 50 Marks. The medium of the question paper shall be English. **The duration of SEE is 01 hours.**
- The question paper will have 50 MCQs **covering all modules**. The questions shall map with the course outcome, program outcome and Blooms RBT level.

**CIE- Continuous Internal Evaluation (50 Marks)**

Bloom's Category	Theory				
	Continuous Assessment Tests			Continuous Comprehensive Assessment (CCA)	
	IAT-1	IAT-2	IAT-3	CCA-1	CCA-2
	50 Marks	50 Marks	50 Marks	50 Marks	50 Marks
Remember	18	17	18	18	18
Understand	16	15	13	15	17
Apply	8	10	8	9	7
Analyse	8	8	10	10	8
Evaluate	-	-	-	-	-
Create	-	-	-	-	-

**CIE Course Assessment Plan**

CO's	Marks Distribution					Total Marks	Weightage
	Test-1		Test-2		Test-3		
	Module-1	Module-2	Module-3	Module-4	Module-5		
CO1	18	6	-	-	2	26	20%
CO2	7	19	-	-	2	28	25%
CO3	-	-	17	7	8	32	20%
CO4	-	-	8	18	8	34	20%
CO5	-	-	-	-	30	30	15%
<b>Total</b>	<b>25</b>	<b>25</b>	<b>25</b>	<b>25</b>	<b>25</b>	<b>-</b>	<b>100%</b>

**SEE- Semester End Examination (50 Marks)**

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	35%
Understand	25%
Apply	20%
Analyse	20%
Evaluate	--
Create	--



SEE Course Plan

CO's	Marks Distribution					Total Marks	Weightage
	Module-1	Module-2	Module-3	Module-4	Module-5		
CO1	2	1	1	0	1	5	10%
CO2	2	3	2	1	2	10	20%
CO3	2	1	2	3	2	10	20%
CO4	4	3	2	3	3	15	30%
CO5	3	2	2	2	1	10	20%
Total	13	10	9	10	8	50	100%

Course Contents and Lecture Schedule

Module No.	Topics	No. of Lectures
1	ಕರ್ನಾಟಕ ಸಂಸ್ಕೃತಿ - ಹಂಪನಾಗರಾಜಯ್ಯ	1
2	ಕರ್ನಾಟಕ ಐಕೀಕರಣ : ಒಂದು ಅಪೂರ್ವ ಚರಿತ್ರೆ - ಜಿ. ವೆಂಕಟಸುಬ್ಬಯ್ಯ	1
3	ಆಡಳಿತ ಭಾಷೆಯಾಗಿ ಕನ್ನಡ - ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶಮತ್ತು ಪ್ರೊಫೆಸರ್ ವಿಕೇಶವಮೂರ್ತಿ	1
4	ವಚನಗಳು : ಬಸವಣ್ಣ, ಅಕ್ಕಮಹಾದೇವಿ, ಅಲ್ಲಮಪ್ರಭು, ಆಯ್ದಕ್ಕಿಮಾರಯ್ಯ, ಜೇಡರದಾಸಿಮಯ್ಯ, ಆಯ್ದಕ್ಕಿಲಕ್ಕಮ್ಮ.	1
5	ಕೀರ್ತನೆಗಳು : ಅದರಂದೇನುಫಲ ಇದರಂದೇನುಫಲ - ಪುರಂದರದಾಸರು, ತಲ್ಲಣಿಸದಿರುಕಂಡ್ಯತಾಳುಮನವೇ - ಕನಕದಾಸರು.	1
6	ತತ್ವಪದಗಳು - ಸಾವಿರಕೊಡಗಳಸುಟ್ಟು - ಶಿಶುನಾಳಶರೀಫ.	1
7	ಡಿ.ವಿ.ಜಿಯವರ ಮಂಕುತಿಮ್ಮನ ಕಗ್ಗದಿಂದ ಆಯ್ದಕೆಲವು ಭಾಗಗಳು.	1
8	ಕುರುಡುಕಾಂಚಾಣ - ದಾ.ರಾ.ಬೇಂದ್ರೆ.	1
9	ಹೊಸಬಾಳಿನಗೀತೆ - ಕುವೆಂಪು	1
10	ಡಾ. ಸರ್.ಎಮ್.ವಿಶ್ವೇಶ್ವರಯ್ಯ : ವ್ಯಕ್ತಿ ಮತ್ತು ಐತಿಹ್ಯ - ಎಎನ್.ಮೂರ್ತಿರಾವ್.	1½
11	ಕರಕುಶಲಕಲೆಗಳು ಮತ್ತು ಪರಂಪರೆಯ ವಿಜ್ಞಾನ - ಕರೀಗೌಡಬೀಚನಹಳ್ಳಿ	1½
12	ಯುಗಾದಿ - ವಸುಧೇಂದ್ರ.	1½
13	ಮೆಗಾನೆಂಬಗಿರಿಜನಪರ್ವತ - ಡಾ. ಹಿ.ಚಿ. ಬೋರಲಿಂಗಯ್ಯ	1½
Total		15 Hrs



# Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	1 <sup>st</sup> /2 <sup>nd</sup>		
Course Title	:	Applied Physics for Computer Science Stream		
Course Code	:	23PHYS12/23PHYS22		
Course Type (Theory/ Practical/ Integrated)	:	Integrated		
Course Category	:	ASC		
Stream	:	Common to all CSE based branches	CIE	: 50 Marks
Teaching hours/ week (L:T:P:S)	:	(2:2:2:0)	SEE	: 50 Marks
Total Hours	:	40 Hrs (L) + 20 Hrs (P)	SEE Duration	: 3 Hours
Credits	:	04		

**Course Learning Objectives:** Students will be taught

Sl.No	Course Objectives
1	To explain the fundamental concepts of physics
2	To familiarize the students with various applications of physics that are relevant to the syllabus
3	To analyse given numericals and apply the theoretical concepts of physics for solving the same
4	To enlighten the concepts of physics for properties of different materials
5	To develop scientific temper among students and encourage them to do projects
6	To give an exposure towards practical knowledge for the theoretical concepts and to perform honest measurements

## Teaching-Learning Process

### Pedagogy (General Instructions):

These are sample Strategies; which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecture method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Show Video/animation films to explain the infrastructures and the mechanism involved in the principle.
3. Encourage collaborative (Group) Learning in the class.
4. Ask at least three HOT (Higher-order Thinking) questions in the class, which promotes critical thinking.
5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
6. Topics will be introduced in multiple representations.
7. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.
9. Individual teachers can device innovative pedagogy to improve teaching-learning.



DSATM

**Scheme of Teaching and Examinations for BE Programme -2023-24  
Outcome Based Education and Choice Based Credit System (CBCS)  
(Effective from the Academic Year 2023-24)**

**COURSE SYLLABUS**

<b>Module No.</b>	<b>Contents of the Module</b>	<b>Hours</b>
1	<p><b>Laser and Optical Fibers:</b>  <b>LASER:</b> Einstein's A and B Coefficients and Expression for Energy Density (Derivation), Laser Action: Conditions and Requisites of a laser system, Semiconductor Diode Laser, Applications: Bar code scanner, Measurement of pollutants in the environment, Numerical Problems.  <b>Optical Fiber:</b> Acceptance angle and Numerical Aperture (NA), Derivation of Expression for NA, Classification of Optical Fibers, Attenuation, Applications: Point to point communication, Numerical Problems  <b>Pre requisite: Properties of light</b>  <b>Self-learning: Characteristic properties of a LASER beam, Interaction of Radiation with Matter, Total Internal Reflection</b></p>	8
<b>Pedagogy</b>	<p><b>Chalk and talk:</b> Expression for Energy Density (Derivation), Expression for NA  <b>PPT:</b> Semiconductor Diode Laser  <b>Videos:</b> Applications of Lasers and Optical Fibers</p>	
2	<p><b>Quantum Mechanics:</b>  de Broglie Hypothesis and Matter Waves, de Broglie wavelength and derivation of expression by analogy, Heisenberg's Uncertainty Principle and its application (Non existence of electron inside the nucleus - Non Relativistic), Principle of Complementarity, Wave Function and its properties, Time independent Schrödinger wave equation (Derivation), Physical Significance of a wave function and Born Interpretation, Expectation value, Eigen functions and Eigen Values, Particle inside one dimensional infinite potential well, it's energy Eigen values and Eigen States, Waveforms and Probabilities. Numerical Problems.  <b>Pre requisite:Wave-Particle dualism</b>  <b>Self-learning: de Broglie Hypothesis</b></p>	8
<b>Pedagogy</b>	<p><b>PPT:</b> Quantization of Energy States, Waveforms and Probabilities, Principle of Complementarity,  <b>Video:</b> Quantization of Energy States, Waveforms and Probabilities  <b>Chalk Talk</b>  <b>Group Discussion</b></p>	
3	<p><b>Quantum Computing:</b>  <b>Principles of Quantum Information &amp; Quantum Computing:</b>  Introduction to Quantum Computing, Moore's law &amp; its end, Differences between Classical &amp; Quantum computing.  Concept of qubit and its properties. Representation of qubit by Bloch sphere. Single and Two qubits. Extension to N qubits.  <b>Dirac representation and matrix operations:</b>  Matrix representation of 0 and 1 States, Identity Operator I, Applying I to <math> 0\rangle</math> and <math> 1\rangle</math> states, Pauli Matrices and its operations on <math> 0\rangle</math> and <math> 1\rangle</math> states, Explanation of i) Conjugate of a matrix and ii) Transpose of a matrix. Unitary matrix U, Examples: Row and Column Matrices and their multiplication (Inner Product), Probability, and Quantum Superposition, normalization rule. Orthogonality, Orthonormality. Numerical Problems</p>	8

	<p><b>Quantum Gates:</b> Quantum Not Gate, Pauli – X, Y and Z Gates, Hadamard Gate, Phase Gate (or S Gate), T Gate, CNOT Gate (Discussion for 4 different input states), Numerical Problems.</p> <p><b>Pre requisites: Matrices</b></p> <p><b>Self-learning: Moore’s law, Young’s double slit experiment</b></p>	
<b>Pedagogy</b>	<p><b>PPT:</b> Introduction to Quantum Computing, Moore’s law &amp; its end, Differences between Classical &amp; Quantum computing. Concept of qubit and its properties.</p> <p><b>Video:</b> Representation of qubit by Bloch sphere. Single and Two qubits. Extension to N qubits.</p> <p><b>Chalk Talk</b></p> <p><b>Group Discussion</b></p> <p><b>Seminars</b></p>	
<b>4</b>	<p><b>Electrical Conductivity in metals</b> Assumptions and Failures of Classical Free Electron Theory, Assumptions of Quantum Free Electron Theory, Fermi Energy, Density of States, Fermi Factor, Variation of Fermi Factor With Temperature and Energy level, Success of Quantum Free Electron Theory . Numerical Problems.</p> <p>Semiconductors and its classification, Fermi level in Intrinsic Semiconductor, Expression for concentration of electrons in conduction band &amp; holes concentration in valence band (only mention the expression), Relation between Fermi energy &amp; Energy gap in intrinsic semiconductors(derivation), Electrical conductivity of a semiconductor (derivation), Hall effect, Expression for Hall coefficient (derivation) and its application.</p> <p><b>Pre requisites: Fundamentals of semiconductor</b></p> <p><b>Self-learning: Fermi energy level for extrinsic semiconductors</b></p>	<b>8</b>
<b>Pedagogy</b>	<p><b>PPT:</b> Hall coefficient (derivation) and its application.</p> <p><b>Video:</b> Hall coefficient (derivation) and its application, classification of Semiconductors</p> <p><b>Chalk Talk,Group Discussion,Seminars</b></p>	
<b>5</b>	<p><b>Superconductivity</b> Temperature dependence of resistivity, Mathessian rule, Superconductors, Meissner’s Effect, Critical Field, Temperature dependence of Critical field, Types of Super Conductors, BCS theory (Qualitative), Quantum Tunnelling, High Temperature superconductivity, Josephson Junctions (Qualitative), DC and RF SQUIDS, Applications: Maglev Vehicles.</p> <p><b>Advanced Engineering Materials</b> Nanomaterials: properties of nanomaterials, quantum confinement(Qualitative), synthesis methods(Top-down &amp; bottom-up approaches) and applications, Shape memory alloys (SMA), Characteristics and applications of SMAs, NiTi alloy and its properties</p> <p><b>Pre requisites: Basics of nanomaterials</b></p> <p><b>Self-learning: Quantum Tunnelling</b></p>	<b>8</b>
<b>Pedagogy</b>	<p><b>PPT:</b> Nanomaterials and shape memory alloy</p> <p><b>Video: Superconductor applications</b></p> <p><b>Chalk Talk</b></p> <p><b>Group Discussion</b></p> <p><b>Seminars</b></p>	

## List of Experiments or Programs

Sl.No	Experiments/Programs	Cos
1	Determination of wavelength of LASER using Diffraction Grating.	6
2	Determination of acceptance angle and numerical aperture of the given Optical Fiber.	6
3	Determination of Magnetic Flux Density at any point along the axis of a circular coil	6
4	Determination of resistivity of a semiconductor by Four Probe Method	6
5	Study the I-V Characteristics of the Given Bipolar Junction Transistor	6
6	Determination of dielectric constant of the material of capacitor by Charging and Discharging method.	6
7	Study the frequency response of Series & Parallel LCR circuits.	6
8	Determination of Plank's Constant using LEDs.	6
9	Identification of circuit elements in a Black Box and determination of values of the components	6
10	Study the Characteristics of a Photo-Diode and to determine the power responsivity / Verification of Inverse Square Law of Intensity of Light	6
11	GNU Step Interactive Simulations	4
12	PHET Interactive Simulations	4

## Reference Books

### Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)

1	A Textbook of Engineering Physics- M.N. Avadhanulu and P.G. Kshirsagar, 10 <sup>th</sup> revised Ed, S. Chand. & Company Ltd, New Delhi.
2	Engineering Physics-Gaur and Gupta-Dhanpat Rai Publications-2017.
3	Concepts of Modern Physics-Arthur Beiser: 6 <sup>th</sup> Ed; Tata McGraw Hill Edu Pvt Ltd- New Delhi 2006
4	An Introduction to Lasers theory and applications by M.N. Avadhanulu and P.S. Hemne revised Edition 2012. S. Chand and Company Ltd –New Delhi.
5	Fundamentals of Fibre Optics in Telecommunication & Sensor Systems, B.P. Pal, New Age International Publishers.
6	Quantum Computation and Quantum Information, Michel A. Nelsen & Isaac L. Chung, Cambridge Universities Press, 2010 Edition
7	Quantum Computing, Vishal Sahani, Mc Graw Hill Education, 2007 Edition

**Course Outcomes: At the end of the course, the student will be able to:**

CO	Course Outcomes	RBT Level	Level Indicator
CO1	Understand the various fundamental concepts in Applied Physics	Remember/Understand	L1/L2
CO2	Apply the basic principles of physics in diverse engineering applications	Apply	L3
CO3	Analyse the given numerical and find the solutions	Analyse	L4
CO4	Design the simulations with the applications of physics	Evaluate	L5
CO5	Create scientific models, reports and posters in teams on applied physics themes	Create	L6
CO6	Conduct experiments in physics and perform precise and accurate measurements	Evaluate	L5

**Mapping of Course Outcomes to Program Outcomes:**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C02	3	--	--	--	--	--	--	--	--	--	--	--	--	--
C03	--	2	--	--	--	--	--	--	--	--	--	--	--	--
C04	--	--	2	--	2	--	--	--	--	--	--	--	--	--
C05	--	--	--	--	--	--	--	--	2	2	--	1	--	--
C06	--	--	--	--	2	--	--	--	2	2	--	2	--	--

**Weblinks and Video Lectures (e-Resources)**

1	<b>Laser:</b> <a href="https://www.britannica.com/technology/laser,k">https://www.britannica.com/technology/laser,k</a>
2	<b>Laser:</b> <a href="https://nptel.ac.in/courses/115/102/115102124/">https://nptel.ac.in/courses/115/102/115102124/</a>
3	<b>Quantum mechanics:</b> <a href="https://nptel.ac.in/courses/115/104/115104096/">https://nptel.ac.in/courses/115/104/115104096/</a>
4	<b>Physics:</b> <a href="http://hyperphysics.phy-astr.gsu.edu/hbase/hframe.html">http://hyperphysics.phy-astr.gsu.edu/hbase/hframe.html</a>
5	<b>Numerical Aperture of fiber:</b> <a href="https://bop-iitk.vlabs.ac.in/exp/numerical-aperture-measurement">https://bop-iitk.vlabs.ac.in/exp/numerical-aperture-measurement</a>

Assessment Pattern (both CIE and SEE)

Applied Science Courses								
4 credits – (IPCC) - Theory and Practical								
Assessment Method	Component	Type of Assessments	Syllabus Coverage	Maximum Marks	Average	Reduced Marks	Minimum Passing Marks	Evaluation Details
<b>Total CIE Theory + Practical</b>				<b>50</b>			<b>20</b>	
<b>CIE</b>	<b>Theory</b>	Internal Assessment Test (IAT) - I	Module - 1 & 2	50	$(50+50+50) / 3$	<b>15</b>	6	Average of Three Internal test each of 50 Marks scale down the marks to 15 Marks
		Internal Assessment Test (IAT) - II	Module - 3 & 4	50				
		Internal Assessment Test (IAT) - III	Module - 5	50				
	<b>Continuous Comprehensive Assessment (CCA)</b>	CCA-1- Pedagogical Initiatives	Considering all the Modules	50	$(50+50) / 2$	<b>10</b>	4	Two CCA methods as per VTU Clause 22OB4.2 of regulations to be adopted. If CCA chosen is Project Based Learning, then one assessment method may be adopted
		CCA-2- Pedagogical Initiatives		50				
<b>Total CIE Theory</b>						<b>25</b>	10	Scale down Marks of IAT and CCA to 25

CIE	Practical	Conduction of Experiments	Continuous Evaluation of each experiment			Average of all Experiments	10	4	Performance of the Experiment (On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. 20 marks are for conducting the experiment and calculations/observations/output)
			Record	05	10				
			Observation book	05					
		Practical Test	Write up	15	50	---	10	4	One Internal Practical Test after conduction of all Experiments for 50 Marks
			Execution	25					
			Viva-voce	10					
		Open Ended Experiment	Write up	05	20	---	5	2	One experiment for 20 marks.  20 marks reduced to 05 marks
			Execution	10					
			Viva-voce	05					
		<b>Total CIE Practical</b>						25	10



SEE		Theory exam	Entire theory syllabus including questions from lab component	100	---	50	18	SEE Exam is theory Exam conducted for 100 Marks, scored Marks are scaled down to 50 Marks
CIE + SEE				100	---	---	40	
				<ul style="list-style-type: none"> <li>• The Minimum Marks to be secured in CIE to appear for SEE shall be 10 (40% of Maximum Marks – 25) in the Theory Component and 10 (40% of Maximum Marks – 25) in the Practical component.</li> <li>• The Laboratory Component for the IPCC shall be for CIE only.</li> <li>• However, in SEE, the Questions from the Laboratory Component shall be included in the respective Modules only.</li> </ul>				

**The Minimum Marks to be secured in CIE to appear for SEE shall be 10 (40% of Maximum Marks – 25) in the Theory Component and 10 (40% of Maximum Marks -25) in the Practical Component. The Laboratory Component of the IPCC shall be for CIE only. However, in SEE the questions from the Laboratory Component shall be included in the respective Modules only.**

**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum Marks (20 Marks out of 50).

The minimum passing mark for the SEE is 35% of the maximum Marks (18 Marks out of 50).

A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 Marks out of 100) in the total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

**Possible continuous and comprehensive assessment:**

Project based, Problem Based, Building Models, Lab-to-Land, Mobile Studio, Design and Programming Contest, Certification, Concept Map (Collage presentation/poster presentation), Case studies, Think-Pair-Share, Flipped classroom, storytelling. The assessment of these techniques can be either based on Quiz or rubrics.

The faculty can adopt any other CCA method of implementation and its assessment with prior approval of Program Assessment Committee (PAC).

**Continuous Internal Evaluation (CIE):**

The CIE Marks for the theory component of the IC shall be **25 Marks** and for the laboratory component **25 Marks**.

**CIE for the theory component of the IC**

**Internal Assessment test:**

**The IA test questions are to be framed to map the Course Outcomes (COs), Program Outcomes (POs) and the Blooms RBT Levels. Emphasis to be given for higher order RBT levels**

Three Tests each of **50 Marks** scaled down to **25 Marks**

- First test after 6<sup>th</sup> week of the semester (syllabus completion of 35 – 40%)
- Second test after 10<sup>th</sup> week of semester (syllabus completion of 65 – 70%)
- Third test after 14<sup>th</sup> week of semester (syllabus completion of 90 – 100%)

The average score of three test is taken and scaled down to **15 Marks**.

**Continuous and Comprehensive Assessment (CCA):**

Two of continuous and comprehensive assessment (CCA) to be conducted to attain COs and POs, evaluated each for **50 Marks**. Total Marks scored will be CCA1+CCA2 and scaled down to **10 Marks**.

- CCA1 after 4<sup>th</sup> week and CCA2 after 9<sup>th</sup> week. The evaluation includes either through quiz or rubrics
- CCA as project-based learning,
  - CCA is evaluated for **50 Marks** with review 1 of **20 Marks** after and review 2 of **30 Marks** includes project demonstration/competition and report submission.
  - The evaluation of review 1 after 6<sup>th</sup> weeks of semester and review 2 after 12<sup>th</sup> week of semester with project demonstration and submission of the report

Total score for CCA is **10 Marks**

Total Marks scored for theory component of CIE (IAT+ CCA) is **25 Marks**

**CIE for the practical component of the IC**

- On completion of every experiment/program in the laboratory, the students shall be evaluated and Marks shall be awarded on the same day. The **10 Marks** are for conducting the experiment and preparation of the laboratory record, the other **10 Marks shall be for the test** conducted at the end of the semester and **5 Marks** for conducting Open Ended Experiments.
- The CIE Marks awarded in the case of the practical component shall be based on the continuous evaluation of the laboratory report and the conduction. Each experiment report can be evaluated for 05 Marks conduction(Observation Book) and 5 Marks for Record Book. Marks of all experiments' write-ups and conduction are added and scaled to **10 Marks**.
- The Practical laboratory test (**duration 03 hours**) at the end of the 15<sup>th</sup> week of the semester/after completion of all the experiments (whichever is early) shall be conducted for **50 Marks** and scaled down to **10 Marks**.
- Open Ended Experiments are conducted after the completion of regular Experiments/Programs for 20 Marks and scaled down to **5 Marks**
- Scaled-down Marks of write-up, evaluations and tests, will be added as CIE Marks for the laboratory component of IC/IPCC for **25 Marks**.
- The minimum Marks to be secured in CIE to appear for SEE shall be 10 (40% of maximum Marks) in the theory component and 10 (40% of maximum Marks) in the practical component.
- The laboratory component of the IC/IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included. The maximum of 05 questions is to be set from the practical component of IC/IPCC, the total Marks of all questions should not be more than 25 Marks.

The theory component of the IC shall be for both CIE and SEE.

**Semester End Examination (SEE):**

- Theory SEE will be conducted as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)
- The question paper shall be set for 100 Marks. The medium of the question paper shall be English. The duration of SEE is 03 hours.
- The question paper will have 10 questions. Two questions per module. Each question is set for 20 Marks. The student has to answer 5 full questions, selecting one full question from each module summing up to maximum score of 100 Marks. Marks **scored out of 100 shall proportionally be reduced to 50 Marks**.
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module. The two questions should be of same course outcome, program outcome and Blooms RBT level. Emphasis to be given for higher order RBT levels

**CIE- Continuous Internal Evaluation (50 Marks)**

Bloom's Category	Theory					Practical
	Continuous Assessment Tests			Continuous Comprehensive Assessment (CCA)		Practical Test
	IAT-1	IAT-2	IAT-3	CCA-1	CCA-2	
	50 Marks	50 Marks	50 Marks	50 Marks	50 Marks	50 Marks
Remember	10	10	10			
Understand	24	24	24			15
Apply	8	8	8			
Analyse	8	8	8			10
Evaluate				50	50	25
Create						

### CIE Course Assessment Plan

CO's	Marks Distribution						Total Marks	Weightage
	Test-1		Test-2		Test-3			
	Module-1	Module-2	Module-2	Module-3	Module-4	Module-5		
CO1	6	4	4	6	6	4	30	20
CO2	16	8	8	16	10	14	72	48
CO3	4	4	4	4	4	4	24	16
CO4	4	4	4	4	4	4	24	16
CO5								
CO6								
<b>Total</b>	30	20	20	30	24	26	150	100

### SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	16
Understand	40
Apply	16
Analyse	28
Evaluate	--
Create	--

## SEE Course Plan

CO's	Marks Distribution					Total Marks	Weightage
	Module-1	Module-2	Module-3	Module-4	Module-5		
CO1	25	25	22	20	20	112	56
CO2	6	6	8	6	6	32	16
CO3	10	10	10	12	14	56	28
CO4	--	--	--	--	--	--	--
CO5	--	--	--	--	--	--	--
CO6	--	--	--	--	--	--	--
<b>Total</b>	<b>41</b>	<b>41</b>	<b>40</b>	<b>38</b>	<b>40</b>	<b>200</b>	<b>100%</b>

## Course Contents and Lecture Schedule

Module No.	Topics	No. of Lectures
1	Einstein's A and B Coefficients : Rates of Absorption and emissions, Thermal Equilibrium, Boltzmann Relation, Derivation of Expression for Energy Density. Conclusions on Einstein's coefficients	1.5 Hrs
1	Laser Action: Population Inversion explanation, Metastable State: Description using 3 level system, Requisites of a laser system : Energy Source, Active Medium, Laser Cavity	1
1	Semiconductor Diode Laser: Principle, Construction, Working, merits and demerits. Applications of LASER: Bar code scanner, Measurement of pollutants	1
1	Numerical Problems: Einstein coefficients, Boltzmann factor	0.5
1	Propagation of Light Through the Optical fiber (Ray Diagram), Acceptance angle and Numerical Aperture (NA) Explanation and derivation	1
1	Modes of Propagation and RI Profile, Classification of Optical Fibers: Single Mode Step Index and Multi Mode Step and Graded Index Fibers,	1
1	Attenuation, Attenuation Coefficient, Types of Fiber Losses: Absorption, Scattering and Geometrical Losses, Applications: point to point Communication	1
1	Numerical Problems : Numerical Aperture, Acceptance angle and Attenuation Co-efficient.	1
2	Statement of de-Broglie Hypothesis, Derivation of expression for de Broglie wavelength ( $\lambda$ ) by analogy and different forms of expression for ( $\lambda$ )	1
2	Heisenberg's Uncertainty Principle, Non existence of electron inside the nucleus (Non-relativistic),	1
2	Principle of Complementarity, Correlation between de Broglie Wavelength, Heisenberg's Uncertainty principle and wave packet, Wave Function, Explanation, General Mathematical Form (Exponential),	1
2	Physical Significance of a wave function (Probability Density) and Born Interpretation, Expectation value, Eigen functions and Eigen Values,	1
2	Schrödinger Time Independent wave definition, Setting up of Time independent Schrodinger wave equation in 1D (derivation) and extension to 3D (mention)	1
2	One Dimensional Potential Well Explanation and Boundary conditions, Schrödinger Wave equation for a particle in 1 D infinite potential well, General Solution, Applying Boundary Conditions, Energy Eigen Values (Quantization of Energy States), Normalization and Eigen Function, Variation of wave functions and probability density distributions for n = 1, 2, 3 states	2
2	Numerical Problems on de Broglie Hypothesis, Heisenberg's Uncertainty Principle, Energy Eigen Values for a particle in 1D infinite potential well	1
3	Introduction to Quantum Computing, Moore's law & its end. Differences between classical & quantum computing.	1
3	Concept of qubit and its properties. Representation of qubit by Bloch sphere. single and two qubits. Extension to N qubits.	1
3	Matrix representation of 0 and 1 States, Identity Operator I, Applying I to $ 0\rangle$ and $ 1\rangle$ states to show there is no change, Pauli Matrices and its operations on 0 and 1 states, Explanation of i) Conjugate of a matrix and ii) Transpose of a matrix. Unitary Matrix U, Examples: Row and Column Matrices and	2

	their multiplication (Inner Product), Probability, and Quantum Superposition, normalization rule. Orthogonality, Orthonormality.	
3	Quantum Not Gate, Pauli – X, Y and Z Gates, Hadamard Gate, Phase Gate (or S Gate), T Gate	1
3	Controlled gate, CNOT Gate,	1
3	Numerical Problems: Identity, Unitary, Inner Product, Orthogonality, Gates: X Gates, Hadamard Gate, CNOT Gate, Relating T and S gates (Standard Forms),	2
4	Assumptions and Failures of Classical Free Electron Theory, Assumptions of Quantum Free Electron Theory,	2
4	Fermi Energy, Density of States, Fermi Factor, Variation of Fermi Factor With Temperature and Energy level, Success of Quantum Free Electron Theory.	1
4	Semiconductors and its classification, Fermi level in Intrinsic Semiconductor, Expression for concentration of electrons in conduction band & holes concentration in valance band (only mention the expression),	2
4	Relation between Fermi energy & Energy gap in intrinsic semiconductors(derivation), Electrical conductivity of a semiconductor (derivation), Explanation of Hall Effect, Hall Voltage, Hall field, Derivation of Expression for Hall coefficient and Hall Voltage. Applications.	2
4	Numerical Problems: Fermi energy, Fermi factor, electrical conductivity metals, semiconductor	1
5	General Introduction about Superconductivity, Graphical approach of Temperature dependence of resistivity in metals, Mathiessen's rule [ $\rho = \rho_0 + \rho(T)$ ], Temperature dependence of resistivity in superconductors, Definition of superconductivity & Critical temperature. Meissner's Effect,	1
5	Critical field, Temperature dependence of Critical field, Detailed explanation of Type1 & Type-II Superconductors. BCS Theory: Phonon & Phonon field, cooper pairs, High Temperature Superconductors(qualitative)	1
5	Brief explanation of SQUID & mention its applications, The construction and working of MAGLEV vehicle.	1
5	Numerical Problem: Critical field, Mathiessen's rule	1
5	Nanomaterials, synthesis methods (qualitative) properties and applications, quantum confinement(Qualitative),	2
5	Shape memory alloys (SMA), Characteristics, Properties of NiTi alloy, applications,	1
<b>Total</b>		40 Hrs



# Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

<b>Semester</b>	:	<b>2<sup>nd</sup></b>		
<b>Course Title</b>	:	<b>Engineering Exploration Course</b>		
<b>Course Code</b>	:	<b>23EEXC28</b>		
<b>Course Type (Theory/ Practical/Integrated)</b>	:	<b>Practical</b>		
<b>Course Category</b>	:	<b>AEC/SDC</b>		
<b>Stream</b>	:	<b>Common to all streams</b>	<b>CIE</b>	<b>50 Marks</b>
<b>Teaching hr/week (L: T: P:S)</b>	:	<b>0:0:0:2</b>	<b>SEE</b>	<b>50 Marks</b>
<b>Total Hours</b>	:	<b>30 Hrs</b>	<b>SEE Duration</b>	<b>03 Hours</b>
<b>Credits</b>	:	<b>01</b>		

### Course Learning Objectives: Students will be taught

Sl. No	Course Objectives
1	Introduce Students to different engineering disciplines, creative and innovative thinking, design and develop solution through brainstorming.
2	Identify required constraints and gaps, provide critical analysis, visualization, programming, hardware interfacing.
3	Involve students in experimental hands-on project-based learning using modern software tools and hardware components, with prominence on community problems in engineering domains.
4	Enable students to work in a team, collaborative learning and develop communication and presentation skills and technical report writing
5	Encourage lifelong learning and infusing interdisciplinary mindset creating social values and ethical implications of their creative work.

### Teaching-Learning Process

#### Pedagogy (General Instructions):

These are sample Strategies which teachers can use to accelerate the attainment of the various

Course Outcomes.

1. Lecture method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Show Video/animation films to explain the infrastructures and the mechanism involved in the principle.
3. Encourage collaborative (Group) Learning in the class.
4. Ask at least three HOT (Higher-order Thinking) questions in the class, which promotes critical thinking.
5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
6. Topics will be introduced in multiple representations.
7. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.
9. Individual teachers can device innovative pedagogy to improve teaching-learning.



DSATM

Scheme of Teaching and Examinations for BE Programme -2023-24  
Outcome Based Education and Choice Based Credit System (CBCS)  
(Effective from the Academic Year 2023-24)

COURSE SYLLABUS

Module No.	Contents of the Module	Hours
1	<b>Introduction to Engineering Exploration, Workplace Readiness Skills</b> Engineering Projects in Community Service, Exploration and design thinking Process-Empathize, Define, Ideate, Prototype, Test. Importance of Interdisciplinary team work, effective participation in teamwork and leadership roles. critical thinking and problem-solving skills, professional work ethics, importance of project life cycle, project management, importance of communication. Embrace, Learn, and Adapt to Failure as a Way to Success.	02
<b>Pedagogy</b>	Understand the course objective and explore the project ideas through brainstorming.	
2	<b>Problem Identification, Specification Development</b> - Clear and measurable requirements, identifying relevant benchmarks, identifying the gap between the available and required products, requirements documentation.	02
<b>Pedagogy</b>	Demonstrate existing projects – video/website/hands-on <b>[Demonstration Phase]</b>	
3	<b>Platform Based Development-</b> Introduction to sensors, transducers and actuators and their usage in real time applications. Networking Fundamentals, Web Development/App Development, Nano materials – preparation methods and applications, Electric Vehicles, Robotics and Drones Platform based development -Arduino, electronic circuit simulations and programming concepts.	04
<b>Pedagogy</b>	Handson Session - Tinkercad, Wireshark tool, CryptTool, Kali Linux-fundamental commands, HTML, CSS commands,3D Printing Simulator Model, Altair software, Arduino IDE <b>[Exploration Phase]</b>	
4	Design and Develop Solution, Testing. Prototype—Start to Create Your Solution	20
<b>Pedagogy</b>	Experiential Project Based Learning <b>[Open Ended Phase]</b>	
5	Report Writing, Project Demonstration and Presentation	02
<b>Pedagogy</b>	Demonstration and Presentation	



## List of Experiments or Programs

Sl. No	Experiments/Programs	COs
1	Write a program to Blink an LED (light emitting diode) using Arduino's digital output	CO1 CO2 CO3 CO4 CO5
2	Develop a Gas Detecting Alarm system with Arduino	
3	Create a Wikipedia page.	
4	Create an event website, Community-Based Disaster Preparedness Platform	
5	Develop a simple Calculator Application.	
6	3D printing of real structures and machines	
7	Micro magnetic simulation	
8	Basic Circuit Simulations using Pspice	
9	Affordable Housing with Sustainable Materials, Renewable Energy Microgrid for Rural Communities.	
10	Smart Water Distribution and Conservation Network, Solar-Powered Mobile Charging Stations	

Sl. No	Open Ended Phase
1	<b>Project Stream 1:</b> Electronics, Robotics, IOT and Sensors
2	<b>Project Stream 2:</b> Computer Science and IT Applications
3	<b>Project Stream 3:</b> Mechanical and Electrical tools
4	<b>Project Stream 4:</b> Eco-friendly solutions for waste management, infrastructure, safety, alternative energy sources, Agriculture, Environmental science and other fields of engineering.

## Reference Books

### Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)

1	Exploring Engineering An Introduction to Engineering and Design 5th Edition - April 30, 2020 Authors: Robert Balmer, William Keat Paperback ISBN: 9780128150733 eBook ISBN: 9780128150740
2	Tim Brown, Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation (2009) Esra Gonen Izmir University of Economics
3	Arduino Project Handbook: Volume One: Complete Guide to Creating with the Arduino by Mark Geddes [ISBN-10 0992952603, Publisher: Sketch Publishing]
4	Exploring Arduino: Tools and Techniques for Engineering Wizardry by Jeremy Blum [ISBN-10 1119405378, Publisher: Wiley]
5	Practical Python Programming for IoT: Build advanced IoT projects using a Raspberry Pi 4, MQTT, RESTful APIs, WebSocket's, and Python 3 Paperback – Import, 15 May 2020

**Course Outcomes: At the end of the course, the student will be able to:**

CO	Course Outcomes	RBT Level	Level Indicator
CO1	Apply the domain knowledge to solve the problem statement with multidisciplinary approach.	L3	Apply
CO2	Identify the performance parameter, components, algorithm/logic/design to solve the defined real-time problem.	L4	Analyse
CO3	Design and Develop solution to the proposed problem statement and test the hypothesis wherever applicable using modern tools	L3	Apply
CO4	Analyse the result and synthesize the project findings as project report.	L4	Evaluate
CO5	Demonstrate technical skills and competency through their project with ethics, effective presentation and communication skills as an individual and in a team.	L5	Evaluate

**Mapping of Course Outcomes to Program Outcomes:**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	2	-	-	-	-	-
CO3	-	-	3	-	3	-	-	-	-	-	-	-
CO4	-	-	-	3	-	-	-	-	-	-	-	2
CO5	-	-	-	-	-	2	-	2	3	3	3	2

**Weblinks and Video Lectures (e-Resources)**

1	<a href="https://www.electronicsforu.com/mini-projects-ideas?utm_source=google&amp;utm_medium=cpc&amp;utm_campaign=Ele.com+-+traffic+Dynamic+Search+-22-12-2021&amp;gclid=EAlaIQobChMIsf3N4bD3_wlVHAyDax1a5wkrEAAYASAAEgJNe_D_BwE">https://www.electronicsforu.com/mini-projects-ideas?utm_source=google&amp;utm_medium=cpc&amp;utm_campaign=Ele.com+-+traffic+Dynamic+Search+-22-12-2021&amp;gclid=EAlaIQobChMIsf3N4bD3_wlVHAyDax1a5wkrEAAYASAAEgJNe_D_BwE</a>
2	<a href="https://www.mooc-list.com/tags/design-thinking?__cf_chl__tk=OiyDIM1QC0P7pJVSWWWpKKITaJH2pBsQoyI9laeWj.U-1688552822-0-gaNycGzNC5A">https://www.mooc-list.com/tags/design-thinking?__cf_chl__tk=OiyDIM1QC0P7pJVSWWWpKKITaJH2pBsQoyI9laeWj.U-1688552822-0-gaNycGzNC5A</a>
3	<a href="https://www.sciencebuddies.org/science-fair-projects/engineering-design-process/engineering-design-problem-statement">https://www.sciencebuddies.org/science-fair-projects/engineering-design-process/engineering-design-problem-statement</a>
4	<a href="https://www.3dsourced.com/rigid-ink/best-3d-printing-books/#3D%20Printing%20Courses">https://www.3dsourced.com/rigid-ink/best-3d-printing-books/#3D%20Printing%20Courses</a>
5	<a href="https://youtu.be/nE1C4ghfvac">https://youtu.be/nE1C4ghfvac</a>
6	<a href="https://youtu.be/ebO38bbq0_4">https://youtu.be/ebO38bbq0_4</a>
7	<a href="https://youtu.be/qUEbxTkPIWI">https://youtu.be/qUEbxTkPIWI</a>
8	<a href="https://youtu.be/5zAQot4pKgU">https://youtu.be/5zAQot4pKgU</a>
9	<a href="https://youtu.be/QQZ6EGf0Ju8">https://youtu.be/QQZ6EGf0Ju8</a>
10	<a href="https://youtu.be/UgtjRob5qMg">https://youtu.be/UgtjRob5qMg</a>

**Assessment Pattern (both CIE and SEE)**

**Engineering Exploration Course**

**1 Credit Courses – Project**

Assessment Method	Component	Type of Assessments	Syllabus Coverage	Maximum Marks	Average	Reduced Marks	Minimum Passing Marks	Evaluation Details
<b>Total CIE Project</b>				<b>50</b>	----	----	<b>20</b>	
<b>CIE</b>	<b>Project Based Learning</b>	Review – 1	Module - 1 & 2	50	$(50+50+50) / 3$	<b>25</b>	<b>10</b>	Average of Three reviews each of 50 Marks scale down the marks to 25 Marks
		Review – 2	Module - 3 & 4	50				
		Review – 3	Module - 5	50				
	<b>Continuous Comprehensive Assessment (CCA)</b>	CCA-1- Pedagogical Initiatives	Considering all the Modules	50	$(50+50) / 2$	<b>25</b>	<b>10</b>	Two CCA methods as per VTU Clause 22OB4.2 of regulations to be adopted. If CCA chosen is Project Based Learning, then one assessment
		CCA-2- Pedagogical Initiatives		50				

								method may be adopted
	<b>Total CIE Project</b>					<b>50</b>	<b>20</b>	Scale down Marks of IAT and CCA to 25
<b>SEE</b>		Project Based Evaluation	Entire syllabus	50	-	<b>50</b>	<b>18</b>	Writeup (10) Conduction and Results (30) Viva Voce (10), Duration 03 hours
<b>CIE + SEE</b>				<b>100</b>	-	-	<b>40</b>	

**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum Marks (20 Marks out of 50).

The minimum passing mark for the SEE is 35% of the maximum Marks (18 Marks out of 50).

A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 Marks out of 100) in the total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

**Continuous Internal Evaluation (CIE):**

The CIE will constitute of three reviews and two continuous and comprehensive assessment

The CIE Marks for the internal assessment test shall be **50 Marks each** for review 1, review 2 and review – 3 (project demo/participation in project competitions/paper publications). The scored Marks are scaled down to **25 Marks**.

The phases of evaluating the project:

- Review 1 is evaluated for 50 Marks after 5<sup>th</sup> week of the semester.
- Review 2 is evaluated for 50 Marks after 10<sup>th</sup> week of the semester.
- Review 3 is evaluated for 50 Marks after 13<sup>th</sup> week of the semester

**Rubrics for Review 1:**

Ideating the problem definition	20% of max. Marks
Identifying the objectives and methodology	20% of max. Marks
Design of the project	40% of max. Marks
Presentation (oral and written) and preparation of review 1 report	20% of max. Marks

**Rubrics for Review 2:**

Implementation of the design	40% of max. Marks
Validate the result with various scenarios	30% of max. Marks
Presentation (oral and written)	30% of max. Marks

**Rubrics for Review 3:**

Demonstration of the project	40% of max. Marks
Viva-voce	20% of max. Marks
Report evaluation	20% of max. Marks
Paper presentation/participation in project competitions	20% of max. Marks

**Continuous and Comprehensive Assessment (CCA):**

CCA1 and CCA2 are evaluated for 50 marks each.

CCA 1 is the assessment of the laboratory sessions scaled to 15 marks and CCA 2 is the quiz scaled 10 marks

**Semester End Examination (SEE):**

- The SEE as project exam will be conducted as per the scheduled timetable, for the **duration 03 hours**.
- SEE as project work will be conducted by two examiners appointed by the chief controller, examination.

SEE Marks for the project work shall be awarded using appropriate rubrics with the ratio of 50:25:25 for quality work and report, viva-voce and presentation skills

**CIE- Continuous Internal Evaluation (50 Marks)**

Bloom's Category	Project					Practical
	Continuous Assessment Tests			Continuous Comprehensive Assessment (CCA)		Practical Test
	Review-1	Review-2	Review-3	CCA-1	CCA-2	
	50 Marks	50 Marks	50 Marks	50 Marks	50 Marks	50 Marks
Remember	-	-	-	-	-	-
Understand	-	-	-	-	05	-
Apply	30	10	-	20	15	-
Analyse	20	20	20	20	20	-
Evaluate	-	20	30	10	10	-
Create	-	-	-	-	-	-

**CIE Course Assessment Plan**

CO's	Marks Distribution					Total Marks	Weightage (%)
	Review-1		Review-2		Review-3		
	Module-1	Module-2	Module-3	Module-4	Module-5		
CO1	05	10	-	-	-	15	10
CO2	10	10	-	-	-	20	14
CO3	05	10	05	05	20	45	30
CO4	-	-	10	10	20	40	26
CO5	-	-	10	10	10	30	20
Total	20	30	25	25	50	150	100

**SEE- Semester End Examination (50 Marks)**

Bloom's Category	SEE Marks (80% Project Demonstration+20%Report)
Remember	-
Understand	-
Apply	40%

Analyse	30%
Evaluate	10%
Create	-

### SEE Course Plan

CO's	Marks Distribution			Total Marks	Weightage
	Empathize, Define, Ideate (Writeup)	Design and Analyse the result. (Project Demo)	Report Evaluation		
CO1	05	-	10	15	30%
CO2	05	-	-	05	10%
CO3	-	15	-	15	30%
CO4	-	10	-	10	20%
CO5	-	05	-	05	10%
<b>Total</b>	<b>10</b>	<b>30</b>	<b>10</b>	<b>50</b>	<b>100%</b>

### Course Contents and Lecture Schedule

Module No.	Topics	No. of Lectures
1	Engineering Projects in Community Service, Exploration and design thinking Process- Empathize, Define, Ideate, Prototype, Test. Importance of Interdisciplinary team work, effective participation in teamwork and leadership roles. critical thinking and problem-solving skills, professional work ethics, importance of project life cycle, project management, importance of communication. Embrace, Learn, and Adapt to Failure as a Way to Success.	01
1	Understand the course objective and explore the project ideas through brainstorming.	01
2	Problem Identification, Specification Development - Clear and measurable requirements, identifying relevant benchmarks, identifying the gap between the available and required products, requirements documentation.	01
2	Demonstrate existing projects – video/website/hands-on	01
3	Introduction to sensors, transducers and actuators and their usage in real time applications- Tinkercad Tool, Arduino IDE	01
3	Networking Fundamentals, Web Development/App Development	01
3	Nano materials – preparation methods and applications, Electric Vehicles	01
3	Robotics and Drones-3D Printing Simulator Model, Altair software	01
4	Design and Develop Solution, Testing. Prototype—Start to Create Your Solution	20
5	Report Writing, Project Demonstration and Presentation	02
<b>Total</b>		<b>30</b>



# Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	1st			
Course Title	:	Indian Constitution			
Course Code	:	23ICNC17			
Course Type (Theory/ Practical/ Integrated)	:	Theory			
Course Category	:	HSSC			
Stream	:	Common to all	CIE	:	50 Marks
Teaching hours/ week (L:T:P:S)	:	1:0:0:0	SEE	:	50 Marks
Total Hours	:	15 Hrs	SEE Duration	:	2 Hours
Credits	:	01			

**Course Learning Objectives:** Students will be taught

Sl. No	Course Objectives
1	To know about the basic structure of Indian Constitution.
2	To know the Fundamental Rights (FR's), DPSP's and Fundamental Duties (FD's) of our constitution.
3	To know about our Union Government, political structure & codes, procedures.
4	To know the State Executive & Elections system of India.
5	To learn about Amendments, Emergency Provisions and other important provisions given by the constitution.

## Teaching-Learning Process

### Pedagogy (General Instructions):

These are sample Strategies; which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecture method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Show Video/animation films to explain the infrastructures and the mechanism involved in the principle.
3. Encourage collaborative (Group) Learning in the class.
4. Ask at least three HOT (Higher-order Thinking) questions in the class, which promotes critical thinking.
5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
6. Topics will be introduced in multiple representations.
7. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.
9. Individual teachers can devise innovative pedagogy to improve teaching-learning.





DSATM

**Scheme of Teaching and Examinations for BE Programme -2023-24**  
**Outcome Based Education and Choice Based Credit System (CBCS)**  
**(Effective from the Academic Year 2023-24)**

**COURSE SYLLABUS**

<b>Module No.</b>	<b>Contents of the Module</b>	<b>Hours</b>
1	Introduction to the Indian constitution, importance of Indian Constitution, drafting of the Constitution, Salient features of India Constitution. Preamble of Indian Constitution, structure of the Indian Constitution	03
<b>Pedagogy</b>	Direct instructional method (Low/Old Technology) Apart from conventional lecture methods, various types of innovative teaching techniques through videos, animation films may be adapted so that the delivered lesson can progress the students	
2	Fundamental Rights (FR's) and its Restriction and limitations, Directive Principles of State Policy (DPSP's) and its present relevance in Indian society, Fundamental Duties and its Scope and significance in Nation	03
<b>Pedagogy</b>	Flipped classrooms (High/advanced Technological tools) Apart from conventional lecture methods, various types of innovative teaching techniques through videos, animation films may be adapted so that the delivered lesson can progress the students	
3	Union Executive: Parliamentary System, Union Executive – President, Prime Minister, Union Cabinet, Parliament - LS and RS, Parliamentary Committees, Important Parliamentary Terminologies. Judicial System of India, Supreme Court of India, Judges of Supreme Court	03
<b>Pedagogy</b>	Blended learning (Combination of Low/Old Technology and High/advanced Technological tools) Apart from conventional lecture methods, various types of innovative teaching techniques through videos, animation films may be adapted so that the delivered lesson can progress the students	
4	State Executive: State Legislature System, State Executive – Governor, Chief Minister, State Cabinet, State Legislature – Vidhana Sabha and Vidhana Parishad, Judicial System of state, High Court of State, Judges of High Court	03
<b>Pedagogy</b>	Enquiry and evaluation-based learning Apart from conventional lecture methods, various types of innovative teaching techniques through videos, animation films may be adapted so that the delivered lesson can progress the students	

<b>5</b>	Election Commission of India, Elections & Electoral Process, Emergency Provisions, types of emergencies, effects of emergency, Amendment to Constitution, and Important Constitutional Amendments till today, Special Provisions for certain classes.	<b>03</b>
<b>Pedagogy</b>	Personalized learning Apart from conventional lecture methods, various types of innovative teaching techniques through videos, animation films may be adapted so that the delivered lesson can progress the students	

### Reference Books

#### Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)

<b>1</b>	“Constitution of India” (for Competitive Exams) - Published by Naidhruva Edutech Learning Solutions, Bengaluru. – 2022.
<b>2</b>	“Introduction to the Constitution of India”, (Students Edition.) by Durga Das Basu (DD Basu): Prentice –Hall, 2008.
<b>3</b>	“Constitution of India, Professional Ethics and Human Rights” by Shubham Singles, Charles E. Haries, and et al: published by Cengage Learning India, Latest Edition – 2019.
<b>4</b>	“The Constitution of India” by Merunandan K B: published by Merugu Publication, Second Edition, Bengaluru.
<b>5</b>	“Samvidhana Odu” - for Students & Youths by Justice HN Nagamohan Dhas, Sahayana, kerekon.

**Course Outcomes: At the end of the course, the student will be able to:**

<b>CO</b>	<b>Course Outcomes</b>	<b>RBT Level</b>	<b>Level Indicator</b>
<b>CO1</b>	Understand the making of the constitution, its structure and Functioning	Understand	L2
<b>CO2</b>	Understand the importance of Fundamental Rights (FR's), Directive Principles of State Policy (DPSP's) and Fundamental Duties.	Understand	L2
<b>CO3</b>	Understand the structure and functioning of Union Executive	Understand	L2
<b>CO4</b>	Understand the structure and functioning of State Executive	Understand	L2
<b>CO5</b>	Understand the importance of Election Commission of India, Emergency Provisions, Amendment to Constitution, and Special Provisions under the constitution of India.	Understand	L2

**Mapping of Course Outcomes to Program Outcomes:**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	--	--	--	--	--	3	--	--	--	--	--	--	--	--
C02	--	--	--	--	--	3	--	--	--	--	--	--	--	--
C03	--	--	--	--	--	3	--	--	--	--	--	--	--	--
C04	--	--	--	--	--	3	--	--	--	--	--	--	--	--
C05	--	--	--	--	--	3	--	--	--	--	--	--	--	--

**Weblinks and Video Lectures (e-Resources)**

1	<a href="https://archive.nptel.ac.in/courses/129/106/129106003/">https://archive.nptel.ac.in/courses/129/106/129106003/</a>
2	<a href="https://web.iitd.ac.in/~burra/teaching/burra19aud-lectures-contents.pdf">https://web.iitd.ac.in/~burra/teaching/burra19aud-lectures-contents.pdf</a>

Assessment Pattern (both CIE and SEE)

**Constitution of India / Samskruthika Kannada / Communicative English / Professional writing skills in English/ Innovation Design & Thinking**

**1 Credit Courses – Theory**

Assessment Method	Component	Type of Assessments	Syllabus Coverage	Maximum Marks	Average	Reduced Marks	Minimum Passing Marks	Evaluation Details
<b>Total CIE Theory</b>				<b>50</b>	----	----	<b>20</b>	
<b>CIE</b>	<b>Theory</b>	Internal Assessment Test (IAT) – I (MCQ)	Module - 1 & 2	50	(50+50+50) / 3	<b>25</b>	10	Average of Three Internal test each of 50 Marks scale down the marks to 15 Marks
		Internal Assessment Test (IAT) – II (MCQ)	Module - 3 & 4	50				
		Internal Assessment Test (IAT) – III (QUIZ)	Module - 5	50				
	<b>Continuous Comprehensive Assessment (CCA)</b>	CCA-1- Pedagogical Initiatives	Considering all the Modules	50	(50+50) / 2	<b>25</b>	10	Two CCA methods as per VTU Clause 22OB4.2 of regulations to be adopted. If CCA chosen is Project Based Learning, then one assessment method may be adopted
		CCA-2- Pedagogical Initiatives		50				
	<b>Total CIE Theory</b>						<b>50</b>	<b>20</b>

<b>SEE</b>		Theory exam – (MCQ Type)	Entire syllabus	50	----	50	18	SEE Exam is theory Exam with MCQ type Question Papers of 50 Questions with each question 1 Mark each. Examination duration is 1 Hour
<b>CIE + SEE</b>				100	----	----	40	

- The Minimum Marks to be secured in CIE to appear for SEE shall be 10 (40% of Maximum Marks – 25) in the Theory Component and 10 (40% of Maximum Marks – 25) in the Practical component.
- The Laboratory Component for the IPCC shall be for CIE only.
- However, in SEE, the Questions from the Laboratory Component shall be included in the respective Modules only.

## 1 Credit Course - Theory

### **Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum Marks (20 Marks out of 50).

The minimum passing mark for the SEE is 35% of the maximum Marks (18 Marks out of 50).

A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 Marks out of 100) in the total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

### **Possible continuous and comprehensive assessment:**

Crossword, Maize, Debate, Role Play, Community Service, Mind Map, Concept Map, Case Study, Group Discussions, Ideathon

The faculty may adopt any other CCA method of implementation and its assessment with prior approval of Program Assessment Committee (PAC).

### **Continuous Internal Evaluation (CIE):**

The CIE Marks for the internal assessment test shall be **25 Marks** and for the continuous and comprehensive assessment (CCA) shall be **25 Marks**.

### **Internal Assessment test:**

**The IA test questions are to be framed to map the course outcomes, program outcomes and the Blooms RBT Levels. Emphasis to be given for higher order RBT levels**

Three Tests (MCQ) each of **50 Marks**

- First test after 6<sup>th</sup> week of the semester (syllabus completion of 35 – 40%)
- Second test after 10<sup>th</sup> week of semester (syllabus completion of 65 – 70%)
- Third test after 14<sup>th</sup> week of semester (syllabus completion of 90 – 100%)

The average score of three test is taken and scaled down to **25 Marks**.

### **Continuous and Comprehensive Assessment (CCA):**

Two of continuous and comprehensive assessment (CCA) to be conducted to attain COs and POs, evaluated each for **50 Marks**. Total Marks scored will be CCA1+CCA2 and scaled down to **25 Marks**.

- CCA1 to be conducted after 4<sup>th</sup> week
- CCA2 to be conducted after 9<sup>th</sup> week.
- The evaluation of CCAs includes either through quiz or rubrics

Total score for CCA is **25 Marks**

Total Marks scored for theory component of CIE (IAT + CCA) is **50 Marks**

### **Semester End Examination (SEE):**

- Theory SEE will be conducted as per the scheduled timetable, with common question papers for the subject .
- The question paper shall be set for 50 Marks. The medium of the question paper shall be English. **The duration of SEE is 01 hours.**
- The question paper will have 50 MCQs **covering all modules**. The questions shall map with the course outcome, program outcome and Blooms RBT level.

### CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Theory					Practical
	Continuous Assessment Tests			Continuous Comprehensive Assessment (CCA)		Practical Test
	IAT-1	IAT-2	IAT-3	CCA-1	CCA-2	
	50 Marks	50 Marks	50 Marks	50 Marks	50 Marks	50 Marks
Remember	-	-	-	-	-	-
Understand	50	50	50	50	50	-
Apply	-	-	-	-	-	-
Analyse	-	-	-	-	-	-
Evaluate	-	-	-	-	-	-
Create	-	-	-	-	-	-

### CIE Course Assessment Plan

CO's	Marks Distribution					Total Marks	Weightage
	Test-1		Test-2		Test-3		
	Module-1	Module-2	Module-3	Module-4	Module-5		
CO1	-	-	-	-	-	-	-
CO2	25	25	25	25	50	150	100
CO3	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-
<b>Total</b>	25	25	25	25	50	150	100

### SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	--
Understand	50
Apply	--
Analyse	--
Evaluate	--
Create	--

## SEE Course Plan

CO's	Marks Distribution					Total Marks	Weightage
	Module-1	Module-2	Module-3	Module-4	Module-5		
CO1	10	--	--	--	--	10	20%
CO2	--	10	--	--	--	10	20%
CO3	--	--	10	--	--	10	20%
CO4	--	--	--	10	--	10	20%
CO5	--	--	--	--	10	10	20%
<b>Total</b>	<b>10</b>	<b>10</b>	<b>10</b>	<b>10</b>	<b>10</b>	<b>50</b>	<b>100%</b>

## Course Contents and Lecture Schedule

Module No.	Topics	No. of Lectures
1	Introduction to the Indian constitution, importance of Indian Constitution	1
1	Drafting of the Constitution, Salient features of India Constitution	1
1	Preamble of Indian Constitution, structure of the Indian Constitution	1
2	Fundamental Rights (FR's) and its Restriction and limitations,	1
2	Directive Principles of State Policy (DPSP's) and its present relevance in Indian society	1
2	Fundamental Duties and its Scope and significance in Nation	1
3	Union Executive: Parliamentary System, Union Executive – President, Prime Minister, Union Cabinet	1
3	Parliament - LS and RS, Parliamentary Committees, Important Parliamentary Terminologies	1
3	Judicial System of India, Supreme Court of India, Judges of Supreme Court	1
4	State Executive: State Legislature System, State Executive – Governor, Chief Minister, State Cabinet	1
4	State Legislature – Vidhana Sabha and Vidhana Parishad	1
4	Judicial System of state, High Court of State, Judges of High Court	1
5	Election Commission of India, Elections & Electoral Process	1
5	Emergency Provisions, types of emergencies, effects of emergency	1
5	Amendment to Constitution, and Important Constitutional Amendments till today, Special Provisions for certain classes.	1
<b>Total</b>		<b>15 Hrs</b>





# Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	1 <sup>ST</sup>			
Course Title	:	Introduction To Civil Engineering			
Course Code	:	23CECV11			
Course Type (Theory/Practical/Integrated)	:	Theory			
Course Category	:	CEC-1			
Stream	:	For Non Civil Stream	CIE	:	50 Marks
Teaching hour/week (L: T:P:S)	:	2:2:0:0	SEE	:	50 Marks
Total Hours	:	40 Hrs	SEE Duration	:	3 Hours
Credits	:	3			

**Course Learning Objectives:** Students will be taught

Sl.No	Course Objectives
1	To Make students know the scope of various specializations of civil engineering
2	To Develop students' ability to analyse the problems involving forces, moments with their applications in real term on site.
3	To Create awareness about Environment, and Built Environment
4	To Appraise the knowledge about Geotechnical, Transportation, Construction and Unique Areas of Civil Engineering

## Teaching-Learning Process

### Pedagogy (General Instructions):

These are sample Strategies; which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecture method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Show Video/animation films to explain the infrastructures and the mechanism involved in the principle.
3. Encourage collaborative (Group) Learning in the class.
4. Ask at least three HOT (Higher-order Thinking) questions in the class, which promotes critical thinking.
5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
6. Topics will be introduced in multiple representations.
7. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.

9. Individual teachers can devise innovative pedagogy to improve teaching-learning.



DSATM

**Scheme of Teaching and Examinations for BE Programme -2023-24  
Outcome Based Education and Choice Based Credit System (CBCS)  
(Effective from the Academic Year 2023-24)**

**COURSE SYLLABUS**

Module No.	Contents of the Module	Hours
1	<p><b>[A] Introduction to Civil Engineering:</b> Surveying, Structural Engineering, Geotechnical Engineering, Hydraulics &amp; Water Resources, Transportation Engineering, Environmental Engineering, Construction planning &amp; Project management.</p> <p><b>[B]Basic Materials of Construction:</b> Bricks, Cement &amp; mortars, Plain, Reinforced &amp; Pre-stressed Concrete, Structural steel, Construction Chemicals.</p> <p><b>[C] Structural elements of a building:</b> Foundation, plinth, lintel, chejja, Masonry wall, column, beam, slab and staircase, Plinth area, carpet area, floor area ratio, numerical problems, local building bye laws.</p>	08
Pedagogy	<b>Model Presentation for practical understanding: PPT reflecting all the verticals &amp; their scope</b>	
2	<p><b>Analysis of force systems:</b> Concept of idealization, system of forces, principles of superposition and transmissibility, Resolution and composition of forces, Law of Parallelogram of forces, Resultant of concurrent and non-concurrent coplanar force systems, moment of forces, couple, Varignon's theorem, free body diagram, equations of equilibrium, equilibrium of concurrent and non-concurrent coplanar forces systems.</p>	08
Pedagogy	<b>Chalk &amp; Talk: Tutorial class for typical Problem solving</b>	
3	<p><b>Environment:</b> Water Supply and Sanitary systems, urban air pollution management, Solid waste management, identification of Landfill sites, urban flood control</p> <p><b>Built-environment:</b> Energy efficient buildings, recycling, Temperature and Sound control in buildings, Security systems; Smart buildings</p>	08
Pedagogy	<b>Group discussions- on importance of Energy efficient bids; Role play for Waste mgmt.</b>	
4	<p><b>Geo-technical Engineering:</b> Origin and formation of soil, Foundations-Importance, Types, and Factors to be considered in selection of foundations.</p> <p>Construction Technology : Prefabricated Structures, Construction Management principles and application, Drone Survey in construction</p>	08
Pedagogy	<b>Site visit to show difference between conventional &amp; PEB; PPT having foundation types &amp; selection criteria</b>	

5	<p><b>Transportation Engineering:</b> Importance and classification of roads and railways, types of highway pavements and its functions. Concepts of Multimodal transportation system- relevance and integration.</p> <p><b>Unique Areas:</b> Concepts of Automation and Robotics in Construction, Concept of Sustainability in Civil Engineering, Introduction to sustainable development goals, Concept of Smart, Clean and Safe city.</p>	08
Pedagogy	Chalk & Talk, Video presentation on Multi modal transit system: PPT showing concept of smart city, characteristics, considerations & Limitations	

**List of Experiments or Programs:**

Sl.No	Experiments/Programs	COs
1	Nil	

**Reference Books**

**Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)**

1	<i>Basic Civil Engineering &amp; Engineering Mechanics:</i> Bansal R.K., Rakesh Ranjan Beohar and Ahmad Ali Khan, Laxmi Publications 2015:
2	<i>Mechanics for Engineers, Statics and Dynamics:</i> Beer F. P. and Johnston E.R., Mc Graw Hill. 1987:
3	<i>Engineering Mechanics:</i> Irving H. Shames, Prentice-Hall, 2019:
4	<i>Elements of Civil Engineering and Engineering Mechanics:</i> Kolhapure B K, EBPB, 2014:
5	<i>Engineering Mechanics: Principles of Statics and Dynamics:</i> Hibbler R.C., Pearson Press, 2017:
6.	<i>Engineering Mechanics,</i> Timoshenko S, Young D.H., Rao J.V. Pearson Press, 5th Edition- 2017:

**Course Outcomes: At the end of the course, the student will be able to:**

CO	Course Outcomes	RBT Level	Level Indicator
CO1	Identify the various disciplines of civil engineering; Materials and Elements of Building, construction Bye-Laws	U	L2
CO2	Interpret the concepts and Importance of Environmental, Transportation, Geotechnical, Construction Technology concepts in construction industry.	A	L3
CO3	Analyse the Resultant of Force systems and Resolution of Force	An	L4
CO4	Evaluate modern construction technique that opens a project for public use in short span of starting; Role of advanced techniques like; Drone survey, construction project management ...etc..:	C	L5
CO5	Judging the existing Civil Engineering infrastructure works; Assessing the concept of Clean, Green, Safe & thus a smart city in maintaining sustainable Ecosystem, part of Civil engineering profession	E	L6

### Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	1	--	--	--	--	1	--	--	--	--	--	--	--	--
C02	3	2	--	--	--	1	1	--	--	--	--	--	--	--
C03	1	3	2	1	--	--		1	--	--	--	--	--	--
C04	--	1	2	--	1	--	1	2	1	1	--	1	1	1
C05	--	1	1	2	--	--	--	1	1	1	1	1	1	1

### Weblinks and Video Lectures (e-Resources):

1	<a href="https://www.youtube.com/watch?v=nGfVTNfNwnk&amp;list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT">https://www.youtube.com/watch?v=nGfVTNfNwnk&amp;list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT</a>
2	<a href="https://www.youtube.com/watch?v=ljDIIMvxeg&amp;list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT&amp;index=5">https://www.youtube.com/watch?v=ljDIIMvxeg&amp;list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT&amp;index=5</a>
3	<a href="https://www.youtube.com/watch?v=3YBXteL-qY4">https://www.youtube.com/watch?v=3YBXteL-qY4</a>
4	<a href="https://www.youtube.com/watch?v=lheoBL2QaqU&amp;list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT&amp;index=7">https://www.youtube.com/watch?v=lheoBL2QaqU&amp;list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT&amp;index=7</a>
5	<a href="https://www.youtube.com/watch?v=z95UW4wwzSc&amp;list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT&amp;index=10">https://www.youtube.com/watch?v=z95UW4wwzSc&amp;list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT&amp;index=10</a>
6	<a href="https://www.youtube.com/watch?v=ksmsp9OzAsI">https://www.youtube.com/watch?v=ksmsp9OzAsI</a>
7	<a href="https://www.youtube.com/watch?v=Zrc_gB1YYS0">https://www.youtube.com/watch?v=Zrc_gB1YYS0</a>
8	<a href="https://play.google.com/store/apps/details?id=vn.edu.best4u.com.bieudonoiluc">https://play.google.com/store/apps/details?id=vn.edu.best4u.com.bieudonoiluc</a>
9	<a href="https://play.google.com/store/apps/details?id=com.teobou">https://play.google.com/store/apps/details?id=com.teobou</a>

**Engineering Science Course (ESC) / Emerging Technology Course (ETC) / Programming Language Course (PLC)**

**3 Credits & 2 Credits Courses – Theory (if Integrated)**

Assessment Method	Component	Type of Assessments	Syllabus Coverage	Maximum Marks	Average	Reduced Marks	Minimum Passing Marks	Evaluation Details
<b>Total CIE Theory + Practical</b>				<b>50</b>	----	----	<b>20</b>	
<b>CIE</b>	<b>Theory</b>	Internal Assessment Test (IAT) - I	Module - 1 & 2	50	(50+50+50) / 3	<b>15</b>	<b>6</b>	Average of Three Internal test each of 50 Marks scale down the marks to 15 Marks
		Internal Assessment Test (IAT) - II	Module - 3 & 4	50				
		Internal Assessment Test (IAT) - III	Module - 5	50				
	<b>Continuous Comprehensive Assessment (CCA)</b>	CCA-1- Pedagogical Initiatives	Considering all the Modules	50	(50+50) / 2	<b>10</b>	<b>4</b>	Two CCA methods as per VTU Clause 22OB4.2 of regulations to be adopted. If CCA chosen is Project Based Learning, then one assessment method may be adopted
		CCA-2- Pedagogical Initiatives		50				
<b>Total CIE Theory</b>						<b>25</b>	<b>10</b>	Scale down Marks of IAT and CCA to 25

CIE	Practical	Conduction of Experiments	Continuous Evaluation of each experiment		Average of all Experiments	10	4	Performance of the Experiment (On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. 20 marks are for conducting the experiment and calculations/observations/output)	
			Record	05					10
			Observation book	05					
		Practical Test	Write up	15	50	----	10	4	One Internal Practical Test after conduction of all Experiments for 50 Marks
			Execution	25					
			Viva-voce	10					
		Open Ended Experiment	Write up	05	20	----	5	2	One experiment for 20 marks.  20 marks reduced to 05 marks
			Execution	10					
			Viva-voce	05					
		<b>Total CIE Practical</b>					25	10	Scale down Marks of Experiments, Record, Observation, Practical Test and Open-Ended Experiment

SEE		Theory exam	Entire theory syllabus including questions from lab Component in respective Modules	100	----	50	18	SEE Exam is theory Exam conducted for 100 Marks, scored Marks are scaled down to 50 Marks
<b>CIE + SEE</b>				100	----	----	40	

- The Minimum Marks to be secured in CIE to appear for SEE shall be 10 (40% of Maximum Marks – 25) in the Theory Component and 10 (40% of Maximum Marks – 25) in the Practical component.
- The Laboratory Component for the IPCC shall be for CIE only.
- However, in SEE, the Questions from the Laboratory Component shall be included in the respective Modules only.

Note: If few of the 3 Credit Courses are Integrated course type, for such courses the method suggested for 4 Credit IPCC Course shall be followed

#### 4 Credit Course – IPCC

**The Minimum Marks to be secured in CIE to appear for SEE shall be 10marks (40% of Maximum Marks – 25) in the Theory Component and 10 (40% of Maximum Marks -25) in the Practical Component. The Laboratory Component of the IPCC shall be for CIE only. However, in SEE the questions from the Laboratory Component shall be included in the respective Modules only.**

#### **Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum Marks (20 Marks out of 50).

The minimum passing mark for the SEE is 35% of the maximum Marks (18 Marks out of 50).

A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 Marks out of 100) in the total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

#### **Possible continuous and comprehensive assessment:**

Project based, Problem Based, Building Models, Lab-to-Land, Mobile Studio, Design and Programming Contest, Certification, Concept Map (Collage presentation/poster presentation), Case studies, Think-Pair-Share, Flipped classroom, storytelling. The assessment of these techniques can be either based on Quiz or rubrics.

The faculty can adopt any other CCA method of implementation and its assessment with prior approval of Program Assessment Committee (PAC).

#### **Continuous Internal Evaluation (CIE):**

The CIE Marks for the theory component of the IPCC shall be **25 Marks** and for the laboratory component **25 Marks**.

#### **CIE for the theory component of the IPCC**

#### **Internal Assessment test:**

**The IA test questions are to be framed to map the Course Outcomes(COs), Program Outcomes(POs) and the Blooms RBT Levels. Emphasis to be given for higher order RBT levels**

Three Tests each of **50 Marks**

- First test after 6<sup>th</sup> week of the semester (syllabus completion of 35 – 40%)
- Second test after 10<sup>th</sup> week of semester (syllabus completion of 65 – 70%)
- Third test after 14<sup>th</sup> week of semester (syllabus completion of 90 – 100%)

The average score of three test is taken and scaled down to **15 Marks**.

#### **Continuous and Comprehensive Assessment (CCA):**

Two of continuous and comprehensive assessment (CCA) to be conducted to attain COs and POs, evaluated each for **50 Marks**. Total Marks scored will be CCA1+CCA2 and scaled down to **10 Marks**.



- CCA1 after 4<sup>th</sup> week and CCA2 after 9<sup>th</sup> week. The evaluation includes either through quiz or rubrics
- CCA as project-based learning,
  - CCA is evaluated for **50 Marks** with review 1 of **20 Marks** after and review 2 of **30 Marks** includes project demonstration/competition and report submission.
  - The evaluation of review 1 after 6<sup>th</sup> weeks of semester and review 2 after 12<sup>th</sup> week of semester with project demonstration and submission of the report

Total score for CCA is **10 Marks**

Total Marks scored for theory component of CIE (IAT+ CCA) is **25 Marks**

#### **CIE for the practical component of the IPCC**

- On completion of every experiment/program in the laboratory, the students shall be evaluated and Marks shall be awarded on the same day. The **15 Marks** are for conducting the experiment and preparation of the laboratory record, the other **10 Marks shall be for the test** conducted at the end of the semester.
- The CIE Marks awarded in the case of the practical component shall be based on the continuous evaluation of the laboratory report and the conduction. Each experiment report can be evaluated for 05 Marks and conduction for 10Marks. Marks of all experiments' write-ups and conduction are added and averaged to 15 Marks.
- The laboratory test (**duration 03 hours**) at the end of the 15<sup>th</sup> week of the semester/after completion of all the experiments (whichever is early) shall be conducted for 50 Marks and scaled down to **05 Marks**.
- Scaled-down Marks of write-up, evaluations and tests, will be added as CIE Marks for the laboratory component of IC/IPCC for **25 Marks**.
- The minimum Marks to be secured in CIE to appear for SEE shall be 10 (40% of maximum Marks) in the theory component and 10 (40% of maximum Marks) in the practical component.
- The laboratory component of the IC/IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included. The maximum of 05 questions is to be set from the practical component of IC/IPCC, the total Marks of all questions should not be more than 25 Marks.

The theory component of the IPCC shall be for both CIE and SEE.

#### **Semester End Examination (SEE):**

- Theory SEE will be conducted as per the scheduled timetable, with common question papers for the subject
- The question paper shall be set for 100 Marks. The medium of the question paper shall be English. **The duration of SEE is 03 hours.**
- The question paper will have 10 questions. Two questions per module. Each question is set for 20 Marks. The student has to answer 5 full questions, selecting one full question from each module summing up to maximum score of 100 Marks. **Marks scored out of 100 shall proportionally be reduced to 50 Marks.**
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module. The two questions shall be of same course outcome, program outcome and Blooms RBT level. Emphasis to be given for higher order RBT levels

### **3 Credit Course – Theory**

**Note: A few of the Courses of 3 Credit are Integrated Course Type, for such courses the method suggested for 4 Credit IPCC shall be followed.**

#### **Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum Marks (20 Marks out of 50).

The minimum passing mark for the SEE is 35% of the maximum Marks (18 Marks out of 50).

A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 Marks out of 100) in the total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

**Possible continuous and comprehensive assessment:**

Project based, Problem Based, Building Models, Lab-to-Land, Mobile Studio, Design and Programming Contest, Group Problem Solving, Certification, Concept Map (Collage presentation/poster presentation), Case studies, Think-Pair-Share, Flipped classroom, storytelling. The assessment of these techniques can be either based on Quiz or rubrics.

The faculty may adopt any other CCA method of implementation and its assessment with prior approval of Program Assessment Committee (PAC).

**Continuous Internal Evaluation (CIE):**

The CIE Marks for the internal assessment test shall be **25 Marks** and for the continuous and comprehensive assessment (CCA) shall be **25 Marks**.

**Internal Assessment test:**

**The IA test questions are to be framed to map the course outcomes, program outcomes and the Blooms RBT Levels. Emphasis to be given for higher order RBT levels**

Three Tests each of **50 Marks** scaled down to **25 Marks**

- First test after 6<sup>th</sup> week of the semester (syllabus completion of 35 – 40%)
- Second test after 10<sup>th</sup> week of semester (syllabus completion of 65 – 70%)
- Third test after 14<sup>th</sup> week of semester (syllabus completion of 90 – 100%)

The average score of three test is taken and scaled down to **25 Marks**.

**Continuous and Comprehensive Assessment (CCA):**

Two of continuous and comprehensive assessment (CCA) to be conducted to attain COs and POs, evaluated each for **50 Marks**. Total Marks scored will be CCA1+CCA2 and scaled down to **25 Marks**.

- CCA1 after 4<sup>th</sup> week and CCA2 after 9<sup>th</sup> week. The evaluation includes either through quiz or rubrics
- CCA as project-based learning,
  - CCA is evaluated for **50 Marks** with review 1 of **20 Marks** after and review 2 of **30 Marks** includes project demonstration/competition and report submission.
  - The evaluation of review 1 after 6<sup>th</sup> weeks of semester and review 2 after 12<sup>th</sup> week of semester with project demonstration and submission of the report

Total score for CCA is **25 Marks**

Total Marks scored for theory component of CIE (IAT + CCA) is **50 Marks**

**Semester End Examination (SEE):**

- Theory SEE will be conducted as per the scheduled timetable, with common question papers for the subject
- The question paper shall be set for 100 Marks. The medium of the question paper shall be English. **The duration of SEE is 03 hours.**

- The question paper will have 10 questions. Two questions per module. Each question is set for 20 Marks. The student must answer 5 full questions, selecting one full question from each module summing up to maximum score of 100 Marks. Marks scored out of 100 shall proportionally be reduced to 50 Marks.
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module. The two questions shall be of same course outcome, program outcome and Blooms RBT level. Emphasis to be given for higher order RBT levels

### CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Theory					Practical
	Continuous Assessment Tests			Continuous Comprehensive Assessment (CCA)		Practical Test
	IAT-1	IAT-2	IAT-3	CCA-1	CCA-2	
	50 Marks	50 Marks	50 Marks	50 Marks	50 Marks	50 Marks
Remember	12	10				-----
Understand	14	16				-----
Apply	18	16		12	12	-----
Analyse	6	8		14	14	-----
Evaluate	--	--		14	14	-----
Create	--	--		10	10	-----

### CIE Course Assessment Plan

CO's	Marks Distribution					Total Marks	Weightage
	Test-1		Test-2		Test-3		
	Module-1	Module-2	Module-3	Module-4	Module-5		
CO1	10	05	05	05	05	30	30%
CO2	05	--	10	05	15	25	25%
CO3	10	10	--	05	15	30	30%
CO4	--	10	--	--	05	10	10%
CO5	--	--	10	10	10	30	30%
CO6	--	--	--	--	--	--	0%
<b>Total</b>	<b>25</b>	<b>25</b>	<b>25</b>	<b>25</b>	<b>50</b>		

### SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	10
Understand	10
Apply	10

Analyse	10
Evaluate	10
Create	--

### SEE Course Plan

CO's	Marks Distribution					Total Marks	Weightage
	Module-1	Module-2	Module-3	Module-4	Module-5		
CO1	5	--	5	5	5	20	40%
CO2	--	--	5	--	5	10	20%
CO3	--	10	--	--	--	10	20%
CO4	5	--	--	5	--	10	20%
<b>Total</b>	<b>10</b>	<b>10</b>	<b>10</b>	<b>10</b>	<b>10</b>	<b>50</b>	<b>100%</b>

### Course Contents and Lecture Schedule

Module No.	Topics	No. of Lectures
1	<b>Introduction to Civil Engineering And</b>	
1	[A] Introduction to Civil Engineering: Surveying, Structural Engineering, Geo-technical Engineering, Hydraulics & Water Resources	1
1	Transportation Engineering, Environmental Engineering, and Construction planning & Project management.	1
1	[B] Basic Materials of Construction: Bricks, Cement & mortars, Plain, Reinforced	1
1	& Pre-stressed Concrete, Structural steel, Construction Chemicals.	1
1	[C] Structural elements of a building: Foundation, plinth, lintel, chejja	1
1	Masonry wall, column, beam, slab and staircase	1
1	Plinth area, carpet area, floor area ratio	1
1	Numerical problems, local building bye laws.	1
2	<b>Analysis of force systems:</b>	
2	Analysis of force systems: Concept of idealization, system of forces, principles of superposition and transmissibility <sup>2</sup>	1
2	Resolution and composition of forces and numerical problems.	1
2	Law of Parallelogram of forces and numerical problems.	1
2	Resultant of concurrent and non-concurrent coplanar force systems and numerical problems.	1
2	Moment of forces, couple, Varignon's theorem, free body diagram, equations of equilibrium, equilibrium of concurrent and numerical problems.	1

2	Moment of forces, couple and numerical problems.	1
2	Varignon's theorem, free body diagram and numerical problems.	1
2	Equations of equilibrium, equilibrium of concurrent and non-concurrent coplanar forces systems and numerical problems.	1
3	<b>Environment And Built Environment</b>	1
3	Environment: Water Supply and Sanitary systems	1
3	Solid waste management And Identification of Landfill sites;	1
3	urban air pollution management, And Urban flood control	1
3	Built-environment: Energy efficient buildings	1
3	Temperature and Sound control in buildings	1
3	Concept of Recycling; Security systems & Smart Buildings	1
4	<b>Geo-technical Engineering:</b>	
4	Geo-technical Engineering: Origin and formation of soil	1
4	Foundations-Importance And Types of foundations.	1
4	Factors to be considered in selection of foundations.	1
4	Construction Technology : Prefabricated Structures.	1
4	Construction Management principles.	1
4	Construction Management application	1
4	Drone Survey in construction	1
5	<b>Transportation Engineering And Unique Areas:</b>	
5	Importance and classification of roads and railways	1
5	Importance of railways	1
5	Types of highway pavements and its functions.	1
5	Concepts of Multimodal transportation system- relevance and integration.	1
5	Unique Areas: Concepts of Automation and Robotics in Construction	1
5	Concept of Sustainability in Civil Engineering	1
5	Introduction to sustainable development goals	1
5	Concept of Smart, Clean and Safe city.	1
<b>Total</b>		<b>40 Hrs</b>



# Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

<b>Semester</b>	:	<b>2<sup>nd</sup></b>	
<b>Course Title</b>	:	<b>Introduction to Internet of Things (IOT)</b>	
<b>Course Code</b>	:	<b>23ETCS23</b>	
<b>Course Type (Theory/ Practical/ Integrated)</b>	:	<b>Theory</b>	
<b>Course Category</b>	:	<b>ETC</b>	
<b>Stream</b>	:	<b>CSE Stream</b>	<b>CIE</b> : <b>50 Marks</b>
<b>Teaching hours/week (L: T:P:S)</b>	:	<b>2:0:0:2</b>	<b>SEE</b> : <b>50 Marks</b>
<b>Total Hours</b>	:	<b>40 Hrs</b>	<b>SEE Duration</b> : <b>3 Hours</b>
<b>Credits</b>	:	<b>3</b>	

**Course Learning Objectives:** Students will be taught

Sl.No	Course Objectives
1	<ul style="list-style-type: none"> <li>• Understand about the fundamentals of Internet of Things and its building blocks along with their characteristics.</li> </ul>
2	<ul style="list-style-type: none"> <li>• Understand the recent application domains of IoT in everyday life.</li> </ul>
3	<ul style="list-style-type: none"> <li>• Gain insights about the current trends of Associated IOT technologies and IOT Analytics'.</li> </ul>
4	<ul style="list-style-type: none"> <li>• To come out with real time projects addressing the socio economic problems prevailing in the society</li> </ul>

### Teaching-Learning Process

#### Pedagogy (General Instructions):

These are sample Strategies; which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecture method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Show Video/animation films to explain the infrastructures and the mechanism involved in the principle.
3. Encourage collaborative (Group) Learning in the class.
4. Ask at least three HOT (Higher-order Thinking) questions in the class, which promotes critical thinking.
5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
6. Topics will be introduced in multiple representations.
7. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.
9. Individual teachers can devise innovative pedagogy to improve teaching-learning.



DSATM

Scheme of Teaching and Examinations for BE Programme -2023-24  
Outcome Based Education and Choice Based Credit System (CBCS)  
(Effective from the Academic Year 2023-24)

**COURSE SYLLABUS**

Module No.	Contents of the Module	Hours
1	<b>Basics of Networking:</b> Introduction, Network Types, Layered network models, Addressing, TCP/IP Transport layer, Internetworking, ipv4, ipv6, Transition from ipv4 to ipv6. <b>Emergence of IoT:</b> Introduction, Evolution of IoT, Enabling IoT and the Complex Interdependence of Technologies, IoT Networking Components Textbook 1: Chapter 1- 1.1 to 1.5, Chapter 4 – 4.1 to 4.4 . Text Book 2:Chapter 20 – 20.1 to 20.4	8 hrs
<b>Pedagogy</b>	<b>ICT Based Learnings, Project</b>	
2	<b>IoT Sensing and Actuation:</b> Introduction, Sensors, Sensor Characteristics, Sensorial Deviations, Sensing Types, Sensing Considerations, Actuators, Actuator Types, Actuator Characteristics. Textbook 1: Chapter 5 – 5.1 to 5.9	8 hrs
<b>Pedagogy</b>	<b>ICT Based Learnings ,Project</b>	
3	IoT Processing Topologies and Types: Data Format, Importance of Processing in IoT, Processing Topologies, IoT Device Design and Selection Considerations, Processing Offloading. Textbook 1: Chapter 6 – 6.1 to 6.5	8 hrs
<b>Pedagogy</b>	<b>ICT Based Learnings ,Project</b>	
4	ASSOCIATED IOT TECHNOLOGIES Cloud Computing: Introduction, Virtualization, Cloud Models, Service-Level Agreement in Cloud Computing, Cloud Implementation, Sensor-Cloud: Sensors-as-a-Service.  IOT CASE STUDIES Agricultural IoT – Introduction and Case Studies  Textbook 1: Chapter 10– 10.1 to 10.6; Chapter 12- 12.1-12.2	8 hrs
<b>Pedagogy</b>	<b>Project, Collaborative Learning</b>	
5	IOT CASE STUDIES AND FUTURE TRENDS Vehicular IoT – Introduction Healthcare IoT – Introduction, Case Studies IoT Analytics – Introduction Introduction to Arduino, Arduino UNO Programming.	

	Textbook 1: Chapter 13– 13.1; Chapter 14- 14.1-14.2; Chapter 17- 17.1 ;Text Book 4 : Chapter 7 – 7.1 to 7.4	<b>8 hrs</b>
<b>Pedagogy</b>	<b>Project, Collaborative Learning</b>	

**List of Experiments or Programs using Arduino/Raspberry Pi**

Sl.No	Experiments/Programs	Cos
1	<b>Networking Projects to understand Internet Connectivity to IoT</b>	<b>CO4</b>
2	<b>Basic Working of Sensors using Hardware and Software</b>	<b>CO4</b>
3	<b>Reading Temperature and Relative Humidity value from Sensor</b>	<b>CO4</b>
4	<b>Understanding of IPV4 and IPV6 Protocol Study</b>	<b>CO4</b>
5	<b>Sensor Networks: Wireless Sensor Networks, Sensor Nodes</b>	<b>CO4</b>
6	<b>Understanding IoT Working by using Tinkercad Simulation Software</b>	<b>CO5</b>
7	<b>Implementation of different modules using Tinkercad</b>	<b>CO5</b>
8	<b>Implementation of IoT with Raspberry Pi</b>	<b>CO5</b>
9	<b>Health Monitoring System</b>	<b>CO5</b>
10	<b>Smart Agriculture System</b>	<b>CO5</b>

**Reference Books**

**Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)**

1	Sudip Misra, Anandarup Mukherjee, Arijit Roy, "Introduction to IoT", Cambridge University Press 2021. Reference:
2	Behrouz A. Forouzan, "Data Communications and Networking", McGraw-Hill, Fourth edition, 2007, Page no: 579 to 587 , 596 to 605.
3	S. Misra, C. Roy, and A. Mukherjee, 2020. Introduction to Industrial Internet of Things and Industry 4.0. CRC Press.
4	Srinivasa K G, " Internet of Things", CENGAGE learning India, 2017.
5	Sudip Misra, "IOT PPT", Lecture 22 - "Introduction to Arduino". Reference: <a href="http://www.infocobuild.com/education/audio-video-courses/computer-science/introduction-to-iiit-kharagpur.html">http://www.infocobuild.com/education/audio-video-courses/computer-science/introduction-to-iiit-kharagpur.html</a>
6	Vijay Madiseti and Arshdeep Bahga, "Internet of Things (A Hands-on-Approach)", 1st Edition, VPT, 2014.
7	Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", 1st Edition, Apress Publications, 2013.



**Course Outcomes: At the end of the course, the student will be able to:**

CO	Course Outcomes	RBT Level	Level Indicator
C01	Describe the evolution of IoT, IoT networking components, Internet Protocols and addressing strategies in IoT.	Remember	L1
C02	Classify various sensing devices and actuator types.	Understand	L2
C03	Demonstrate the processing in IoT.	Apply	L3
C04	Analysing different Associated IOT Technologies	Analyze	L4
C05	Develop the IOT applications using Arduino/ Raspberry Pi	Create	L6

**Mapping of Course Outcomes to Program Outcomes:**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	--	--	--	--	--	--	--	--	--	--	--	--	2	1
C02	3	--	--	--	--	--	--	--	--	--	--	--	--	--
C03	3	--	--	--	--	--	--	--	--	--	--	--	--	--
C04	--	3	--	--	3	1	1	1	3	2	--	3	2	2
C05	--	--	--	--	3	1	1	1	3	2	--	3	2	2

**Weblinks and Video Lectures (e-Resources)**

1	<a href="https://nptel.ac.in/noc/courses/noc19/SEM1/noc19-cs31/">https://nptel.ac.in/noc/courses/noc19/SEM1/noc19-cs31/</a>
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Assessment Pattern (both CIE and SEE)

Engineering Science Course (ESC) / Emerging Technology Course (ETC) / Programming Language Course (PLC)

3 Credits & 2 Credits Courses – Theory (if Integrated)

Assessment Method	Component	Type of Assessments	Syllabus Coverage	Maximum Marks	Average	Reduced Marks	Minimum Passing Marks	Evaluation Details
<b>Total CIE Theory + Practical</b>				<b>50</b>	----	----	<b>20</b>	
<b>CIE</b>	<b>Theory</b>	Internal Assessment Test (IAT) - I	Module - 1 & 2	50	$(50+50+50) / 3$	<b>15</b>	6	Average of Three Internal test each of 50 Marks scale down the marks to 15 Marks  Two CCA methods as per VTU Clause 22OB4.2 of regulations to be adopted. If CCA chosen is Project Based Learning, then one assessment method may be adopted
		Internal Assessment Test (IAT) - II	Module - 3 & 4	50				
		Internal Assessment Test (IAT) - III	Module - 5	50				
	<b>Continuous Comprehensive Assessment (CCA)</b>	CCA-1- Pedagogical Initiatives	Considering all the Modules	50	$(50+50) / 2$	<b>10</b>	4	
		CCA-2- Pedagogical Initiatives		50				
<b>Total CIE Theory</b>						<b>25</b>	10	Scale down Marks of IAT and CCA to 25

CIE	Project/ Practical	Conduction of Experiments	Continuous Evaluation of each experiment			Average of all Experiments	10	4	Performance of the Experiment (On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. 20 marks are for conducting the experiment and calculations/observations/output)
			Record	05	10				
			Observation book	05					
		Practical Test	Write up	15	50	----	10	4	One Internal Practical Test after conduction of all Experiments for 50 Marks
			Execution	25					
			Viva-voce	10					
		Open Ended Experiment	Write up	05	20	----	5	2	One experiment for 20 marks.  20 marks reduced to 05 marks
			Execution	10					
			Viva-voce	05					
		<b>Total CIE Practical</b>						25	10

<b>SEE</b>		Theory exam	Entire theory syllabus including questions from lab Component in respective Modules	100	----	50	18	SEE Exam is theory Exam conducted for 100 Marks, scored Marks are scaled down to 50 Marks
<b>CIE + SEE</b>				100	----	----	40	

- The Minimum Marks to be secured in CIE to appear for SEE shall be 10 (40% of Maximum Marks – 25) in the Theory Component and 10 (40% of Maximum Marks – 25) in the Practical component.
- The Laboratory Component for the IPCC shall be for CIE only.
- However, in SEE, the Questions from the Laboratory Component shall be included in the respective Modules only.

Note: If few of the 3 Credit Courses are Integrated course type, for such courses the method suggested for 4 Credit IPCC Course shall be followed

**The Minimum Marks to be secured in CIE to appear for SEE shall be 10 (40% of Maximum Marks – 25) in the Theory Component and 10 (40% of Maximum Marks -25) in the Practical Component. The Laboratory Component of the IPCC shall be for CIE only. However, in SEE the questions from the Laboratory Component shall be included in the respective Modules only.**

**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum Marks (20 Marks out of 50).

The minimum passing mark for the SEE is 35% of the maximum Marks (18 Marks out of 50).

A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 Marks out of 100) in the total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

**Possible continuous and comprehensive assessment:**

Project based, Problem Based, Building Models, Lab-to-Land, Mobile Studio, Design and Programming Contest, Certification, Concept Map (Collage presentation/poster presentation), Case studies, Think-Pair-Share, Flipped classroom, storytelling. The assessment of these techniques can be either based on Quiz or rubrics.

The faculty can adopt any other CCA method of implementation and its assessment with prior approval of Program Assessment Committee (PAC).

**Continuous Internal Evaluation (CIE):**

The CIE Marks for the theory component of the IC shall be **25 Marks** and for the laboratory component **25 Marks**.

**CIE for the theory component of the IC**

**Internal Assessment test:**

**The IA test questions are to be framed to map the Course Outcomes (COs), Program Outcomes (POs) and the Blooms RBT Levels. Emphasis to be given for higher order RBT levels**

Three Tests each of **50 Marks** scaled down to **25 Marks**

- First test after 6<sup>th</sup> week of the semester (syllabus completion of 35 – 40%)
- Second test after 10<sup>th</sup> week of semester (syllabus completion of 65 – 70%)
- Third test after 14<sup>th</sup> week of semester (syllabus completion of 90 – 100%)

The average score of three test is taken and scaled down to **15 Marks**.

**Continuous and Comprehensive Assessment (CCA):**

Two of continuous and comprehensive assessment (CCA) to be conducted to attain COs and POs, evaluated each for **50 Marks**. Total Marks scored will be CCA1+CCA2 and scaled down to **10 Marks**.

- CCA1 after 4<sup>th</sup> week and CCA2 after 9<sup>th</sup> week. The evaluation includes either through quiz or rubrics
- CCA as project-based learning,
  - CCA is evaluated for **50 Marks** with review 1 of **20 Marks** after and review 2 of **30 Marks** includes project demonstration/competition and report submission.
  - The evaluation of review 1 after 6<sup>th</sup> weeks of semester and review 2 after 12<sup>th</sup> week of semester with project demonstration and submission of the report

Total score for CCA is **10 Marks**

Total Marks scored for theory component of CIE (IAT+ CCA) is **25 Marks**

**CIE for the practical component of the IC**

- On completion of every experiment/program in the laboratory, the students shall be evaluated and Marks shall be awarded on the same day. The **10 Marks** are for conducting the experiment and preparation of the laboratory record, the other **10 Marks shall be for the test** conducted at the end of the semester and **5 Marks** for conducting Open Ended Experiments.
- The CIE Marks awarded in the case of the practical component shall be based on the continuous evaluation of the laboratory report and the conduction. Each experiment report can be evaluated for 05 Marks conduction(Observation Book) and 5 Marks for Record Book. Marks of all experiments' write-ups and conduction are added and scaled to **10 Marks**.
- The Practical laboratory test (**duration 03 hours**) at the end of the 15<sup>th</sup> week of the semester/after completion of all the experiments (whichever is early) shall be conducted for **50 Marks** and scaled down to **10 Marks**.
- Open Ended Experiments are conducted after the completion of regular Experiments/Programs for 20 Marks and scaled down to **5 Marks**
- Scaled-down Marks of write-up, evaluations and tests, will be added as CIE Marks for the laboratory component of IC/IPCC for **25 Marks**.
- The minimum Marks to be secured in CIE to appear for SEE shall be 10 (40% of maximum Marks) in the theory component and 10 (40% of maximum Marks) in the practical component.
- The laboratory component of the IC/IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included. The maximum of 05 questions is to be set from the practical component of IC/IPCC, the total Marks of all questions should not be more than 25 Marks.

The theory component of the IC shall be for both CIE and SEE.

**Semester End Examination (SEE):**

- Theory SEE will be conducted as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)
- The question paper shall be set for 100 Marks. The medium of the question paper shall be English. The duration of SEE is 03 hours.
- The question paper will have 10 questions. Two questions per module. Each question is set for 20 Marks. The student has to answer 5 full questions, selecting one full question from each module summing up to maximum score of 100 Marks. Marks **scored out of 100 shall proportionally be reduced to 50 Marks**.
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module. The two questions should be of same course outcome, program outcome and Blooms RBT level. Emphasis to be given for higher order RBT levels

### CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Theory					Project/Practical
	Continuous Assessment Tests			Continuous Comprehensive Assessment (CCA)		Project /Practical Test
	IAT-1	IAT-2	IAT-3	CCA-1	CCA-2	
	50 Marks	50 Marks	50 Marks	50 Marks	50 Marks	50 Marks
Remember	18	18	18	10	10	05
Understand	16	16	16	10	10	05
Apply	16	16	16	10	10	10
Analyse				4	4	10
Evaluate						10
Create				16	16	10

### CIE Course Assessment Plan

CO's	Marks Distribution					Total Marks	Weightage
	Test-1		Test-2		Test-3		
	Module-1	Module-2	Module-3	Module-4	Module-5		
CO1	4	3	3			10	20%
CO2	6	6	3			15	30%
CO3			4	4	4	12	24%
CO4				4	3	07	14%
CO5				3	3	06	12%
<b>Total</b>	<b>10</b>	<b>9</b>	<b>10</b>	<b>11</b>	<b>10</b>	<b>50</b>	<b>100%</b>

### SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	12
Understand	13
Apply	15
Analyse	5
Evaluate	--
Create	5

## SEE Course Plan

CO's	Marks Distribution					Total Marks	Weightage
	Module-1	Module-2	Module-3	Module-4	Module-5		
CO1	3	2	3	2	2	12	24%
CO2	3	3	3	2	2	13	26%
CO3	--	--	5	5	5	15	30%
CO4	--	--	1	2	2	5	10%
CO5	--	--	--	2	3	5	10%
<b>Total</b>	<b>6</b>	<b>5</b>	<b>12</b>	<b>13</b>	<b>14</b>	<b>50</b>	<b>100%</b>

## Course Contents and Lecture Schedule

Module No.	Topics	No. of Lectures
1	<b>Basics of Networking:</b> Introduction	1
2	Network Types	1
3	Layered network models	1
4	Addressing, TCP/IP Transport layer	1
5	Internetworking, ipv4, ipv6 Transition from ipv4 to ipv6	1
6	<b>Emergence of IoT:</b> Introduction ,Evolution of IoT	1
7	Enabling IoT	1
8	Complex Interdependence of Technologies	1
9	IoT Networking Components	1
10	Project	2
11	<b>IoT Sensing and Actuation:</b> Introduction, Sensors	1
12	Sensor Characteristics	1
13	Sensorial Deviations, Sensing Types	1
14	Sensing Considerations, Actuators	1
15	Actuator Types, Actuator Characteristics.	1
16	Data Format	1
17	Importance of Processing in IoT	1
18	Processing Topologies	1
19	IOT Device Design and Selection Considerations	1
20	Processing Offloading.	1
21	Project	2
22	ASSOCIATED IOT TECHNOLOGIES	1
23	Cloud Computing: Introduction	1
24	Virtualization, Cloud Models	1
25	Service-Level Agreement in Cloud Computing	1
26	Cloud Implementation, Sensor-Cloud: Sensors-as-a-Service.	1
27	IOT CASE STUDIES ,Agricultural IoT – Introduction and Case Studies	1



<b>28</b>	Project	<b>3</b>
<b>29</b>	IOT CASE STUDIES AND FUTURE TRENDS	<b>1</b>
<b>30</b>	Vehicular IoT – Introduction	<b>1</b>
<b>31</b>	Healthcare IoT – Introduction	<b>1</b>
<b>32</b>	Case Studies IoT Analytics – Introduction to Arduino	<b>1</b>
<b>33</b>	Arduino UNO Programming	<b>1</b>
<b>34</b>	Project	<b>3</b>
<b>Total</b>		<b>40 Hrs</b>



# Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	2 <sup>nd</sup>		
Course Title	:	Introduction to Python Programming		
Course Code	:	23PLCS21		
Course Type (Theory/ Practical/ Integrated)	:	Integrated		
Category	:	PLC / PBL		
Stream	:	Common to all branches	CIE	: 50 Marks
Teaching hours/ week (L:T:P:S)	:	2:0:2:0	SEE	: 50 Marks
Total Hours	:	28+12=40 Hrs	SEE Duration	: 3 Hours
Credits	:	03		

**Course Learning Objectives:** Students will be able to:

Sl. No	Course Objectives
1	Learn the syntax and semantics of the Python programming language.
2	Illustrate the process of structuring the data using lists, tuples
3	Analyse string manipulation and pattern matching methods
4	Demonstrate the use of built-in functions to navigate the file system.
5	Implement the Object-Oriented Programming concepts in Python.

### Teaching-Learning Process

#### Pedagogy:

Some sample strategies to accelerate the attainment of the various course outcomes are listed below:

1. Adopt different teaching methods to attain the course outcomes.
2. Include videos to demonstrate various concepts in Python.
3. Encourage collaborative (Group) learning to enhance team building.
4. Include at least three **HOTs (Higher-order Thinking Skills)** modulewise questions to promote critical thinking.
5. Adopt **Problem-Based Learning (PBL)**, which fosters students' analytical skills and develops thinking skills such as evaluating, generalizing, and analysing information rather than simply recalling it.
6. Show different ways to solve a problem and encourage the students to come up with creative and optimal solutions.
7. Discuss various case studies to map with real world scenarios and improve the understanding.
8. Devise innovative pedagogy to improve **Teaching-Learning Process (TLP)**.



DSATM

Scheme of Teaching and Examinations for BE Programme -2023-24  
Outcome Based Education and Choice Based Credit System (CBCS)  
(Effective from the Academic Year 2023-24)

COURSE CURRICULUM

Module No.	Contents of the Module	Hours
1	<p><b>Python Basics:</b> Entering Expressions into the Interactive Shell, The Integer, Floating-Point, and String Data Types, String Concatenation and Replication, Storing Values in Variables, Your First Program, Dissecting Your Program.</p> <p><b>Flow control:</b> Boolean Values, Comparison Operators, Boolean Operators, Mixing Boolean and Comparison Operators, Elements of Flow Control, Program Execution, Flow Control Statements, Importing Modules.</p>	6
2	<p><b>Functions:</b> def Statements with Parameters, Return Values and return Statements, The None Value, Keyword Arguments and print (), Local and Global Scope, The global Statement, Exception Handling, Recursion.</p> <p><b>Lists:</b> The List Data Type, Working with Lists, Methods, List Memory management List-like Types. Tuples- Working with Tuples</p>	6
3	<p><b>Dictionaries:</b> The Dictionary Data Type, Method, Working with dictionaries, types, data set handling with dictionaries, Pretty Printing.</p> <p><b>Strings:</b> Working with Strings, Useful String Methods, Pattern matching with Regular Expressions, Patten matching without Regular Expressions</p>	5
4	<p><b>Files operations:</b> Files and File Paths, The os. path Module, File Operations, Compressing Files with the zip file, exception handling.</p> <p><b>Classes and objects:</b> Defining a Class, Defining a Method, Instantiating an Object, Invoking a Method, Using Constructor, Using Class Attributes and Static Methods, Understanding Object, property , decorators, composition and aggregation</p>	5
5	<p><b>Object-Oriented Programming:</b> Encapsulation, Polymorphism, Abstraction, Inheritance</p> <p><b>Scientific Computing Using Python:</b> Data analysis and numerical computing with NumPy and plotting, Introduction to scipy, pandas, Scikit-learn, pytorch.</p>	6

**Pedagogical Initiatives (Not limited to):**

- **Think Pair and Share (Blended Learning):** provides an opportunity for students to learn from one another
- **Problem Solving:** encourages cognitive thinking and enables creative problem solving
- **Poster Presentation:** allows students to represent the concepts visually in order to understand the topics easily.
- **Case studies:** maps different domains in real time applications
- **Demonstration:** exhibits the implementation process

## List of Programs

**Getting Started:** Introducing Python, Setting Up Python in operating systems like windows, LINUX etc., Python in Real time Applications.

**Note:** Python platforms to be used: Anaconda, Pycharm, IDLE.

Sl. No.	List of Programs	COs
1.	a. Develop a program to read the student details like Name, USN, and Marks in three subjects. Display the student details, total marks and percentage with suitable messages. b. Develop a Python program to check whether a given number is palindrome or not and also count the number of occurrences of each digit in the input number	CO1
2.	a. Develop a program to generate Fibonacci sequence of length (N). Read N from the console. b. Write a function to calculate factorial of a number with and without recursion.	CO2
3.	a. Read N numbers from the console and create a list. Develop a program to print mean, variance and standard deviation with suitable messages using functions. b. Develop a python program to convert binary to decimal, octal to hexadecimal using functions.	CO2
4.	Read a multi-digit number (as chars) from the console. Develop a program to print the frequency of each digit with suitable messages.	CO2
5.	a. Develop a program to print 10 most frequently appearing words in a text file. [Hint: Use dictionary with distinct words and their frequency of occurrences. Sort the dictionary in the reverse order of frequency and display dictionary slice of first 10 items] b. Develop a program to sort the contents of a text file and write the sorted contents into a separate text file. [Hint: Use string methods strip(), len(), list methods sort(), append(), and file methods open(), read lines(), and write()].	CO3
6.	a. Develop a program to backing Up a given Folder (Folder in a current working directory) into a ZIP File by using relevant modules and suitable methods. b. Write a function named DivExp which takes TWO parameters a, b and returns a value c ( $c=a/b$ ). Write suitable assertion for $a>0$ in function DivExp and raise an exception for when $b=0$ . Develop a suitable program which reads two values from the console and calls a function DivExp.	CO3
7.	a. Develop a Python program to demonstrate find all function and character class using regex module. b. Develop a python program that could search the text in a file for phone numbers (+919900889977) and email addresses ( <a href="mailto:sample@gmail.com">sample@gmail.com</a> ).	CO4

8.	Define a function which takes TWO objects representing complex numbers and returns new complex number with a addition of two complex numbers. Define a suitable class 'Complex' to represent the complex number. Develop a program to read N (N >=2) complex numbers and to compute the addition of N complex numbers.	CO3
9.	Develop a program that uses class Student which prompts the user to enter marks in three subjects and calculates total marks, percentage and displays the score card details. [Hint: Use list to store the marks in three subjects and total marks. Use __init__() method to initialize name, USN and the lists to store marks and total, Use getMarks() method to read marks into the list, and display() method to display the score card details.].	CO3
10.	Develop a program to convert list and dictionary into NumPy array	CO5
	<p><b>Open Ended Questions:</b></p> <ol style="list-style-type: none"> <li>1. Design a web page using Flask in python.</li> <li>2. Demonstrate Web scraping using suitable example.</li> <li>3. Demonstrate API Integration.</li> <li>4. Demonstrate about Data Visualization.</li> <li>5. Demonstrate GUI Applications.</li> <li>6. Demonstrate E-mail Automation.</li> </ol>	

### Programming Language Course / Project Based Learning (PLC/PBL): Introduction to Python Programming

This Course refers to Professional Theory Core Course Integrated with Practical Component Credit for this course can be 03 and its Teaching Learning hours (L: T: P: PJ) can be considered as (2: 0: 2: 0).

#### CIE for Practical component of the PLC/PBL:

**15 marks** for the conduction of practical experiment and preparation of the Laboratory record, and **10 marks** for the test to be conducted after the completion of all the laboratory sessions.

On completion of every program in the laboratory, the student shall be evaluated including viva-voce and marks shall be awarded on the same day.

Each program report can be evaluated for **15 marks** (Write-up – 3 marks, Execution – 8 marks .and Viva – 4 marks)

The Laboratory test (duration 2 hours / 3 hours) after completion of all the programs shall be conducted for 50 marks and scaled down to **10 marks**.

The project review (periodical review) shall be conducted for 50 marks and scale down to **10 marks**.

The theory part shall be evaluated both by CIE and SEE. The practical part shall be evaluated by only CIE (no SEE).

However, questions from the practical part of PLC/PBL shall be included in the SEE question paper. This course is common to all branches of first year B.E 2023-24 regulation.

**Note:** L- Theory Lecture, T- Tutorial, P-Practical, PJ-Project, CIE: Continuous Internal Evaluation, SEE: Semester End Examination.

**Text Books**

1. **Automate the Boring Stuff with Python**, Al Sweigart, No Starch Press, 1<sup>st</sup> Edition, 2015
2. **Scientific Computing with Python: High-performance scientific computing with NumPy, SciPy, and pandas** by Claus Fuhrer, Jan Erik Solem, Olivier Verdier, Pakt publications, 2<sup>nd</sup> Edition, 2021

**Reference Books**

1. **Think Python: How to Think Like a Computer Scientist**, Allen B. Downey, Green Tea Press 2<sup>nd</sup> Edition, 2015.
2. **Python for data analysis**, Wes Mckinney, O'Reilly Publications, 3<sup>rd</sup> edition ,2023

**Course Outcomes: At the end of the course, the student will be able to:**

CO	Course Outcomes	RBT Level	Level Indicator
CO1	<b>Understand</b> the syntax and schematics of Python programming.	<b>Understand</b>	L2
CO2	<b>Apply</b> data structures, functions for effective implementation of solution.	<b>Apply</b>	L3
CO3	<b>Analyse</b> object-oriented concepts and file operations.	<b>Analyse</b>	L4
CO4	<b>Evaluate</b> strings using pattern recognition techniques.	<b>Evaluate</b>	L5
CO5	<b>Implement</b> real world problems by using Data analysis and Scientific computation methods.	<b>Create</b>	L6

**Weblinks and Video Lectures (e-Resources)**

- 1 The Joy of Computing using Python: [https://onlinecourses.nptel.ac.in/noc23\\_cs20/preview](https://onlinecourses.nptel.ac.in/noc23_cs20/preview)
- 2 Python for Data Science: [https://onlinecourses.nptel.ac.in/noc22\\_cs32/preview](https://onlinecourses.nptel.ac.in/noc22_cs32/preview)
- 3 Infyspringboard-Scipy: [https://infyspringboard.onwingspan.com/web/en/app/toc/lex\\_auth\\_01282535449306726468422\\_shared/overview](https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01282535449306726468422_shared/overview)
- 4 Python for everybody: Course era
- 5 Udemy: <https://www.udemy.com/course/python-pandas/> -

Assessment Pattern (both CIE and SEE)

Engineering Science Course (ESC) / Emerging Technology Course (ETC) / Programming Language Course (PLC)

3 Credits & 2 Credits Courses – Theory (if Integrated)

Assessment Method	Component	Type of Assessments	Syllabus Coverage	Maximum Marks	Average / Total	Reduced Marks	Minimum Passing Marks	Evaluation Details
<b>Total CIE Theory + Practical</b>				<b>50</b>	----	----	<b>20</b>	
<b>CIE</b>	<b>Theory</b>	Internal Assessment Test (IAT) - I	Module - 1 & 2	50	(50+50+50) / 3	<b>15</b>	<b>6</b>	Average of Three Internal test each of 50 Marks scale down the marks to 15 Marks
		Internal Assessment Test (IAT) - II	Module - 3 & 4	50				
		Internal Assessment Test (IAT) - III	Module - 5	50				
	<b>Continuous Comprehensive Assessment (CCA)</b>	CCA-1- Project Review – 1	Considering all the Modules	20	50	<b>10</b>	<b>4</b>	Two CCA methods as per VTU Clause 22OB4.2 of regulations to be adopted. If CCA chosen is Project Based Learning, then one assessment method may be adopted
		CCA-2- Project Review – 2		30				
<b>Total CIE Theory</b>						<b>25</b>	<b>10</b>	Scale down Marks of IAT and CCA to 25



<b>CIE</b>	<b>Practical</b>	Conduction of Experiments	Continuous Evaluation of each experiment			Average of all Experiments	<b>10</b>	4	Performance of the Experiment (On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. 20 marks are for conducting the experiment and calculations/observations/output)
			Record	05	10				
			Observation book	05					
		Practical Test	Write up	15	50	----	<b>10</b>	4	One Internal Practical Test after conduction of all Experiments for 50 Marks
			Execution	25					
			Viva-voce	10					
		Open Ended Experiment	Write up	05	20	----	<b>5</b>	2	One experiment for 20 marks.  20 marks reduced to 05 marks
			Execution	10					
			Viva-voce	05					
		<b>Total CIE Practical</b>						<b>25</b>	10

<b>SEE</b>		Theory exam	Entire theory syllabus including questions from lab Component in respective Modules	100	----	<b>50</b>	18	SEE Exam is theory Exam conducted for 100 Marks, scored Marks are scaled down to 50 Marks
<b>CIE + SEE</b>				100	----	----	40	

- The Minimum Marks to be secured in CIE to appear for SEE shall be 10 (40% of Maximum Marks – 25) in the Theory Component and 10 (40% of Maximum Marks – 25) in the Practical component.
- The Laboratory Component for the IPCC shall be for CIE only.
- However, in SEE, the Questions from the Laboratory Component shall be included in the respective Modules only.

Note: If few of the 3 Credit Courses are Integrated course type, for such courses the method suggested for 4 Credit IPCC Course shall be followed

**The Minimum Marks to be secured in CIE to appear for SEE shall be 10 (40% of Maximum Marks – 25) in the Theory Component and 10 (40% of Maximum Marks -25) in the Practical Component. The Laboratory Component of the IPCC shall be for CIE only. However, in SEE the questions from the Laboratory Component shall be included in the respective Modules only.**

**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum Marks (20 Marks out of 50).

The minimum passing mark for the SEE is 35% of the maximum Marks (18 Marks out of 50).

A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 Marks out of 100) in the total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

**Possible continuous and comprehensive assessment:**

Project based, Problem Based, Building Models, Lab-to-Land, Mobile Studio, Design and Programming Contest, Certification, Concept Map (Collage presentation/poster presentation), Case studies, Think-Pair-Share, Flipped classroom, storytelling. The assessment of these techniques can be either based on Quiz or rubrics.

The faculty can adopt any other CCA method of implementation and its assessment with prior approval of Program Assessment Committee (PAC).

**Continuous Internal Evaluation (CIE):**

The CIE Marks for the theory component of the IC shall be **25 Marks** and for the laboratory component **25 Marks**.

**CIE for the theory component of the IC**

**Internal Assessment test:**

**The IA test questions are to be framed to map the Course Outcomes (COs), Program Outcomes (POs) and the Blooms RBT Levels. Emphasis to be given for higher order RBT levels**

Three Tests each of **50 Marks** scaled down to **25 Marks**

- First test after 6<sup>th</sup> week of the semester (syllabus completion of 35 – 40%)
- Second test after 10<sup>th</sup> week of semester (syllabus completion of 65 – 70%)
- Third test after 14<sup>th</sup> week of semester (syllabus completion of 90 – 100%)

The average score of three test is taken and scaled down to **15 Marks**.

**Continuous and Comprehensive Assessment (CCA):**

Two of continuous and comprehensive assessment (CCA) to be conducted to attain COs and POs, evaluated each for **50 Marks**. Total Marks scored will be CCA1+CCA2 and scaled down to **10 Marks**.

- CCA1 after 4<sup>th</sup> week and CCA2 after 9<sup>th</sup> week. The evaluation includes either through quiz or rubrics
- CCA as project-based learning,
  - CCA is evaluated for **50 Marks** with review 1 of **20 Marks** after and review 2 of **30 Marks** includes project demonstration/competition and report submission.
  - The evaluation of review 1 after 6<sup>th</sup> weeks of semester and review 2 after 12<sup>th</sup> week of semester with project demonstration and submission of the report

Total score for CCA is **10 Marks**

Total Marks scored for theory component of CIE (IAT+ CCA) is **25 Marks**

### **CIE for the practical component of the IC**

- On completion of every experiment/program in the laboratory, the students shall be evaluated and Marks shall be awarded on the same day. The **10 Marks** are for conducting the experiment and preparation of the laboratory record, the other **10 Marks shall be for the test** conducted at the end of the semester and **5 Marks** for conducting Open Ended Experiments.
- The CIE Marks awarded in the case of the practical component shall be based on the continuous evaluation of the laboratory report and the conduction. Each experiment report can be evaluated for 05 Marks conduction(Observation Book) and 5 Marks for Record Book. Marks of all experiments' write-ups and conduction are added and scaled to **10 Marks**.
- The Practical laboratory test (**duration 03 hours**) at the end of the 15<sup>th</sup> week of the semester/after completion of all the experiments (whichever is early) shall be conducted for **50 Marks** and scaled down to **10 Marks**.
- Open Ended Experiments are conducted after the completion of regular Experiments/Programs for 20 Marks and scaled down to **5 Marks**
- Scaled-down Marks of write-up, evaluations and tests, will be added as CIE Marks for the laboratory component of IC/IPCC for **25 Marks**.
- The minimum Marks to be secured in CIE to appear for SEE shall be 10 (40% of maximum Marks) in the theory component and 10 (40% of maximum Marks) in the practical component.
- The laboratory component of the IC/IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included. The maximum of 05 questions is to be set from the practical component of IC/IPCC, the total Marks of all questions should not be more than 25 Marks.

The theory component of the IC shall be for both CIE and SEE.

### **Semester End Examination (SEE):**

- Theory SEE will be conducted as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)
- The question paper shall be set for 100 Marks. The medium of the question paper shall be English. The duration of SEE is 03 hours.
- The question paper will have 10 questions. Two questions per module. Each question is set for 20 Marks. The student has to answer 5 full questions, selecting one full question from each module summing up to maximum score of 100 Marks. Marks **scored out of 100 shall proportionally be reduced to 50 Marks**.
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module. The two questions should be of same course outcome, program outcome and Blooms RBT level. Emphasis to be given for higher order RBT levels

### CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Theory					Practical
	Continuous Assessment Tests			Continuous Comprehensive Assessment (CCA)		Practical Test
	IAT-1	IAT-2	IAT-3	CCA-1 (Review 1)	CCA-2 (Review 2)	
	50 Marks	50 Marks	50 Marks	20 Marks	30 Marks	50 Marks
Remember	10	-	-	-	-	
Understand	20	10	-	10		
Apply	20	20	10	5	5	20
Analyse	-	20	20	5	5	10
Evaluate	-	-	15	-	10	10
Create	-	-	5	-	10	10

### CIE Course Assessment Plan

CO's	Marks Distribution					Total Marks	Weightage
	Test-1		Test-2		Test-3		
	Module-1	Module-2	Module-3	Module-4	Module-5		
CO1	10	10	-	-	-	20	13.33%
CO2	5	5	10	10	10	40	26.66%
CO3	5	5	5	5	15	35	23.33%
CO4	5	5	5	5	15	35	23.33%
CO5	--	--	5	5	10	20	13.33%
<b>Total</b>	<b>25</b>	<b>25</b>	<b>25</b>	<b>25</b>	<b>50</b>	<b>150</b>	<b>100%</b>

### SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	5
Understand	5
Apply	10

Analyse	10
Evaluate	10
Create	10

**SEE Course Plan**

CO's	Marks Distribution					Total Marks	Weightage
	Module-1	Module-2	Module-3	Module-4	Module-5		
CO1	10	--	--	--	--	10	10%
CO2	10	10	--	--	--	20	20%
CO3	--	10	10	--	--	20	20%
CO4	--	--	10	10		20	20%
CO5	--	--		10	10	20	20%
<b>Total</b>	<b>20</b>	<b>20</b>	<b>20</b>	<b>20</b>	<b>20</b>	<b>100</b>	<b>100%</b>



# Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	2 <sup>nd</sup>			
Course Title	:	Professional Writing Skills in English			
Course Code	:	23CENC26			
Course Type (Theory/ Practical/ Integrated)	:	Theory			
Course Category	:	HSSC			
Stream	:	Common to All Branches	CIE	:	50 Marks
Teaching hr/week (L: T:P:S)	:	1:0:0:0	SEE	:	50 Marks
Total Hours	:	15 Hrs	SEE Duration	:	2 Hours
Credits	:	1			

**Course Learning Objectives:** Students will be taught.

Sl.No	Course Objectives
1	To Identify the Common Errors in Writing and Speaking of English
2	To Achieve better technical writing and Presentation skills.
3	To read technical proposals properly and make them to Write good technical reports
4	Acquire Employment and Workplace communication skills.
5	To learn about Techniques of Information Transfer through presentation in different level.

## Teaching-Learning Process

### Pedagogy (General Instructions):

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecture method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Show Video/animation films to explain the infrastructures and the mechanism involved in the principle.
3. Encourage collaborative (Group) Learning in the class.
4. Ask at least three HOT (Higher-order Thinking) questions in the class, which promotes critical thinking.
5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyse information rather than simply recall it.
6. Topics will be introduced in multiple representations.
7. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.
9. Individual teachers can devise innovative pedagogy to improve teaching-learning.



DSATM

**Scheme of Teaching and Examinations for BE Programme -2023-24**  
**Outcome Based Education and Choice Based Credit System (CBCS)**  
**(Effective from the Academic Year 2023-24)**

**COURSE SYLLABUS**

Module No.	Contents of the Module	Hours
1	<b>Identifying Common Errors in Writing and Speaking English:</b> Common errors identification in parts of speech, Use of verbs and phrasal verbs, Auxiliary verbs and their forms, Subject Verb Agreement (Concord Rules), Common errors in Subject-verb agreement, Sequence of Tenses and errors identification in Tenses. Words Confused/Misused.	03
<b>Pedagogy</b>	(i) Direct instructional method ( Low/Old Technology) (ii) Enquiry and evaluation based learning (iii) Personalized learning (iv) Problems based learning through discussion (v) Chalk & Talk, Interaction, Live examples & Videos	
2	<b>Nature and Style of sensible writing:</b> Organizing Principles of Paragraphs in Documents, Writing Introduction and Conclusion, Importance of Proper Punctuation, Precise writing and Techniques in Essay writing, Sentence arrangements and Corrections activities. Misplaced modifiers, Contractions, Collocations, Word Order, Errors due to the Confusion of words.	03
<b>Pedagogy</b>	(i) Direct instructional method ( Low/Old Technology) (ii) Enquiry and evaluation based learning (iii) Personalized learning (iv) Problems based learning through discussion (v) Chalk & Talk, Interaction, Live examples & Videos	
3	<b>Technical Reading and Writing Practices:</b> Technical writing process, Introduction to Technical Reports writing, Significance of Reports, Types of Reports. Introduction to Technical Proposals Writing, Types of Technical Proposals, Characteristics of Technical Proposals. Scientific Writing Process. Grammar – Voices and Reported Speech, Spotting Error & Sentence Improvement, Cloze Test and Theme Detection Exercises.	03
<b>Pedagogy</b>	(i) Direct instructional method ( Low/Old Technology) (ii) Enquiry and evaluation based learning (iii) Personalized learning (iv) Problems based learning through discussion (v) Chalk & Talk, Interaction, Live examples & Videos	



4	<b>Professional Communication for Employment:</b> Listening Comprehension, Types of Listening, Listening Barriers, Improving Listening Skills. Reading Comprehension, Tips for effective reading. Job Applications, Types of official/employment/business Letters, Resume vs. Bio Data, Profile, CV. Writing effective resume for employment, Emails, Blog Writing and Memos.	03
<b>Pedagogy</b>	(i) Direct instructional method ( Low/Old Technology) (ii) Enquiry and evaluation based learning (iii) Personalized learning (iv ) Problems based learning through discussion (v) Chalk & Talk, Interaction, Live examples & Videos	
5	<b>Professional Communication at Workplace:</b> Group Discussion and Professional Interviews, Characteristics and Strategies of a GD and PI's, Intra and Interpersonal Communication Skills at workplace, Non-Verbal Communication Skills and its importance in GD and Interview. Presentation skills and Formal Presentations by Students, Strategies of Presentation Skills.	03
<b>Pedagogy</b>	(i) Direct instructional method ( Low/Old Technology) (ii) Enquiry and evaluation based learning (iii) Personalized learning (iv) Problems based learning through discussion (v) Chalk & Talk, Interaction, Live examples & Videos	

<b>Reference Books</b>	
<b>Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)</b>	
1	Professional Writing Skills in English” published by Phillip Learning – Education (ILS), Bangalore – 2022.
2	Functional English” (As per AICTE 2018 Model Curriculum) (ISBN-978-93-5350-047-4) Cengage learning India Pvt Limited [Latest Edition 2019].
3	English for Engineers by N.P.Sudharshana and C.Savitha, Cambridge University Press – 2018.
4	Technical Communication by Gajendra Singh Chauhan and Et al, (ISBN-978-93-5350-050-4), Cengage learning India Pvt Limited [Latest Revised Edition] - 2019.
5	Technical Communication – Principles and Practice, Third Edition by Meenakshi Raman and Sangeetha Sharma, Oxford University Press 2017
6	High School English Grammar & Composition by Wren and Martin, S Chandh & Company Ltd – 2015
7	Effective Technical Communication – Second Edition by M Ashraf Rizvi, McGraw Hill Education (India) Private

**Course Outcomes: At the end of the course, the student will be able to:**

CO	Course Outcomes	RBT Level	Level Indicator
CO1	To Identify the Common Errors in Writing and Speaking of English	Remember	L-1
CO2	To practice better Technical writing and Presentation skills.	Understand	L-2
CO3	To read Technical proposals properly and make them to Write good technical reports	Understand	L-2
CO4	Acquire Employment and Workplace communication skills.	Apply	L-3
CO5	To learn about Techniques of Information Transfer through presentation in different level	Understand	L-2

**Mapping of Course Outcomes to Program Outcomes:**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	--	--	--	--	--	--	--	2	1	2	--	2	--	--
CO2	--	--	--	--	--	--	--	1	1	1	--	1	--	--
CO3	--	--	--	--	--	--	--	2	2	2	--	2	--	--
CO4	--	--	--	--	--	--	--	2	1	1	--	1	--	--
CO5	--	--	--	--	--	--	--	1	2	1	--	1	--	--

**Weblinks and Video Lectures (e-Resources)**

1	<a href="https://drive.google.com/drive/folders/1rqloQbY2HWu7xbFSmaGU3YAc7Tbhc3b1">https://drive.google.com/drive/folders/1rqloQbY2HWu7xbFSmaGU3YAc7Tbhc3b1</a>
2	<a href="https://drive.google.com/file/d/1UbpxJBcZNFyCxMEK0KqpR6NjpNfd4e1n/view?usp=drive_link">https://drive.google.com/file/d/1UbpxJBcZNFyCxMEK0KqpR6NjpNfd4e1n/view?usp=drive_link</a>
3	<a href="https://drive.google.com/file/d/11GUI1amPCq75n8mHoGnc9qzv_OJFzCHM/view?usp=drive_link">https://drive.google.com/file/d/11GUI1amPCq75n8mHoGnc9qzv_OJFzCHM/view?usp=drive_link</a>
4	<a href="https://drive.google.com/file/d/1RbPsNDA_ATiTXP_Tn8y2Udpc2NZTcvoy/view?usp=drive_link">https://drive.google.com/file/d/1RbPsNDA_ATiTXP_Tn8y2Udpc2NZTcvoy/view?usp=drive_link</a>
5	<a href="https://drive.google.com/file/d/1brLXNdwBFugdZJ1B4_TtzN43_KhhZvZI/view?usp=drive_link">https://drive.google.com/file/d/1brLXNdwBFugdZJ1B4_TtzN43_KhhZvZI/view?usp=drive_link</a>

**Constitution of India / Samskruthika Kannada / Communicative English / Professional writing skills in English/ Innovation Design & Thinking**

**1 Credit Courses – Theory**

Assessment Method	Component	Type of Assessments	Syllabus Coverage	Maximum Marks	Average	Reduced Marks	Minimum Passing Marks	Evaluation Details
<b>Total CIE Theory</b>				<b>50</b>	----	----	<b>20</b>	
<b>CIE</b>	<b>Theory</b>	Internal Assessment Test (IAT) – I (MCQ)	Module - 1 & 2	50	$(50+50+50) / 3$	<b>15</b>	6	Average of Three Internal test each of 50 Marks scale down the marks to 15 Marks
		Internal Assessment Test (IAT) – II (MCQ)	Module - 3 & 4	50				
		Internal Assessment Test (IAT) – III (QUIZ)	Module - 5	50				
	<b>Continuous Comprehensive Assessment (CCA)</b>	CCA-1- Pedagogical Initiatives	Considering all the Modules	50	$(50+50) / 2$	<b>10</b>	4	Two CCA methods as per VTU Clause 22OB4.2 of regulations to be adopted. If CCA chosen is Project Based Learning, then one assessment method may be adopted
		CCA-2- Pedagogical Initiatives		50				
<b>Total CIE Theory</b>						<b>25</b>	10	Scale down Marks of IAT and CCA to 25

<b>SEE</b>		Theory exam – (MCQ Type)	Entire syllabus	50	---	50	18	SEE Exam is theory Exam with MCQ type Question Papers of 50 Questions with each question 1 Mark each. Examination duration is 1 Hour
<b>CIE + SEE</b>				100	---	---	40	

- The Minimum Marks to be secured in CIE to appear for SEE shall be 10 (40% of Maximum Marks – 25) in the Theory Component and 10 (40% of Maximum Marks – 25) in the Practical component.
- The Laboratory Component for the IPCC shall be for CIE only.
- However, in SEE, the Questions from the Laboratory Component shall be included in the respective Modules only.

## 1 Credit Course – Theory

### **Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%.

The minimum passing mark for the CIE is 40% of the maximum Marks (20 Marks out of 50).

The minimum passing mark for the SEE is 35% of the maximum Marks (18 Marks out of 50).

A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 Marks out of 100) in the total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

### **Possible continuous and comprehensive assessment:**

Crossword, Maize, Debate, Role Play, Community Service, Mind Map, Concept Map, Case Study, Group Discussions, Ideathon

The faculty may adopt any other CCA method of implementation and its assessment with prior approval of Program Assessment Committee (PAC).

### **Continuous Internal Evaluation (CIE):**

The CIE Marks for the internal assessment test shall be **25 Marks** and for the continuous and comprehensive assessment (CCA) shall be **25 Marks**.

### **Internal Assessment test:**

**The IA test questions are to be framed to map the course outcomes, program outcomes and the Blooms RBT Levels. Emphasis to be given for higher order RBT levels**

Three Tests (MCQ) each of **50 Marks**

- First test after 6<sup>th</sup> week of the semester (syllabus completion of 35 – 40%)
- Second test after 10<sup>th</sup> week of semester (syllabus completion of 65 – 70%)
- Third test after 14<sup>th</sup> week of semester (syllabus completion of 90 – 100%)

The average score of three test is taken and scaled down to **25 Marks**.

### **Continuous and Comprehensive Assessment (CCA):**

Two of continuous and comprehensive assessment (CCA) to be conducted to attain COs and POs, evaluated each for **50 Marks**. Total Marks scored will be CCA1+CCA2 and scaled down to **25 Marks**.

- CCA1 to be conducted after 4<sup>th</sup> week
- CCA2 to be conducted after 9<sup>th</sup> week.
- The evaluation of CCAs includes either through quiz or rubrics

Total score for CCA is **25 Marks**

Total Marks scored for theory component of CIE (IAT + CCA) is **50 Marks**

### **Semester End Examination (SEE):**

- Theory SEE will be conducted as per the scheduled timetable, with common question papers for the subject .
- The question paper shall be set for 50 Marks. The medium of the question paper shall be English.  
**The duration of SEE is 01 hours.**
- The question paper will have 50 MCQs **covering all modules**. The questions shall map with the course outcome, program outcome and Blooms RBT level.

### CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Theory				
	Continuous Assessment Tests			Continuous Comprehensive Assessment (CCA)	
	IAT-1	IAT-2	IAT-3	CCA-1	CCA-2
	50 Marks	50 Marks	50 Marks	50 Marks	50 Marks
Remember	18	18	17	18	17
Understand	16	13	15	17	15
Apply	8	9	10	7	8
Analyse	8	10	8	8	10
Evaluate	--	--	--	--	--
Create	--	--	--	--	--

### CIE Course Assessment Plan

CO's	Marks Distribution					Total Marks	Weightage
	Test-1		Test-2		Test-3		
	Module-1	Module-2	Module-3	Module-4	Module-5		
CO1	19	5	--	--	5	29	25%
CO2	6	20	--	--	6	32	24%
CO3	--	--	17	7	5	29	21%
CO4	--	--	8	18	6	32	16%
CO5	--	--	--	--	28	28	14%
<b>Total</b>	<b>25</b>	<b>25</b>	<b>25</b>	<b>25</b>	<b>50</b>		<b>100%</b>

### SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	35%
Understand	30%
Apply	20%
Analyse	15%
Evaluate	--
Create	--

## SEE Course Plan

CO's	Marks Distribution					Total Marks	Weightage
	Module-1	Module-2	Module-3	Module-4	Module-5		
CO1	3	2	2	2	1	10	20%
CO2	4	3	2	3	3	15	30%
CO3	2	1	2	3	2	10	20%
CO4	2	3	2	1	2	10	20%
CO5	2	1	1	1	0	5	10%
<b>Total</b>	<b>13</b>	<b>10</b>	<b>09</b>	<b>10</b>	<b>8</b>	<b>50</b>	<b>100%</b>

## Course Contents and Lecture Schedule

Module No.	Topics	No. of Lectures
1	Identifying Common Errors in Writing and Speaking English: Common errors identification in parts of speech	1
1	Use of verbs and phrasal verbs, Auxiliary verbs and their forms, Subject Verb Agreement (Concord Rules)	1
1	Common errors in Subject-verb agreement, Sequence of Tenses and errors identification in Tenses. Words Confused/Misused	1
2	Nature and Style of sensible writing: Organizing Principles of Paragraphs in Documents, Writing Introduction and Conclusion	1
2	Importance of Proper Punctuation, Precise writing and Techniques in Essay writing, Sentence arrangements and Corrections activities	1
2	Misplaced modifiers, Contractions, Collocations, Word Order, Errors due to the Confusion of words	1
3	Technical Reading and Writing Practices: Technical writing process & Scientific Writing Process, Spotting Error & Sentence Improvement	1
3	Introduction to Technical Reports writing, Significance of Reports, Types of Reports, Cloze Test and Theme Detection Exercises	1
3	Introduction to Technical Proposals Writing, Types of Technical Proposals, Characteristics of Technical Proposals Grammar – Voices and Reported Speech	1
4	Listening Comprehension, Types of Listening, Listening Barriers, Improving Listening Skills. Reading Comprehension, Tips for effective reading	1
4	Job Applications, Types of official / employment / business Letters,	1
4	Resume vs. Bio Data, Profile, CV. Writing effective resume for employment, Emails, Blog Writing and Memos	1
5	Group Discussion and Professional Interviews, Characteristics and Strategies of a GD and PI's,.	1
5	Intra and Interpersonal Communication Skills at workplace, Non-Verbal Communication Skills and its importance in GD and Interview.	1
5	Presentation skills and Formal Presentations by Students, Strategies of Presentation Skills	1
	<b>Revision</b>	
<b>Total</b>		<b>15 Hrs</b>

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III SEMESTER												
Sl. No	Course and Course Code	Course Title	Teaching Department (TD) and Question Paper Setting Board (PSB)	Teaching Hours /Week				Examination				Credits
				Theory Lecture	Tutorial	Practical/ Drawing	Self-Study	Duration in hours	CIE Marks	SEE Marks	Total Marks	
				L	T	P	S					
1	BSC 21MAT31	Transform Calculus, Fourier Series and Numerical Techniques	Maths	3	0	0		03	50	50	100	3
2	IPCC 21CS32	Data Structures and Applications	Any CS Board Department	3	0	2		03	50	50	100	4
3	IPCC 21CS33	Analog and Digital Electronics		3	0	2		03	50	50	100	4
4	PCC 21CS34	Computer Organization and Architecture		3	0	0		03	50	50	100	3
5	PCC 21CSL35	Object Oriented Programming with JAVA Laboratory		0	0	2		03	50	50	100	1
6	UHV 21UH36	Social Connect and Responsibility	Any Department	0	0	1		01	50	50	100	1
7	HSMC 21KSK37/47	Samskrutika Kannada	TD and PSB: HSMC	1	0	0		01	50	50	100	1
	HSMC 21KSK37/47	Balake Kannada										
	OR											
	HSMC 21CIP37/47	Constitution of India and Professional Ethics										
8	AEC 21CS38X/21 CSL38X	Ability Enhancement Course - III	TD: Concerned department PSB: Concerned Board	If offered as Theory Course				01	50	50	100	1
				1	0	0						
				If offered as lab. course				02				
				0	0	2						
<b>Total</b>								<b>400</b>	<b>400</b>	<b>800</b>	<b>18</b>	
9	Scheduled activities for III to VIII semesters	NMDC 21NS83	National Service Scheme (NSS)	NSS	All students have to register for any one of the course namely National Service Scheme, Physical Education (PE)(Sports and Athletics) and Yoga with the concerned coordinator of the course during the first week of III semester. The activities shall be carried out from (for 5 semesters) between III semester to VIII semester. SEE in the above courses shall be conducted during VIII semester examinations and the accumulated CIE marks shall be added to the SEE marks. Successful completion of the registered course is mandatory for the award of the degree. The events shall be appropriately scheduled by the colleges and the same shall be reflected in the colander prepared for the NSS, PE and Yoga activities.							
		NMDC 21PE83	Physical Education (PE) (Sports and Athletics)	PE								
		NMDC 21YO83	Yoga	Yoga								
<b>Course prescribed to lateral entry Diploma holders admitted to III semester B.E./B.Tech programs</b>												
1	NMDC 21MATDIP31	Additional Mathematics - I	Maths	02	02	--	--	---	100	---	100	0
<p><b>Note:</b> BSC: Basic Science Course, IPCC: Integrated Professional Core Course, PCC: Professional Core Course, INT –Internship, HSMC: Humanity and Social Science &amp; Management Courses, AEC–Ability Enhancement Courses. UHV: Universal Human Value Course.  <b>L</b> –Lecture, <b>T</b> – Tutorial, <b>P</b>- Practical/ Drawing, <b>S</b> – Self Study Component, <b>CIE</b>: Continuous Internal Evaluation, <b>SEE</b>: Semester End Examination. <b>TD</b>-Teaching Department, <b>PSB</b>: Paper Setting department  <b>21KSK37/47</b> Samskrutika Kannada is for students who speak, read and write Kannada and <b>21KSK37/47</b> Balake Kannada is for non-Kannada speaking, reading, and writing students.  <b>Integrated Professional Core Course (IPCC):</b> Refers to Professional Theory Core Course Integrated with Practical's of the same course. Credit for IPCC can be 04 and its Teaching–Learning hours (L : T : P) can be considered as (3 : 0 : 2) or (2 : 2 : 2). The theory part of the IPCC shall be evaluated both by CIE and SEE. The practical part shall be evaluated by only CIE (no SEE). However, questions from the practical part of IPCC shall be included in the SEE question paper. For more details, the regulation governing the Degree of Bachelor of Engineering /Technology (BE/B.Tech.) 2021-22 may be referred.</p>												



**21INT49 Inter/Intra Institutional Internship:** All the students admitted to engineering programs under the lateral entry category shall have to undergo a mandatory 21INT49 Inter/Intra Institutional Internship of 03 weeks during the intervening period of III and IV semesters. The internship shall be slated for CIE only and will not have SEE. The letter grade earned through CIE shall be included in the IV semester grade card. The internship shall be considered as a head of passing and shall be considered for vertical progression and for the award of degree. Those, who do not take up / complete the internship shall be declared fail and shall have to complete during subsequently after satisfying the internship requirements. The faculty coordinator or mentor shall monitor the students' internship progress and interact with them for the successful completion of the internship.

**Non-credit mandatory courses (NCCM):**

**(A) Additional Mathematics I and II:**

**(1)** These courses are prescribed for III and IV semesters respectively to lateral entry Diploma holders admitted to III semester of B.E./B.Tech., programs. They shall attend the classes during the respective semesters to complete all the formalities of the course and appear for the Continuous Internal Evaluation (CIE). In case, any student fails to register for the said course/fails to secure the minimum 40 % of the prescribed CIE marks, he/she shall be deemed to have secured an F grade. In such a case, the student has to fulfill the course requirements during subsequent semester/s to earn the qualifying CIE marks. These courses are slated for CIE only and has no SEE.

**(2)** Additional Mathematics I and II shall not be considered for vertical progression as well as for the calculation of SGPA and CGPA, but completion of the courses shall be mandatory for the award of degree.

**(3)** Successful completion of the courses Additional Mathematics I and II shall be indicated as satisfactory in the grade card. Non-completion of the courses Additional Mathematics I and II shall be indicated as Unsatisfactory.

**(B) National Service Scheme/Physical Education (Sport and Athletics)/ Yoga:**

**(1)** Securing 40 % or more in CIE, 35 % or more marks in SEE and 40 % or more in the sum total of CIE + SEE leads to successful completion of the registered course.

**(2)** In case, students fail to secure 35 % marks in SEE, they have to appear for SEE during the subsequent examinations conducted by the University.

**(3)** In case, any student fails to register for NSS, PE or Yoga/fails to secure the minimum 40 % of the prescribed CIE marks, he/she shall be deemed to have not completed the requirements of the course. In such a case, the student has to fulfill the course requirements during subsequent semester/s to earn the qualifying CIE marks.

**(4)** Successful completion of the course shall be indicated as satisfactory in the grade card. Non-completion of the course shall be indicated as Unsatisfactory.

**(5)** These courses shall not be considered for vertical progression as well as for the calculation of SGPA and CGPA, but completion of the courses shall be mandatory for the award of degree.

**Ability Enhancement Course - III**

21CSL381	Mastering Office	21CS383	
21CS382	Programming in C++	21CS384	

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**IV SEMESTER**

Sl. No	Course and Course Code	Course Title	Teaching Department (TD) and Question and Paper Setting Board (PSB)	Teaching Hours /Week				Examination				Credits
				Theory Lecture	Tutorial	Practical/ Drawing	Self-Study	Duration in hours	CIE Marks	SEE Marks	Total Marks	
				L	T	P	S					
1	BSC 21CS41	Mathematical Foundations for Computing	Maths	2	2	0		03	50	50	100	3
2	IPCC 21CS42	Design and Analysis of Algorithms	Any CS Board Department	3	0	2		03	50	50	100	4
3	IPCC 21CS43	Microcontroller and Embedded Systems		3	0	2		03	50	50	100	4
4	PCC 21CS44	Operating Systems		2	2	0		03	50	50	100	3
5	AEC 21BE45	Biology For Engineers	BT, CHE, PHY	2	0	0		02	50	50	100	2
6	PCC 21CSL46	Python Programming Laboratory	Any CS Board Department	0	0	2		03	50	50	100	1
7	HSMC 21KSK37/47	Sanskrutika Kannada	HSMC	1	0	0		01	50	50	100	1
	HSMC 21KKB37/47	Balake Kannada										
	OR											
	HSMC 21CIP37/47	Constitution of India & Professional Ethics										
8	AEC 21CS48X/21C SL48X	Ability Enhancement Course- IV	TD and PSB: Concerned department	If offered as theory Course				01	50	50	100	1
				1	0	0						
				If offered as lab. course				02				
				0	0	2						
9	UHV 21UH49	Universal Human Values	Any Department	1	0	0		01	50	50	100	1
10	INT 21INT49	Inter/Intra Institutional Internship	Evaluation By the appropriate authorities	Completed during the intervening period of II and III semesters by students admitted to first year of BE./B.Tech and during the intervening period of III and IV semesters by Lateral entry students admitted to III semester.				3	100	--	100	2
<b>Total</b>								<b>550</b>	<b>450</b>	<b>1000</b>	<b>22</b>	

**Course prescribed to lateral entry Diploma holders admitted to III semester of Engineering programs**

1	NCMC 21MATDIP41	Additional Mathematics - II	Maths	02	02	--	--	--	100	--	100	0
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**Note:** BSC: Basic Science Course, IPCC: Integrated Professional Core Course, PCC: Professional Core Course, AEC –Ability Enhancement Courses, HSMC: Humanity and Social Science and Management Courses, UHV- Universal Human Value Courses.

L –Lecture, T – Tutorial, P- Practical/ Drawing, S – Self Study Component, CIE: Continuous Internal Evaluation, SEE: Semester End Examination.

21KSK37/47 Sanskrutika Kannada is for students who speak, read and write Kannada and 21KKB37/47 Balake Kannada is for non-Kannada speaking, reading, and writing students.

Integrated Professional Core Course (IPCC): Refers to Professional Theory Core Course Integrated with Practical's of the same course. Credit for IPCC can be 04 and its Teaching – Learning hours (L : T : P) can be considered as (3 : 0 : 2) or (2 : 2 : 2). The theory part of the IPCC shall be evaluated both by CIE and SEE. The practical part shall be evaluated by only CIE (no SEE). However, questions from practical part of IPCC shall be included in the SEE question paper. For more details the regulation governing the Degree of Bachelor of Engineering /Technology (BE/B.Tech.) 2021-22 may be referred.

**Non – credit mandatory course (NCCM):****Additional Mathematics - II:**

(1) Lateral entry Diploma holders admitted to III semester of B.E./B.Tech., shall attend the classes during the IV semester to complete all the formalities of the course and appear for the Continuous Internal Evaluation (CIE). In case, any student fails to register for the said course/fails to secure the minimum 40 % of the prescribed CIE marks, he/she shall be deemed to have secured an F grade. In such a case, the student has to fulfil the course requirements during subsequent semester/s to earn the qualifying CIE marks. These courses are slated for CIE only and has no SEE.

(2) Additional Mathematics I and II shall not be considered for vertical progression as well as for the calculation of SGPA and CGPA, but completion of the courses shall be mandatory for the award of degree.

(3) Successful completion of the course Additional Mathematics II shall be indicated as satisfactory in the grade card. Non-completion of the courses Additional Mathematics II shall be indicated as Unsatisfactory.

**Ability Enhancement Course - IV**

21CSL481	Web Programming	21CSL483	R Programming
21CS482	Unix Shell Programming	21CS484	

**Internship of 04 weeks during the intervening period of IV and V semesters; 21INT68 Innovation/ Entrepreneurship/ Societal based Internship.**

(1) All the students shall have to undergo a mandatory internship of 04 weeks during the intervening period of IV and V semesters. The internship shall be slated for CIE only and will not have SEE. The letter grade earned through CIE shall be included in the VI semester grade card. The internship shall be considered as a head of passing and shall be considered for vertical progression and for the award of degree. Those, who do not take up / complete the internship shall be considered under F (fail) grade and shall have to complete during subsequently after satisfying the internship requirements.

(2) Innovation/ Entrepreneurship Internship shall be carried out at industry, State and Central Government /Non-government organizations (NGOs), micro, small and medium enterprise (MSME), Innovation centers or Incubation centers. Innovation need not be a single major breakthrough; it can also be a series of small or incremental changes. Innovation of any kind can also happen outside of the business world.

Entrepreneurship internships offers a chance to gain hands on experience in the world of entrepreneurship and helps to learn what it takes to run a small entrepreneurial business by performing intern duties with an established company. This experience can then be applied to future business endeavours. Start-ups and small companies are a preferred place to learn the business tack ticks for future entrepreneurs as learning how a small business operates will serve the intern well when he/she manages his/her own company. Entrepreneurship acts as a catalyst to open the minds to creativity and innovation. Entrepreneurship internship can be from several sectors, including technology, small and medium-sized, and the service sector.

(3) Societal or social internship.

Urbanization is increasing on a global scale; and yet, half the world's population still resides in rural areas and is devoid of many things that urban population enjoy. Rural internship, is a work-based activity in which students will have a chance to solve/reduce the problems of the rural place for better living.

As proposed under the AICTE rural internship programme, activities under Societal or social internship, particularly in rural areas, shall be considered for 40 points under AICTE activity point programme.

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**V SEMESTER**

Sl. No	Course and Course Code	Course Title	Teaching Department (TD) and Question Paper Setting Board (PSB)	Teaching Hours /Week				Examination				Credits
				Theory Lecture	Tutorial	Practical/ Drawing	Self -Study	Duration in hours	CIE Marks	SEE Marks	Total Marks	
				L	T	P	S					
1	BSC 21CS51	Automata Theory and compiler Design	Any CS Board Department	3	0	0		03	50	50	100	3
2	IPCC 21CS52	Computer Networks		3	0	2		03	50	50	100	4
3	PCC 21CS53	Database Management Systems		3	0	0		03	50	50	100	3
4	PCC 21AI54	Principles of Artificial Intelligence		3	0	0		03	50	50	100	3
5	PCC 21CSL55	Database Management Systems Laboratory with Mini Project		0	0	2		03	50	50	100	1
6	AEC 21XX56	Research Methodology & Intellectual Property Rights	TD: Any Department PSB: As identified by university	2	0	0		02	50	50	100	2
7	HSMC 21CIV57	Environmental Studies	TD: Civil/ Environmental /Chemistry/ Biotech. PSB: Civil Engg	1	0	0		1	50	50	100	1
8	AEC 21CS58X/21 CSL58X	Ability Enhancement Course-V	Concerned Board	If offered as Theory courses				01	50	50	100	1
				1	0	0						
				If offered as lab. courses				02				
				0	0	2						
<b>Total</b>								<b>400</b>	<b>400</b>	<b>800</b>	<b>18</b>	

**Ability Enhancement Course - IV**

21CSL581	Angular Js and NodeJS	21CS583	
21CS582	C# and .Net Framework	21CS584	

Note: BSC: Basic Science Course, PCC: Professional Core Course, IPCC: Integrated Professional Core Course, AEC –Ability Enhancement Course INT – Internship, HSMC: Humanity and Social Science & Management Courses.

L –Lecture, T – Tutorial, P- Practical/ Drawing, S – Self Study Component, CIE: Continuous Internal Evaluation, SEE: Semester End Examination.

**Integrated Professional Core Course (IPCC):** refers to Professional Theory Core Course Integrated with Practical of the same course. Credit for IPCC can be 04 and its Teaching – Learning hours (L : T : P) can be considered as (3 : 0 : 2) or (2 : 2 : 2). Theory part of the IPCC shall be evaluated both by CIE and SEE. The practical part shall be evaluated by CIE only and there shall be no SEE. For more details the regulation governing the Degree of Bachelor of Engineering /Technology (BE/B.Tech.) 2021-22 may be referred.

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**VI SEMESTER**

Sl. No	Course and Course Code	Course Title	Teaching Department (TD) and Question Paper Setting Board (PSB)	Teaching Hours /Week				Examination			Credits	
				Theory Lecture	Tutorial	Practical/ Drawing	Self -Study	Duration in hours	CIE Marks	SEE Marks		Total Marks
				L	T	P	S					
1	HSMC 21CS61	Software Engineering and Project Management	Any CS Board Department	2	2	0		03	50	50	100	3
2	IPCC 21AD62	Data Science and its Applications		3	0	2		03	50	50	100	4
3	PCC 21AI63	Machine Learning		3	0	0		03	50	50	100	3
4	PEC 21XX64x	Professional Elective Course-I		3	0	0		03	50	50	100	3
5	OEC 21XX65x	Open Elective Course-I	Concerned Department	3	0	0		03	50	50	100	3
6	PCC 21AIL66	Machine Learning Laboratory	Any CS Board Department	0	0	2		03	50	50	100	1
7	MP 21AIMP67	Mini Project		Two contact hours /week for interaction between the faculty and students.				--	100	--	100	2
8	INT 21INT68	Innovation/Entrepreneurship /Societal Internship	Completed during the intervening period of IV and V semesters.				--	100	--	100	3	
<b>Total</b>								<b>500</b>	<b>300</b>	<b>800</b>	<b>22</b>	

**Professional Elective - I**

21AI641	Business Intelligence	21AI643	Natural Language Processing
21CS642	Advanced JAVA Programming	21AI644	Computer Graphics and Fundamentals of Image Processing

**Open Electives – I offered by the Department to other Department students**

21CS651	Introduction to Data Structures	21CS653	Introduction to Cyber Security
21CS652	Introduction to Database Management Systems	21CS654	Programming in JAVA

**Note: HSMC:** Humanity and Social Science & Management Courses, **IPCC:** Integrated Professional Core Course, **PCC:** Professional Core Course, **PEC:** Professional Elective Courses, **OEC**–Open Elective Course, **MP**–Mini Project, **INT**–Internship.

L –Lecture, T – Tutorial, P - Practical / Drawing, S – Self Study Component, CIE: Continuous Internal Evaluation, SEE: Semester End Examination.

**Integrated Professional Core Course (IPCC):** Refers to Professional Theory Core Course Integrated with Practical of the same course. Credit for IPCC can be 04 and its Teaching – Learning hours (L : T : P) can be considered as (3 : 0 : 2) or (2 : 2 : 2). The theory part of the IPCC shall be evaluated both by CIE and SEE. The practical part shall be evaluated by CIE only and there shall be no SEE. For more details, the regulation governing the Degree of Bachelor of Engineering /Technology (BE/B.Tech) 2021-22 may be referred.

**Professional Elective Courses (PEC):**

A professional elective (PEC) course is intended to enhance the depth and breadth of educational experience in the Engineering and Technology curriculum. Multidisciplinary courses that are added supplement the latest trend and advanced technology in the selected stream of engineering. Each group will provide an option to select one course out of five courses. The minimum students' strength for offering professional electives is 10. However, this conditional shall not be applicable to cases where the admission to the programme is less than 10.

**Open Elective Courses:**

Students belonging to a particular stream of Engineering and Technology are not entitled for the open electives offered by their parent Department. However, they can opt an elective offered by other Departments, provided they satisfy the prerequisite condition if any. Registration to open electives shall be documented under the guidance of the Program Coordinator/ Advisor/Mentor.

Selection of an open elective shall **not be allowed** if,

- (i) The candidate has studied the same course during the previous semesters of the program.
- (ii) The syllabus content of open electives is similar to that of the Departmental core courses or professional electives.
- (iii) A similar course, under any category, is prescribed in the higher semesters of the program.

In case, any college is desirous of offering a course (not included in the Open Elective List of the University) from streams such as Law, Business (MBA), Medicine, Arts, Commerce, etc., can seek permission, at least one month before the commencement of the semester, from the University by

submitting a copy of the syllabus along with the details of expertise available to teach the same in the college. The minimum students' strength for offering open electives is 10. However, this conditional shall not be applicable to cases where the admission to the programme is less than 10.

**Mini-project work:** Mini Project is a laboratory-oriented course which will provide a platform to students to enhance their practical knowledge and skills by the development of small systems/applications.

Based on the ability/abilities of the student/s and recommendations of the mentor, a single discipline or a multidisciplinary Mini- project can be assigned to an individual student or to a group having not more than 4 students.

**CIE procedure for Mini-project:**

**(i) Single discipline:** The CIE marks shall be awarded by a committee consisting of the Head of the concerned Department and two faculty members of the Department, one of them being the Guide. The CIE marks awarded for the Mini-project work shall be based on the evaluation of project report, project presentation skill, and question and answer session in the ratio of 50:25:25. The marks awarded for the project report shall be the same for all the batch mates.

**(ii) Interdisciplinary:** Continuous Internal Evaluation shall be group-wise at the college level with the participation of all the guides of the project. The CIE marks awarded for the Mini-project, shall be based on the evaluation of project report, project presentation skill, and question and answer session in the ratio 50:25:25. The marks awarded for the project report shall be the same for all the batch mates.

**No SEE component for Mini-Project.**

#### VII semester Classwork and Research Internship /Industry Internship (21INT82)

##### Swapping Facility

Institutions can swap VII and VIII Semester Scheme of Teaching and Examinations to accommodate research internship/ industry internship after the VI semester.

**(2)** Credits earned for the courses of VII and VIII Semester Scheme of Teaching and Examinations shall be counted against the corresponding semesters whether VII or VIII semester is completed during the beginning of IV year or later part of IV year of the program.

##### Elucidation:

At the beginning of IV year of the programme i.e., after VI semester, VII semester classwork and VIII semester Research Internship /Industrial Internship shall be permitted to be operated simultaneously by the University so that students have ample opportunity for internship. In other words, a good percentage of the class shall attend VII semester classwork and similar percentage of others shall attend to Research Internship or Industrial Internship.

Research/Industrial Internship shall be carried out at an Industry, NGO, MSME, Innovation centre, Incubation centre, Start-up, Centers of Excellence (CoE), Study Centre established in the parent institute and /or at reputed research organizations / institutes. The internship can also be rural internship.

The mandatory Research internship /Industry internship is for 24 weeks. The internship shall be considered as a head of passing and shall be considered for the award of degree. Those, who do not take up/complete the internship shall be declared fail and shall have to complete during the subsequent University examination after satisfying the internship requirements.

##### INT21INT82 Research Internship/ Industry Internship/Rural Internship

**Research internship:** A research internship is intended to offer the flavour of current research going on in the research field. It helps students get familiarized with the field and imparts the skill required for carrying out research.

**Industry internship:** Is an extended period of work experience undertaken by students to supplement their degree for professional development. It also helps them learn to overcome unexpected obstacles and successfully navigate organizations, perspectives, and cultures. Dealing with contingencies helps students recognize, appreciate, and adapt to organizational realities by tempering their knowledge with practical constraints.

**Rural internship:** A long-term goal, as proposed under the AICTE rural internship programme, shall be counted as rural internship activity.

The student can take up Interdisciplinary Research Internship or Industry Internship.

The faculty coordinator or mentor has to monitor the students' internship progress and interact with them to guide for the successful completion of the internship.

The students are permitted to carry out the internship anywhere in India or abroad. University shall not bear any expenses incurred in respect of internship.

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**(Effective from the academic year 2021 - 22)**

**Swappable VII and VIII SEMESTER****VII SEMESTER**

Sl. No	Course and Course Code	Course Title	Teaching Department (TD) and Question Paper Setting Board (PSB)	Teaching Hours /Week				Examination			Credits	
				Theory Lecture	Tutorial	Practical/ Drawing	Self -Study	Duration in hours	CIE Marks	SEE Marks		Total Marks
				L	T	P	S					
1	PCC 21AI71	Advanced AI and ML	Any CS Board Department	3	0	0		3	50	50	100	3
2	PCC 21CS72	Cloud Computing		2	0	0		3	50	50	100	2
3	PEC 21XX73X	Professional elective Course-II		3	0	0		3	50	50	100	3
4	PEC 21XX74X	Professional elective Course-III		3	0	0		3	50	50	100	3
5	OEC 21XX75X	Open elective Course-II	Concerned Department	3	0	0		3	50	50	100	3
6	Project 21AIP76	Project work		Two contact hours /week for interaction between the faculty and students.				3	100	100	200	10
<b>Total</b>								<b>350</b>	<b>350</b>	<b>700</b>	<b>24</b>	

**VIII SEMESTER**

Sl. No	Course and Course Code	Course Title	Teaching Department	Teaching Hours /Week				Examination			Credits		
				Theory Lecture	Tutorial	Practical/ Drawing	Self -Study	Duration in hours	CIE Marks	SEE Marks		Total Marks	
				L	T	P	S						
1	Seminar 21AI81	Technical Seminar		One contact hour /week for interaction between the faculty and students.				--	100	--	100	01	
2	INT 21INT82	Research Internship/ Industry Internship		Two contact hours /week for interaction between the faculty and students.				03 (Batch wise )	100	100	200	15	
3	NCMC	21NS83	National Service Scheme (NSS)	NSS	Completed during the intervening period of III semester to VIII semester.				--	50	50	100	0
		21PE83	Physical Education (PE) (Sports and Athletics)	PE									
		21YO83	Yoga	Yoga									
<b>Total</b>								<b>250</b>	<b>150</b>	<b>400</b>	<b>16</b>		

**Professional Elective - II**

21AI731	Social Network Analysis	21CS734	Blockchain Technology
21CS732	Digital Image Processing	21CS735	Internet of Things
21AI733	Fullstack Development		

**Professional Elective - III**

21AI741	Augmented Reality	21CS744	Robotic Process Automation Design and Development
21CS742	Multiagent Systems	21CS745	NOSQL DATABASE
21AI743	Predictive Analytics		

**Open Electives - II offered by the Department to other Department students**

21CS751	Programming in Python	21CS754	Introduction to Data Science
21CS752	Introduction to AI and ML	21CS755	
21CS753	Introduction to Big Data		

**Note:** PCC: Professional Core Course, PEC: Professional Elective Courses, OEC–Open Elective Course, AEC –Ability Enhancement Courses.  
L–Lecture, T – Tutorial, P- Practical / Drawing, S – Self Study Component, CIE: Continuous Internal Evaluation, SEE: Semester End Examination.

**Note: VII and VIII semesters of IV year of the programme**

(1) Institutions can swap VII and VIII Semester Scheme of Teaching and Examinations to accommodate research internship/ industry internship after the VI semester.

(2) Credits earned for the courses of VII and VIII Semester Scheme of Teaching and Examinations shall be counted against the corresponding semesters whether VII or VIII semester is completed during the beginning of IV year or later part of IV year of the programme.

**PROJECT WORK (21XXP76):** The objective of the Project work is

- (i) To encourage independent learning and the innovative attitude of the students.
- (ii) To develop interactive attitude, communication skills, organization, time management, and presentation skills.
- (iii) To impart flexibility and adaptability.
- (iv) To inspire team working.
- (v) To expand intellectual capacity, credibility, judgment and intuition.
- (vi) To adhere to punctuality, setting and meeting deadlines.
- (vii) To instil responsibilities to oneself and others.
- (viii) To train students to present the topic of project work in a seminar without any fear, face the audience confidently, enhance communication skills, involve in group discussion to present and exchange ideas.

**CIE procedure for Project Work:**

(1) **Single discipline:** The CIE marks shall be awarded by a committee consisting of the Head of the concerned Department and two senior faculty members of the Department, one of whom shall be the Guide.

The CIE marks awarded for the project work, shall be based on the evaluation of project work Report, project presentation skill, and question and answer session in the ratio 50:25:25. The marks awarded for the project report shall be the same for all the batch mates.

(2) **Interdisciplinary:** Continuous Internal Evaluation shall be group-wise at the college level with the participation of all guides of the college. Participation of external guide/s, if any, is desirable. The CIE marks awarded for the project work, shall be based on the evaluation of project work Report, project presentation skill, and question and answer session in the ratio 50:25:25. The marks awarded for the project report shall be the same for all the batch mates.

**SEE procedure for Project Work:** SEE for project work will be conducted by the two examiners appointed by the University. The SEE marks awarded for the project work, shall be based on the evaluation of project work Report, project presentation skill, and question and answer session in the ratio 50:25:25.

**TECHNICAL SEMINAR (21XXS81):** The objective of the seminar is to inculcate self-learning, present the seminar topic confidently, enhance communication skill, involve in group discussion for exchange of ideas. Each student, under the guidance of a Faculty, shall choose, preferably, a recent topic of his/her interest relevant to the programme of Specialization.

- (i) Carry out literature survey, systematically organize the content.
- (ii) Prepare the report with own sentences, avoiding a cut and paste act.
- (iii) Type the matter to acquaint with the use of Micro-soft equation and drawing tools or any such facilities.
- (iv) Present the seminar topic orally and/or through PowerPoint slides.
- (v) Answer the queries and involve in debate/discussion.
- (vi) Submit a typed report with a list of references.

The participants shall take part in the discussion to foster a friendly and stimulating environment in which the students are motivated to reach high standards and become self-confident.

**Evaluation Procedure:**

The CIE marks for the seminar shall be awarded (based on the relevance of the topic, presentation skill, participation in the question and answer session, and quality of report) by the committee constituted for the purpose by the Head of the Department. The committee shall consist of three teachers from the department with the senior-most acting as the Chairman.

**Marks distribution for CIE of the course:**

Seminar Report:50 marks

Presentation skill:25 marks

Question and Answer: 25 marks. ■ No SEE component for Technical Seminar

**Non – credit mandatory courses (NCMC):**

**National Service Scheme/Physical Education (Sport and Athletics)/ Yoga:**

(1) Securing 40 % or more in CIE,35 % or more marks in SEE and 40 % or more in the sum total of CIE + SEE leads to successful completion of the registered course.

(2) In case, students fail to secure 35 % marks in SEE, they has to appear for SEE during the subsequent examinations conducted by the University.

(3) In case, any student fails to register for NSS, PE or Yoga/fails to secure the minimum 40 % of the prescribed CIE marks, he/she shall be deemed to have not completed the requirements of the course. In such a case, the student has to fulfill the course requirements during subsequently to earn the qualifying CIE marks subject to the maximum programme period.

(4) Successful completion of the course shall be indicated as satisfactory in the grade card. Non-completion of the course shall be indicated as Unsatisfactory.

(5) These courses shall not be considered for vertical progression as well as for the calculation of SGPA and CGPA, but completion of the courses shall be mandatory for the award of degree.



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III SEMESTER													
Sl. No	Course	Course Code	Course Title	Teaching Department (TD) and Question Paper Setting Board (PSB)	Teaching Hours /Week				Examination				Credits
					Theory Lecture	Tutorial	Practical / Drawing	SDA	Duration in hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P	S					
1	PCC/BS C	BCS301	Mathematics for Computer Science	TD: Maths PSB: Maths	3	2	0		03	50	50	100	4
2	IPCC	BCS302	Digital Design & Computer Organization	TD: CA PSB: CS	3	0	2		03	50	50	100	4
3	IPCC	BCS303	Operating Systems	TD: CA PSB: CS	3	0	2		03	50	50	100	4
4	PCC	BCS304	Data Structures and Applications	TD: CA PSB: CS	3	0	0		03	50	50	100	3
5	PCCL	BCSL305	Data Structures Lab	TD: CA PSB: CS	0	0	2		03	50	50	100	1
6	ESC	BXX306x	ESC/ETC/PLC	TD: CA PSB: CS	2	0	2		03	50	50	100	3
7	UHV	BSCK307	<b>Social Connect and Responsibility</b>	Any Department	0	0	2		01	100	---	100	1
8	AEC/ SEC	BXX358x	Ability Enhancement Course/Skill Enhancement Course - III	TD : Concerned department PSB: CS	If the course is a Theory				01	50	50	100	1
					1	0	0						
					If a course is a laboratory				02				
					0	0	2						
9	MC	BNSK359	National Service Scheme (NSS)	NSS coordinator	0	0	2			100	---	100	0
		BPEK359	Physical Education (PE) (Sports and Athletics)	Physical Education Director									
		BYOK359	Yoga	Yoga Teacher									
<b>Total</b>									<b>550</b>	<b>350</b>	<b>900</b>	<b>21</b>	

**PCC:** Professional Core Course, **PCCL:** Professional Core Course laboratory, **UHV:** Universal Human Value Course, **MC:** Mandatory Course (Non-credit), **AEC:** Ability Enhancement Course, **SEC:** Skill Enhancement Course, **L:** Lecture, **T:** Tutorial, **P:** Practical **S= SDA:** Skill Development Activity, **CIE:** Continuous Internal Evaluation, **SEE:** Semester End Evaluation. **K:** This letter in the course code indicates common to all the stream of engineering. **ESC:** Engineering Science Course, **ETC:** Emerging Technology Course, **PLC:** Programming Language Course

**Engineering Science Course (ESC/ETC/PLC) (Note- Student should opt for the course which should not be similar to the course opted in 1<sup>st</sup> Year)**

BCS306A	Object Oriented Programming with Java	BDS306C	Data Analytics with R
BDS306B	Python Programming for Data Science		

**Ability Enhancement Course – III**

BCS358A	Data Analytics with Excel	BCS358C	Project Management with Git
BAI358B	Ethics and Public Policy for AI	BAI358D	PHP Programming

**Professional Core Course (IPCC):** Refers to Professional Core Course Theory Integrated with practicals of the same course. Credit for IPCC can be 04 and its Teaching– Learning hours (L : T : P) can be considered as (3 : 0 : 2) or (2 : 2 : 2). The theory part of the IPCC shall be evaluated both by CIE and SEE. The practical part shall be evaluated by only CIE (no SEE). However, questions from the practical part of IPCC shall be included in the SEE question paper. For more details, the regulation governing the Degree of Bachelor of Engineering /Technology (B.E./B.Tech.) 2022-23 may please be referred.

**National Service Scheme /Physical Education/Yoga:** All students have to register for any one of the courses namely National Service Scheme (NSS), Physical Education (PE)(Sports and Athletics), and Yoga(YOG) with the concerned coordinator of the course during the first week of III semesters. Activities shall be carried out between III semester to the VI semester (for 4 semesters). Successful completion of the registered course and requisite CIE score is mandatory for the award of the degree. The events shall be appropriately scheduled by the colleges and the same shall be reflected in the calendar prepared for the NSS, PE, and Yoga activities. These courses shall not be considered for vertical progression as well as for the calculation of SGPA and CGPA, but completion of the course is mandatory for the award of degree.

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IV SEMESTER													
Sl. No	Course and Course Code		Course Title	Teaching Department (TD) and Question Paper Setting Board (PSB)	Teaching Hours /Week				Examination				Credits
					Theory Lecture	Tutorial	Practical / Drawing	Self - Study	Duration in hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P	S					
1	PCC/BS C	BCS401	Analysis & Design of Algorithms	TD: CA PSB: CS	3	0	0		03	50	50	100	3
2	IPCC	BAI402	Artificial Intelligence	TD: CA PSB: CS	3	0	2		03	50	50	100	4
3	IPCC	BCS403	Database Management Systems	TD: CA PSB: CS	3	0	2		03	50	50	100	4
4	PCCL	BCSL404	Analysis & Design of Algorithms Lab	TD: CA PSB: CS	0	0	2		03	50	50	100	1
5	ESC	BXX405x	ESC/ETC/PLC	TD: CA/Maths PSB: CS/Maths	2	2	0		03	50	50	100	3
6	AEC/ SEC	BXX456x	Ability Enhancement Course/Skill Enhancement Course- IV	TD : Concerned department PSB: CS	If the course is Theory				01	50	50	100	1
					1	0	0						
					If the course is a lab				02				
0	0	2											
4	BSC	BBOK407	Biology For Engineers	TD / PSB: BT, CHE,	2	0	0		03	50	50	100	2
7	UHV	BUHK408	Universal human values course	Any Department	1	0	0		01	50	50	100	1
9	MC	BNSK459	National Service Scheme (NSS)	NSS coordinator	0	0	2			100	---	100	0
		BPEK459	Physical Education (PE) (Sports and Athletics)	Physical Education Director									
		BYOK459	Yoga	Yoga Teacher									
<b>Total</b>									<b>500</b>	<b>400</b>	<b>900</b>	<b>19</b>	

**PCC:** Professional Core Course, **PCCL:** Professional Core Course laboratory, **UHV:** Universal Human Value Course, **MC:** Mandatory Course (Non-credit), **AEC:** Ability Enhancement Course, **SEC:** Skill Enhancement Course, **L:** Lecture, **T:** Tutorial, **P:** Practical **S= SDA:** Skill Development Activity, **CIE:** Continuous Internal Evaluation, **SEE:** Semester End Evaluation. **K :**This letter in the course code indicates common to all the stream of engineering.

#### Ability Enhancement Course / Skill Enhancement Course – IV

BDS456A	Scala	BDS456C	MERN
BDS456B	MangoDB	BCS456D	Technical writing using LATEX

#### Engineering Science Course (ESC/ETC/PLC)

BCS405A	Discrete Mathematical Structures	BAI405C	Optimization for Machine Learning
BAI405B	Metric Spaces	BAI405D	Algorithmic Game Theory

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**National Service Scheme /Physical Education/Yoga:** All students have to register for any one of the courses namely National Service Scheme (NSS), Physical Education (PE)(Sports and Athletics), and Yoga(YOG) with the concerned coordinator of the course during the first week of III semesters. Activities shall be carried out between III semester to the VI semester (for 4 semesters). Successful completion of the registered course and requisite CIE score is mandatory for the award of the degree. The events shall be appropriately scheduled by the colleges and the same shall be reflected in the calendar prepared for the NSS, PE, and Yoga activities. These courses shall not be considered for vertical progression as well as for the calculation of SGPA and CGPA, but completion of the courses is mandatory for the award of degree.

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V SEMESTER													
Sl. No	Course and Course Code		Course Title	Teaching Department (TD) and Question Paper Setting Board (PSB)	Teaching Hours /Week				Examination				Credits
					Theory Lecture	Tutorial	Practical / Drawing	SDA	Duration in hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P	S					
1	HSMS	BCA501	Software Engineering & Project Management	TD: CA PSB: CS	3	0	0		03	50	50	100	3
2	IPCC	BCA502	Computer Networks	TD: CA PSB: CS	3	0	2		03	50	50	100	4
3	PCC	BCA503	Theory of Computation	TD: CA PSB: CS	3	2	0		03	50	50	100	4
4	PCCL	BCAL504	Data Visualization Lab	TD: CA PSB: CS	0	0	2		03	50	50	100	1
5	PEC	BCA515x	Professional Elective Course	TD: CA PSB: CS	3	0	0		03	50	50	100	3
6	PROJ	BCA586	Mini Project	TD: HSM PSB : HSM	0	0	4		03	100		100	2
7	AEC	BRMK557	Research Methodology and IPR	TD: HSM PSB : HSM	2	2	0		02	50	50	100	3
8	MC	BESK508	Environmental Studies	TD: HSM PSB : HSM	2	0	0		02	50	50	100	2
9	MC	BNSK559	National Service Scheme (NSS)	NSS coordinator	0	0	2			100		100	0
		BPEK559	Physical Education (PE) (Sports and Athletics)	Physical Education Director									
		BYOK559	Yoga	Yoga Teacher									
									<b>Total</b>	<b>500</b>	<b>300</b>	<b>800</b>	<b>22</b>
<b>Professional Elective Course</b>													
BCA515A		Computer Vision			BCA515C		Nonlinear Control Techniques						

BCA515B	Information Retrieval	BCA515D	Image and Video Processing
<p><b>PCC:</b> Professional Core Course, <b>PCCL:</b> Professional Core Course laboratory, <b>UHV:</b> Universal Human Value Course, <b>MC:</b> Mandatory Course (Non-credit), <b>AEC:</b> Ability Enhancement Course, <b>SEC:</b> Skill Enhancement Course, <b>L:</b> Lecture, <b>T:</b> Tutorial, <b>P:</b> Practical <b>S= SDA:</b> Skill Development Activity, <b>CIE:</b> Continuous Internal Evaluation, <b>SXX:</b> Semester End Evaluation. <b>K :</b> The letter in the course code indicates common to al the stream of engineering. <b>PROJ:</b> Project /Mini Project. <b>PEC:</b> Professional Elective Course</p>			
<p><b>Professional Core Course (IPCC):</b> Refers to Professional Core Course Theory Integrated with practicals of the same course. Credit for IPCC can be 04 and its Teaching– Learning hours (L : T : P) can be considered as (3 : 0 : 2) or (2 : 2 : 2). The theory part of the IPCC shall be evaluated both by CIE and SEE. The practical part shall be evaluated by only CIE (no SEE). However, questions from the practical part of IPCC shall be included in the SEE question paper. For more details, the regulation governing the Degree of Bachelor of Engineering /Technology (B.E./B.Tech.) 2022-23</p>			
<p><b>National Service Scheme /Physical Education/Yoga:</b> All students have to register for any one of the courses namely National Service Scheme (NSS), Physical Education (PE)(Sports and Athletics), and Yoga(YOG) with the concerned coordinator of the course during the first week of III semesters. Activities shall be carried out between III semester to the VI semester (for 4 semesters). Successful completion of the registered course and requisite CIE score is mandatory for the award of the degree. The events shall be appropriately scheduled by the colleges and the same shall be reflected in the calendar prepared for the NSS, PE, and Yoga activities. These courses shall not be considered for vertical progression as well as for the calculation of SGPA and CGPA, but completion of the course is mandatory for the award of degree.</p>			
<p><b>Mini-project work:</b> Mini Project is a laboratory-oriented/hands on course that will provide a platform to students to enhance their practical knowledge and skills by the development of small systems/applications etc. Based on the ability/abilities of the student/s and recommendations of the mentor, a single discipline or a multidisciplinary Mini- project can be assigned to an individual student or to a group having not more than 4 students.</p>			
<p><b>CIE procedure for Mini-project:</b></p> <p><b>(i) Single discipline:</b> The CIE marks shall be awarded by a committee consisting of the Head of the concerned Department and two faculty members of the Department, one of them being the Guide. The CIE marks awarded for the Mini-project work shall be based on the evaluation of the project report, project presentation skill, and question and answer session in the ratio of 50:25:25. The marks awarded for the project report shall be the same for all the batches mates.</p> <p><b>(ii) Interdisciplinary:</b> Continuous Internal Evaluation shall be group-wise at the college level with the participation of all the guides of the project. The CIE marks awarded for the Mini-project, shall be based on the evaluation of the project report, project presentation skill, and question and answer session in the ratio 50:25:25. The marks awarded for the project report shall be the same for all the batch mates.</p> <p><b>No SEE component for Mini-Project.</b></p>			
<p><b>Professional Elective Courses (PEC):</b> A professional elective (PEC) course is intended to enhance the depth and breadth of educational experience in the Engineering and Technology curriculum. Multidisciplinary courses that are added supplement the latest trend and advanced technology in the selected stream of engineering. Each group will provide an option to select one course. The minimum number of students’ strengths for offering a professional elective is 10. However, this conditional shall not be applicable to cases where the admission to the program is less than 10.</p>			



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**VI SEMESTER**

Sl. No	Course and Course Code		Course Title	Teaching Department (TD) and Question Paper Setting Board (PSB)	Teaching Hours /Week				Examination				Credits
					Theory Lecture	T u r o r i a l	Prac t i c a l / Dra w i n g	SDA	Dur at i o n i n h o u r s	CIE Mar ks	SEE Mar ks	Total Mar ks	
1	IPCC	BCA601	Microcontrollers & Embedded Systems	TD: CA PSB: CS	3	0	2		03	50	50	100	4
2	PCC	BCA602	Machine Learning	TD: CA PSB: CS	4	0	0		03	50	50	100	4
3	PEC	BCA613x	Professional Elective Course	TD: CA PSB: CS	3	0	0		03	50	50	100	3
4	OEC	BCA654x	Open Elective Course	TD: CA PSB: CS	3	0	0		03	50	50	100	3
5	PROJ	BCA 685	Project Phase I	TD: CA PSB: CS	0	0	4		03	100	--	100	2
6	PCCL	BCAL606	Machine Learning lab	TD: CA PSB: CS	0	0	2		03	50	50	100	1
7	AEC/SD C	BCA657x	Ability Enhancement Course/Skill Development Course V	TD and PSB: Concerned department	If the course is offered as a Theory				01	50	50	100	1
					1	0	0						
					If course is offered as a practical								
					0	0	2						
8	MC	BNSK658	National Service Scheme (NSS)	NSS coordinator	0	0	2			100	---	100	0
		BPEK658	Physical Education (PE) (Sports and Athletics)	Physical Education Director									
		BYOK658	Yoga	Yoga Teacher									
<b>Total</b>									<b>500</b>	<b>300</b>	<b>800</b>	<b>18</b>	
<b>Professional Elective Course</b>													
BCA613A	Time Series Analysis			BCA613C	Blockchain Technology								
BCA613B	Cloud Computing			BCA613D	Introduction to Automation								
<b>Open Elective Course</b>													



BCA654A	Introduction to Data Structures	BCA654C	Mobile Application Development
BCA654B	Fundamentals of Operating Systems	BCA654D	Introduction to AI
<b>Ability Enhancement Course / Skill Enhancement Course-V</b>			
BCA657A	Explainable AI	BCA657C	Generative AI
BCA657B	PyTorch	BCA657D	Devops
<p><b>PCC:</b> Professional Core Course, <b>PCCL:</b> Professional Core Course laboratory, <b>UHV:</b> Universal Human Value Course, <b>MC:</b> Mandatory Course (Non-credit), <b>AEC:</b> Ability Enhancement Course, <b>SEC:</b> Skill Enhancement Course, <b>L:</b> Lecture, <b>T:</b> Tutorial, <b>P:</b> Practical <b>S= SDA:</b> Skill Development Activity, <b>CIE:</b> Continuous Internal Evaluation, <b>SEE:</b> Semester End Evaluation. <b>K :</b> The letter in the course code indicates common to all the stream of engineering. <b>PROJ:</b> Project /Mini Project. <b>PEC:</b> Professional Elective Course. <b>PROJ:</b> Project Phase -I, <b>OEC:</b> Open Elective Course</p>			
<p><b>Professional Core Course (IPCC):</b> Refers to Professional Core Course Theory Integrated with practicals of the same course. Credit for IPCC can be 04 and its Teaching– Learning hours (L : T : P) can be considered as (3 : 0 : 2) or (2 : 2 : 2). The theory part of the IPCC shall be evaluated both by CIE and SEE. The practical part shall be evaluated by only CIE (no SEE). However, questions from the practical part of IPCC shall be included in the SEE question paper. For more details, the regulation governing the Degree of Bachelor of Engineering /Technology (B.E./B.Tech.) 2022-23</p>			
<p><b>National Service Scheme /Physical Education/Yoga:</b> All students have to register for any one of the courses namely National Service Scheme (NSS), Physical Education (PE)(Sports and Athletics), and Yoga(YOG) with the concerned coordinator of the course during the first week of III semesters. Activities shall be carried out between III semester to the VI semester (for 4 semesters). Successful completion of the registered course and requisite CIE score is mandatory for the award of the degree. The events shall be appropriately scheduled by the colleges and the same shall be reflected in the calendar prepared for the NSS, PE, and Yoga activities. These courses shall not be considered for vertical progression as well as for the calculation of SGPA and CGPA, but completion of the course is mandatory for the award of degree.</p>			
<p><b>Professional Elective Courses (PEC):</b> A professional elective (PEC) course is intended to enhance the depth and breadth of educational experience in the Engineering and Technology curriculum. Multidisciplinary courses that are added supplement the latest trend and advanced technology in the selected stream of engineering. Each group will provide an option to select one course. The minimum number of students' strengths for offering professional electives is 10. However, this conditional shall not be applicable to cases where the admission to the program is less than 10.</p>			
<p><b>Open Elective Courses:</b> Students belonging to a particular stream of Engineering and Technology are not entitled to the open electives offered by their parent Department. However, they can opt for an elective offered by other Departments, provided they satisfy the prerequisite condition if any. Registration to open electives shall be documented under the guidance of the Program Coordinator/ Advisor/Mentor. The minimum numbers of students' strength for offering Open Elective Course is 10. However, this condition shall not be applicable to class where the admission to the program is less than 10.</p>			
<p><b>Project Phase-I :</b> Students have to discuss with the mentor /guide and with their helphe/she has to complete the literature survey and prepare the report and finally</p>			

define the problem statement for the project work.

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**B.E. in CSE (Artificial Intelligence)**  
**Scheme of Teaching and Examinations 2022**  
 Outcome Based Education (OBE) and Choice Based Credit System (CBCS)  
 (Effective from the academic year 2023-24)

**VII SEMESTER (Swappable VII and VIII SEMESTER)**

Sl. No	Course and Course Code		Course Title	Teaching Department (TD) and Question Paper Setting Board (PSB)	Teaching Hours /Week				Examination				Credits
					Theory Lecture	Tutorial	Practical / Drawing	SDA	Duration in hours	CIE Marks	SEE Marks	Total Marks	
1	IPCC	BCA701	Neural Network & Deep Learning	TD: CA PSB: CS	3	0	2		03	50	50	100	4
2	IPCC	BCA702	Natural Language Processing	TD: CA PSB: CS	3	0	2		03	50	50	100	4
3	PCC	BCA703	Introduction to AI for Cyber Security	TD: CA PSB: CS	4	0	0		03	50	50	100	4
4	PEC	BCA714x	<b>Professional Elective Course</b>	TD: CA PSB: CS	3	0	0		03	50	50	100	3
5	OEC	BCA755x	<b>Open Elective Course</b>	TD: CA PSB: CS	3	0	0		01	50	50	100	3
6	PROJ	BCA786	<b>Major Project Phase-II</b>	TD: CA PSB: CS	0	0	12		03	100	100	200	6
										<b>400</b>	<b>300</b>	<b>700</b>	<b>24</b>

**Professional Elective Course**

BCA714A	AI of Things	BCA714C	Data Engineering & MLOps
BCA714B	Human-Centered AI	BCA714D	Big Data Analytics

**Open Elective Course**

BCA755A	Introduction to DBMS	BCA755C	Software Engineering
BCA755B	Introduction to Algorithms	BCA755D	

**PCC:** Professional Core Course, **PCCL:** Professional Core Course laboratory, **PEC:** Professional Elective Course, **OEC:** Open Elective Course **PR:** Project Work, **L:** Lecture, **T:** Tutorial, **P:** Practical **S= SDA:** Skill Development Activity, **CIE:** Continuous Internal Evaluation, **SEE:** Semester End Evaluation. **TD-** Teaching Department, **PSB:** Paper Setting department, **OEC:** Open Elective Course, **PEC:** Professional Elective Course. **PROJ:** Project work

**Note: VII and VIII semesters of IV years of the program**

**(1)** Institutions can swap the VII and VIII Semester Schemes of Teaching and Examinations to accommodate research internships/ industry internships after the VI

semester.

**(2)** Credits earned for the courses of VII and VIII Semester Scheme of Teaching and Examinations shall be counted against the corresponding semesters whether the VII or VIII semesters is completed during the beginning of the IV year or the later part of IV years of the program.

**Professional Elective Courses (PEC):** A professional elective (PEC) course is intended to enhance the depth and breadth of educational experience in the Engineering and Technology curriculum. Multidisciplinary courses that are added supplement the latest trend and advanced technology in the selected stream of engineering. Each group will provide an option to select one course. The minimum number of students' strengths for offering professional electives is 10. However, this conditional shall not be applicable to cases where the admission to the program is less than 10.

**Open Elective Courses:**

Students belonging to a particular stream of Engineering and Technology are not entitled to the open electives offered by their parent Department. However, they can opt for an elective offered by other Departments, provided they satisfy the prerequisite condition if any. Registration to open electives shall be documented under the guidance of the Program Coordinator/ Advisor/Mentor. The minimum numbers of students' strength for offering Open Elective Course is 10. However, this condition shall not be applicable to class where the admission to the program is less than 10.

**PROJECT WORK (21XXP75):** The objective of the Project work is

- (i)** To encourage independent learning and the innovative attitude of the students.
- (ii)** To develop interactive attitude, communication skills, organization, time management, and presentation skills.
- (iii)** To impart flexibility and adaptability.
- (iv)** To inspire team working.
- (v)** To expand intellectual capacity, credibility, judgment and intuition.
- (vi)** To adhere to punctuality, setting and meeting deadlines.
- (vii)** To install responsibilities to oneself and others.
- (viii)** To train students to present the topic of project work in a seminar without any fear, face the audience confidently, enhance communication skills, involve in group discussion to present and exchange ideas.

**CIE procedure for Project Work:**

**(1) Single discipline:** The CIE marks shall be awarded by a committee consisting of the Head of the concerned Department and two senior faculty members of the Department, one of whom shall be the Guide.

The CIE marks awarded for the project work, shall be based on the evaluation of the project work Report, project presentation skill, and question and answer session in the ratio 50:25:25. The marks awarded for the project report shall be the same for all the batch mates.

**(2) Interdisciplinary:** Continuous Internal Evaluation shall be group-wise at the college level with the participation of all guides of the college. Participation of external guide/s, if any, is desirable. The CIE marks awarded for the project work, shall be based on the evaluation of project work Report, project presentation skill, and

question and answer session in the ratio 50:25:25. The marks awarded for the project report shall be the same for all the batch mates.

**SEE procedure for Project Work:** SEE for project work will be conducted by the two examiners appointed by the University. The SEE marks awarded for the project work shall be based on the evaluation of project work Report, project presentation skill, and question and answer session in the ratio 50:25:25.

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 (Effective from the academic year 2023-24)

**VIII SEMESTER (Swappable VII and VIII SEMESTER)**

Sl. No	Course and Course Code		Course Title	Teaching Department (TD) and Question Paper Setting Board (PSB)	Teaching Hours /Week				Examination				Credits
					Theory Lecture	Tutorial	Practical / Drawing	SDA	Duration in hours	CIE Marks	SEE Marks	Total Marks	
1	PEC	BCA801x	Professional Elective (Online Courses) Only through NPTEL	PSB: CS	3	0	0		03	50	50	100	3
2	OEC	BCA802x	Open Elective (Online Courses) Only through NPTEL	PSB: CS	3	0	0		01	50	50	100	3
3	INT	BCA803	Internship (Industry/Research) (14 - 20 weeks)		0	0	12		03	100	100	200	10
										<b>200</b>	<b>200</b>	<b>400</b>	<b>16</b>

**Professional Elective Course (Online courses)**

BCA801A	BOS will publish courses based on the availability	BCA801C
BCA801B		BCA801D

**Open Elective Courses (Online Courses)**

BCA802A	BOS will publish courses based on the availability	BCA802C
BCA802B		BCA802D

**L:** Lecture, **T:** Tutorial, **P:** Practical **S= SDA:** Skill Development Activity, **CIE:** Continuous Internal Evaluation, **SEE:** Semester End Evaluation. **TD-** Teaching Department, **PSB:** Paper Setting department, **OEC:** Open Elective Course, **PEC:** Professional Elective Course. **PROJ:** Project work, **INT:** Industry Internship / Research Internship / Rural Internship

**Note: VII and VIII semesters of IV years of the program**

**Swapping Facility**

- Institutions can swap VII and VIII Semester Scheme of Teaching and Examinations to accommodate **research internships/ industry internships/Rural Internship**

after the VI semester.

- Credits earned for the courses of VII and VIII Semester Scheme of Teaching and Examinations shall be counted against the corresponding semesters whether VII or VIII semester is completed during the beginning of IV year or later part of IV year of the program.
- **Note: For BCA801x and BCA802x courses BOS will announce list of courses in 6<sup>th</sup> , 7<sup>th</sup> & 8<sup>th</sup> Sem . Students can register in any of the semester to earn the credits in 8<sup>th</sup> Sem**

**Elucidation:**

At the beginning of IV years of the program i.e., after VI semester, VII semester classwork and VIII semester **Research Internship /Industrial Internship / Rural Internship** shall be permitted to be operated simultaneously by the University so that students have ample opportunity for an internship. In other words, a good percentage of the class shall attend VII semester classwork and a similar percentage of others shall attend to Research Internship or Industrial Internship or Rural Internship.

Research/Industrial /Rural Internship shall be carried out at an Industry, NGO, MSME, Innovation center, Incubation center, Start-up, center of Excellence (CoE), Study Centre established in the parent institute and /or at reputed research organizations/institutes.

The mandatory Research internship /Industry internship / Rural Internship is for 14 to 20 weeks. The internship shall be considered as a head of passing and shall be considered for the award of a degree. Those, who do not take up/complete the internship shall be declared to fail and shall have to complete it during the subsequent University examination after satisfying the internship requirements.

**Research internship:** A research internship is intended to offer the flavor of current research going on in the research field. It helps students get familiarized with the field and imparts the skill required for carrying out research.

**Industry internship:** Is an extended period of work experience undertaken by students to supplement their degree for professional development. It also helps them learn to overcome unexpected obstacles and successfully navigate organizations, perspectives, and cultures. Dealing with contingencies helps students recognize, appreciate, and adapt to organizational realities by tempering their knowledge with practical constraints.

**Rural Internship:** Rural development internship is an initiative of Unnat Bharat Abhiyan Cell, RGIT in association with AICTE to involve students of all departments studying in different academic years for exploring various opportunities in techno-social fields, to connect and work with Rural India for their upliftment.

The faculty coordinator or mentor has to monitor the student's internship progress and interact with them to guide for the successful completion of the internship.

The students are permitted to carry out the internship anywhere in India or abroad. University shall not bear any expenses incurred in respect of the internship.

With the consent of the internal guide and Principal of the Institution, students shall be allowed to carry out the internship at their hometown (**within or outside the state or abroad**), provided favorable facilities are available for the internship and the student remains regularly in contact with the internal guide. **University shall not bear any cost involved in carrying out the internship by students.** However, students can receive any financial assistance extended by the organization.

**Professional Elective /Open Elective Course:**These are ONLINE courses suggested by the respective Board of Studies. Details of these courses shall be made available for students on the VTU web portal.

**Please note:** If any clarifications / suggestions please email to [sbhvtuso@yahoo.com](mailto:sbhvtuso@yahoo.com)

<b>Mathematics for Computer Science</b>		Semester	3
Course Code	<b>BCS301</b>	CIE Marks	50
Teaching Hours/Week (L: T:P: S)	3:2:0:0	SEE Marks	50
Total Hours of Pedagogy	40 hours Theory + 20 Hours Tutorial	Total Marks	100
Credits	04	Exam Hours	3
Examination type (SEE)	<b>Theory</b>		
<p><b>Course objectives:</b> This course will enable the students to:</p> <ol style="list-style-type: none"> <li>1. To introduce the concept of random variables, probability distributions, specific discrete and continuous distributions with practical application in Computer Science Engineering and social life situations.</li> <li>2. To Provide the principles of statistical inferences and the basics of hypothesis testing with emphasis on some commonly encountered hypotheses.</li> <li>3. To Determine whether an input has a statistically significant effect on the system's response through ANOVA testing.</li> </ol>			
<p><b>Teaching-Learning Process</b>  <b>Pedagogy (General Instructions):</b>            Teachers can use the following strategies to accelerate the attainment of the various course outcomes.</p> <ol style="list-style-type: none"> <li>1. In addition to the traditional lecture method, different types of innovative teaching methods may be adopted so that the delivered lessons shall develop students' theoretical and applied Mathematical skills.</li> <li>2. State the need for Mathematics with Engineering Studies and Provide real-life examples.</li> <li>3. Support and guide the students for self-study.</li> <li>4. You will assign homework, grading assignments and quizzes, and documenting students' progress.</li> <li>5. Encourage the students to group learning to improve their creative and analytical skills.</li> <li>6. Show short related video lectures in the following ways:               <ul style="list-style-type: none"> <li>• As an introduction to new topics (pre-lecture activity).</li> <li>• As a revision of topics (post-lecture activity).</li> <li>• As additional examples (post-lecture activity).</li> <li>• As an additional material of challenging topics (pre-and post-lecture activity).</li> <li>• As a model solution of some exercises (post-lecture activity).</li> </ul> </li> </ol>			
<b>Module-1: Probability Distributions</b>			
<p><b>Probability Distributions:</b> Review of basic probability theory. Random variables (discrete and continuous), probability mass and density functions. Mathematical expectation, mean and variance. Binomial, Poisson and normal distributions- problems (derivations for mean and standard deviation for Binomial and Poisson distributions only)-Illustrative examples. Exponential distribution. <b>(12 Hours)</b>  <b>(RBT Levels: L1, L2 and L3)</b></p>			
<b>Pedagogy</b>	Chalk and Board, Problem-based learning		
<b>Module-2: Joint probability distribution &amp; Markov Chain</b>			



<p><b>Joint probability distribution:</b> Joint Probability distribution for two discrete random variables, expectation, covariance and correlation.</p> <p><b>Markov Chain:</b> Introduction to Stochastic Process, Probability Vectors, Stochastic matrices, Regular stochastic matrices, Markov chains, Higher transition probabilities, Stationary distribution of Regular Markov chains and absorbing states. <b>(12 Hours)</b> <b>(RBT Levels: L1, L2 and L3)</b></p>	
<b>Pedagogy</b>	Chalk and Board, Problem-based learning
<b>Module-3: Statistical Inference 1</b>	
<p>Introduction, sampling distribution, standard error, testing of hypothesis, levels of significance, test of significances, confidence limits, simple sampling of attributes, test of significance for large samples, comparison of large samples. <b>(12 Hours)</b> <b>(RBT Levels: L1, L2 and L3)</b></p>	
<b>Pedagogy</b>	Chalk and Board, Problem-based learning
<b>Module-4: Statistical Inference 2</b>	
<p>Sampling variables, central limit theorem and confidences limit for unknown mean. Test of Significance for means of two small samples, students 't' distribution, Chi-square distribution as a test of goodness of fit. F-Distribution. <b>(12 Hours)</b> <b>(RBT Levels: L1, L2 and L3)</b></p>	
<b>Pedagogy</b>	Chalk and Board, Problem-based learning
<b>Module-5: Design of Experiments &amp; ANOVA</b>	
<p>Principles of experimentation in design, Analysis of completely randomized design, randomized block design. The ANOVA Technique, Basic Principle of ANOVA, One-way ANOVA, Two-way ANOVA, Latin-square Design, and Analysis of Co-Variance. <b>(12 Hours)</b> <b>(RBT Levels: L1, L2 and L3)</b></p>	
<b>Pedagogy</b>	Chalk and Board, Problem-based learning
<p><b>Course outcome (Course Skill Set)</b> At the end of the course, the student will be able to:</p> <ol style="list-style-type: none"> <li>1. Explain the basic concepts of probability, random variables, probability distribution</li> <li>2. Apply suitable probability distribution models for the given scenario.</li> <li>3. Apply the notion of a discrete-time Markov chain and n-step transition probabilities to solve the given problem</li> <li>4. Use statistical methodology and tools in the engineering problem-solving process.</li> <li>5. Compute the confidence intervals for the mean of the population.</li> <li>6. Apply the ANOVA test related to engineering problems.</li> </ol>	
<p><b>Assessment Details (both CIE and SEE)</b> The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.</p> <p><b>Continuous Internal Evaluation:</b></p> <ul style="list-style-type: none"> <li>● For the Assignment component of the CIE, there are 25 marks and for the Internal Assessment</li> </ul>	

Test component, there are 25 marks.

- The first test will be administered after 40-50% of the syllabus has been covered, and the second test will be administered after 85-90% of the syllabus has been covered
- Any two assignment methods mentioned in the 22OB2.4, if an assignment is project-based then only one assignment for the course shall be planned. The teacher should not conduct two assignments at the end of the semester if two assignments are planned.
- For the course, CIE marks will be based on a scaled-down sum of two tests and other methods of assessment.

**Internal Assessment Test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.**

**Semester-End Examination:**

Theory SEE will be conducted by the University as per the scheduled timetable, with common question papers for the course (**duration 03 hours**).

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
3. The students have to answer 5 full questions, selecting one full question from each module.

Marks scored shall be proportionally reduced to 50 marks

**Suggested Learning Resources:**

**Textbooks:**

1. **Ronald E. Walpole, Raymond H Myers, Sharon L Myers & Keying Ye** "Probability & Statistics for Engineers & Scientists", Pearson Education, 9<sup>th</sup> edition, 2017.
2. **Peter Bruce, Andrew Bruce & Peter Gedeck** "Practical Statistics for Data Scientists" O'Reilly Media, Inc., 2<sup>nd</sup> edition **2020**.

**Reference Books: (Name of the author/Title of the Book/ Name of the publisher/Edition and Year)**

1. **Erwin Kreyszig**, "Advanced Engineering Mathematics", John Wiley & Sons, 9<sup>th</sup> Edition, 2006.
2. **B. S. Grewal** "Higher Engineering Mathematics", Khanna publishers, 44<sup>th</sup> Ed., 2021.
3. **G Haribaskaran** "Probability, Queuing Theory & Reliability Engineering", Laxmi Publication, Latest Edition, 2006
4. **Irwin Miller & Marylees Miller**, John E. Freund's "Mathematical Statistics with Applications" Pearson. Dorling Kindersley Pvt. Ltd. India, 8<sup>th</sup> edition, 2014.
5. **S C Gupta and V K Kapoor**, "Fundamentals of Mathematical Statistics", S Chand and Company, Latest edition.
6. **Robert V. Hogg, Joseph W. McKean & Allen T. Craig**. "Introduction to Mathematical Statistics", Pearson Education 7<sup>th</sup> edition, 2013.
7. **Jim Pitman**. Probability, Springer-Verlag, 1993.
8. **Sheldon M. Ross**, "Introduction to Probability Models" 11<sup>th</sup> edition. Elsevier, 2014.
9. **A. M. Yaglom and I. M. Yaglom**, "Probability and Information". D. Reidel Publishing Company. Distributed by Hindustan Publishing Corporation (India) Delhi, 1983.
10. **P. G. Hoel, S. C. Port and C. J. Stone**, "Introduction to Probability Theory", Universal Book Stall, (Reprint), 2003.
11. **S. Ross**, "A First Course in Probability", Pearson Education India, 6<sup>th</sup> Ed., 2002.
12. **W. Feller**, "An Introduction to Probability Theory and its Applications", Vol. 1, Wiley, 3rd

Ed., 1968.

13. **N.P. Bali and Manish Goyal**, A Textbook of Engineering Mathematics, Laxmi Publications, Reprint, 2010.

14. **Veerarajan T**, Engineering Mathematics (for semester III), Tata McGraw-Hill, New Delhi, 2010

**Web links and Video Lectures (e-Resources):**

<http://nptel.ac.in/courses.php?disciplineID=111>

[http://www.class-central.com/subject/math\(MOOCs\)](http://www.class-central.com/subject/math(MOOCs))

<http://academicearth.org/>

<http://www.bookstreet.in>.

[VTU EDUSAT PROGRAMME – 20](#)

VTU e-Shikshana Program

**Activity-Based Learning (Suggested Activities in Class)/Practical-Based Learning**

- Programming Assignment
- Seminars

<b>Digital Design and Computer Organization</b>		Semester	3
Course Code	BCS302	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:2:0	SEE Marks	50
Total Hours of Pedagogy	40 hours Theory + 20 Hours of Practicals	Total Marks	100
Credits	04	Exam Hours	3
Examination nature (SEE)	Theory		
<p><b>Course objectives:</b></p> <ul style="list-style-type: none"> <li>● To demonstrate the functionalities of binary logic system</li> <li>● To explain the working of combinational and sequential logic system</li> <li>● To realize the basic structure of computer system</li> <li>● To illustrate the working of I/O operations and processing unit</li> </ul>			
<p><b>Teaching-Learning Process (General Instructions)</b>            These are sample Strategies; that teachers can use to accelerate the attainment of the various course outcomes.</p> <ol style="list-style-type: none"> <li>1. Chalk and Talk</li> <li>2. Live Demo with experiments</li> <li>3. Power point presentation</li> </ol>			
<b>MODULE-1</b>		<b>8 Hr</b>	
<p><b>Introduction to Digital Design:</b> Binary Logic, Basic Theorems And Properties Of Boolean Algebra, Boolean Functions, Digital Logic Gates, Introduction, The Map Method, Four-Variable Map, Don't-Care Conditions, NAND and NOR Implementation, Other Hardware Description Language – Verilog Model of a simple circuit.</p> <p><b>Text book 1: 1.9, 2.4, 2.5, 2.8, 3.1, 3.2, 3.3, 3.5, 3.6, 3.9</b></p>			
<b>MODULE-2</b>		<b>8 Hr</b>	
<p><b>Combinational Logic:</b> Introduction, Combinational Circuits, Design Procedure, Binary Adder- Subtractor, Decoders, Encoders, Multiplexers. HDL Models of Combinational Circuits – Adder, Multiplexer, Encoder.</p> <p><b>Sequential Logic:</b> Introduction, Sequential Circuits, Storage Elements: Latches, Flip-Flops.</p> <p><b>Text book 1: 4.1, 4.2, 4.4, 4.5, 4.9, 4.10, 4.11, 4.12, 5.1, 5.2, 5.3, 5.4.</b></p>			
<b>MODULE-3</b>		<b>8 Hr</b>	
<p><b>Basic Structure of Computers:</b> Functional Units, Basic Operational Concepts, Bus structure, Performance – Processor Clock, Basic Performance Equation, Clock Rate, Performance Measurement. <b>Machine Instructions and Programs:</b> Memory Location and Addresses, Memory Operations, Instruction and Instruction sequencing, Addressing Modes.</p> <p><b>Text book 2: 1.2, 1.3, 1.4, 1.6, 2.2, 2.3, 2.4, 2.5</b></p>			
<b>MODULE-4</b>		<b>8 Hr</b>	
<p><b>Input/output Organization:</b> Accessing I/O Devices, Interrupts – Interrupt Hardware, Enabling and Disabling Interrupts, Handling Multiple Devices, Direct Memory Access: Bus Arbitration, Speed, size and Cost of memory systems. Cache Memories – Mapping Functions.</p> <p><b>Text book 2: 4.1, 4.2.1, 4.2.2, 4.2.3, 4.4, 5.4, 5.5.1</b></p>			
<b>MODULE-5</b>		<b>8 Hr</b>	

**Basic Processing Unit:** Some Fundamental Concepts: Register Transfers, Performing ALU operations, fetching a word from Memory, Storing a word in memory. Execution of a Complete Instruction. **Pipelining:** Basic concepts, Role of Cache memory, Pipeline Performance.

**Text book 2: 7.1, 7.2, 8.1**

### PRACTICAL COMPONENT OF IPCC

Sl.N O	Experiments Simulation packages preferred: Multisim, Modelsim, PSpice or any other relevant
1	Given a 4-variable logic expression, simplify it using appropriate technique and simulate the same using basic gates.
2	Design a 4 bit full adder and subtractor and simulate the same using basic gates.
3	Design Verilog HDL to implement simple circuits using structural, Data flow and Behavioural model.
4	Design Verilog HDL to implement Binary Adder-Subtractor – Half and Full Adder, Half and Full Subtractor.
5	Design Verilog HDL to implement Decimal adder.
6	Design Verilog program to implement Different types of multiplexer like 2:1, 4:1 and 8:1.
7	Design Verilog program to implement types of De-Multiplexer.
8	Design Verilog program for implementing various types of Flip-Flops such as SR, JK and D.

#### Course outcomes (Course Skill Set):

At the end of the course, the student will be able to:

CO1: Apply the K-Map techniques to simplify various Boolean expressions.

CO2: Design different types of combinational and sequential circuits along with Verilog programs.

CO3: Describe the fundamentals of machine instructions, addressing modes and Processor performance.

CO4: Explain the approaches involved in achieving communication between processor and I/O devices.

CO5: Analyze internal Organization of Memory and Impact of cache/Pipelining on Processor Performance.

#### Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

#### CIE for the theory component of the IPCC (maximum marks 50)

- IPCC means practical portion integrated with the theory of the course.
- CIE marks for the theory component are **25 marks** and that for the practical component is **25 marks**.
- 25 marks for the theory component are split into **15 marks** for two Internal Assessment Tests (Two Tests, each of 15 Marks with 01-hour duration, are to be conducted) and **10 marks** for other

assessment methods mentioned in 22OB4.2. The first test at the end of 40-50% coverage of the syllabus and the second test after covering 85-90% of the syllabus.

- Scaled-down marks of the sum of two tests and other assessment methods will be CIE marks for the theory component of IPCC (that is for **25 marks**).
- The student has to secure 40% of 25 marks to qualify in the CIE of the theory component of IPCC.

#### **CIE for the practical component of the IPCC**

- **15 marks** for the conduction of the experiment and preparation of laboratory record, and **10 marks** for the test to be conducted after the completion of all the laboratory sessions.
- On completion of every experiment/program in the laboratory, the students shall be evaluated including viva-voce and marks shall be awarded on the same day.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments' write-ups are added and scaled down to **15 marks**.
- The laboratory test (**duration 02/03 hours**) after completion of all the experiments shall be conducted for 50 marks and scaled down to **10 marks**.
- Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IPCC for **25 marks**.
- The student has to secure 40% of 25 marks to qualify in the CIE of the practical component of the IPCC.

#### **SEE for IPCC**

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the course (**duration 03 hours**)

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
3. The students have to answer 5 full questions, selecting one full question from each module.
4. Marks scored by the student shall be proportionally scaled down to 50 Marks

**The theory portion of the IPCC shall be for both CIE and SEE, whereas the practical portion will have a CIE component only. Questions mentioned in the SEE paper may include questions from the practical component.**

#### **Suggested Learning Resources:**

##### **Books**

1. M. Morris Mano & Michael D. Ciletti, Digital Design With an Introduction to Verilog Design, 5e, Pearson Education.
2. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, Computer Organization, 5<sup>th</sup> Edition, Tata McGraw Hill.

#### **Web links and Video Lectures (e-Resources):**

<https://cse11-iiith.vlabs.ac.in/>

**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

Assign the group task to Design the various types of counters and display the output accordingly

**Assessment Methods**

- Lab Assessment (25 Marks)
- GATE Based Aptitude Test

<b>OPERATING SYSTEMS</b>		Semester	3
Course Code	BCS303	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:2:0	SEE Marks	50
Total Hours of Pedagogy	40 hours Theory + 20 hours practicals	Total Marks	100
Credits	04	Exam Hours	3
Examination nature (SEE)	<b>Theory</b>		
<p><b>Course objectives:</b></p> <ul style="list-style-type: none"> <li>● To Demonstrate the need for OS and different types of OS</li> <li>● To discuss suitable techniques for management of different resources</li> <li>● To demonstrate different APIs/Commands related to processor, memory, storage and file system management.</li> </ul>			
<p><b>Teaching-Learning Process (General Instructions)</b>  Teachers can use the following strategies to accelerate the attainment of the various course outcomes.</p> <ol style="list-style-type: none"> <li>1. Lecturer methods (L) need not to be only traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.</li> <li>2. Use of Video/Animation to explain functioning of various concepts.</li> <li>3. Encourage collaborative (Group Learning) Learning in the class.</li> <li>4. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.</li> <li>5. Role play for process scheduling.</li> <li>6. Demonstrate the installation of any one Linux OS on VMware/Virtual Box</li> </ol>			
<b>MODULE-1</b>		<b>8 Hours</b>	
<p><b>Introduction to operating systems, System structures:</b> What operating systems do; Computer System organization; Computer System architecture; Operating System structure; Operating System operations; Process management; Memory management; Storage management; Protection and Security; Distributed system; Special-purpose systems; Computing environments.</p> <p><b>Operating System Services:</b> User - Operating System interface; System calls; Types of system calls; System programs; Operating system design and implementation; Operating System structure; Virtual machines; Operating System debugging, Operating System generation; System boot.</p> <p><b>Textbook 1: Chapter – 1 (1.1-1.12), 2 (2.2-2.11)</b></p>			
<b>MODULE-2</b>		<b>8 Hours</b>	
<p><b>Process Management:</b> Process concept; Process scheduling; Operations on processes; Inter process communication</p> <p><b>Multi-threaded Programming:</b> Overview; Multithreading models; Thread Libraries; Threading issues.</p> <p><b>Process Scheduling:</b> Basic concepts; Scheduling Criteria; Scheduling Algorithms; Thread scheduling; Multiple-processor scheduling,</p> <p><b>Textbook 1: Chapter – 3 (3.1-3.4), 4 (4.1-4.4), 5 (5.1 -5.5)</b></p>			
<b>MODULE-3</b>		<b>8 Hours</b>	



<p><b>Process Synchronization:</b> Synchronization: The critical section problem; Peterson's solution; Synchronization hardware; Semaphores; Classical problems of synchronization;</p> <p><b>Deadlocks:</b> System model; Deadlock characterization; Methods for handling deadlocks; Deadlock prevention; Deadlock avoidance; Deadlock detection and recovery from deadlock.</p> <p><b>Textbook 1: Chapter – 6 (6.1-6.6), 7 (7.1 -7.7)</b></p>	
<b>MODULE-4</b>	<b>8 Hours</b>
<p><b>Memory Management:</b> Memory management strategies: Background; Swapping; Contiguous memory allocation; Paging; Structure of page table; Segmentation.</p> <p><b>Virtual Memory Management:</b> Background; Demand paging; Copy-on-write; Page replacement; Allocation of frames; Thrashing.</p> <p><b>Textbook 1: Chapter -8 (8.1-8.6), 9 (9.1-9.6)</b></p>	
<b>MODULE-5</b>	<b>8 Hours</b>
<p><b>File System, Implementation of File System:</b> File system: File concept; Access methods; Directory and Disk structure; File system mounting; File sharing; <b>Implementing File system:</b> File system structure; File system implementation; Directory implementation; Allocation methods; Free space management.</p> <p><b>Secondary Storage Structure, Protection:</b> Mass storage structures; Disk structure; Disk attachment; Disk scheduling; Disk management; <b>Protection:</b> Goals of protection, Principles of protection, Domain of protection, Access matrix.</p> <p><b>Textbook 1: Chapter – 10 (10.1-10.5) ,11 (11.1-11.5),12 (12.1-12.5), 14 (14.1-14.4)</b></p>	

**PRACTICAL COMPONENT OF IPCC** (May cover all / major modules)

SL.N O	Experiments
1	Develop a c program to implement the Process system calls (fork (), exec(), wait(), create process, terminate process)
2	Simulate the following CPU scheduling algorithms to find turnaround time and waiting time a) FCFS b) SJF c) Round Robin d) Priority.
3	Develop a C program to simulate producer-consumer problem using semaphores.
4	Develop a C program which demonstrates interprocess communication between a reader process and a writer process. Use mkfifo, open, read, write and close APIs in your program.
5	Develop a C program to simulate Bankers Algorithm for DeadLock Avoidance.
6	Develop a C program to simulate the following contiguous memory allocation Techniques: a) Worst fit b) Best fit c) First fit.
7	Develop a C program to simulate page replacement algorithms: a) FIFO b) LRU
8	Simulate following File Organization Techniques a) Single level directory b) Two level directory
9	Develop a C program to simulate the Linked file allocation strategies.
10	Develop a C program to simulate SCAN disk scheduling algorithm.

**Course outcomes (Course Skill Set):**

At the end of the course, the student will be able to:

CO 1. Explain the structure and functionality of operating system

CO 2. Apply appropriate CPU scheduling algorithms for the given problem.

CO 3. Analyse the various techniques for process synchronization and deadlock handling.

CO 4. Apply the various techniques for memory management

CO 5. Explain file and secondary storage management strategies.

CO 6. Describe the need for information protection mechanisms

**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

**CIE for the theory component of the IPCC (maximum marks 50)**

- IPCC means practical portion integrated with the theory of the course.
- CIE marks for the theory component are **25 marks** and that for the practical component is **25 marks**.
- 25 marks for the theory component are split into **15 marks** for two Internal Assessment Tests (Two Tests, each of 15 Marks with 01-hour duration, are to be conducted) and **10 marks** for other assessment methods

mentioned in 22OB4.2. The first test at the end of 40-50% coverage of the syllabus and the second test after covering 85-90% of the syllabus.

- Scaled-down marks of the sum of two tests and other assessment methods will be CIE marks for the theory component of IPCC (that is for **25 marks**).
- The student has to secure 40% of 25 marks to qualify in the CIE of the theory component of IPCC.

#### **CIE for the practical component of the IPCC**

- **15 marks** for the conduction of the experiment and preparation of laboratory record, and **10 marks** for the test to be conducted after the completion of all the laboratory sessions.
- On completion of every experiment/program in the laboratory, the students shall be evaluated including viva-voce and marks shall be awarded on the same day.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments' write-ups are added and scaled down to **15 marks**.
- The laboratory test (**duration 02/03 hours**) after completion of all the experiments shall be conducted for 50 marks and scaled down to **10 marks**.
- Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IPCC for **25 marks**.
- The student has to secure 40% of 25 marks to qualify in the CIE of the practical component of the IPCC.

#### **SEE for IPCC**

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the course (**duration 03 hours**)

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
3. The students have to answer 5 full questions, selecting one full question from each module.
4. Marks scored by the student shall be proportionally scaled down to 50 Marks

**The theory portion of the IPCC shall be for both CIE and SEE, whereas the practical portion will have a CIE component only. Questions mentioned in the SEE paper may include questions from the practical component.**

#### **Suggested Learning Resources:**

##### **Textbooks**

1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, Operating System Principles 8th edition, Wiley-India, 2015

##### **Reference Books**

1. Ann McHoes Ida M Fylnn, Understanding Operating System, Cengage Learning, 6th Edition
2. D.M Dhamdhare, Operating Systems: A Concept Based Approach 3rd Ed, McGraw- Hill, 2013.
3. P.C.P. Bhatt, An Introduction to Operating Systems: Concepts and Practice 4th Edition, PHI(EEE), 2014.
4. William Stallings Operating Systems: Internals and Design Principles, 6th Edition, Pearson.

#### **Web links and Video Lectures (e-Resources):**

1. <https://youtu.be/mXw9ruZaxzQ>

2. <https://youtu.be/vBURTi97EkA>
3. [https://www.youtube.com/watch?v=783KAB-tuE4&list=PLIemF3uozcAKTgsCIj82voMK3TMR0YE\\_f](https://www.youtube.com/watch?v=783KAB-tuE4&list=PLIemF3uozcAKTgsCIj82voMK3TMR0YE_f)
4. <https://www.youtube.com/watch?v=3-ITLMMeeXY&list=PL3pGy4HtqwD0n7bQfHjPnsWzkeRn6mkO>

**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

- Assessment Methods
  - Case Study on Unix Based Systems (10 Marks)
  - Lab Assessment (25 Marks)

<b>DATA STRUCTURES AND APPLICATIONS</b>		Semester	3
Course Code	BCS304	CIE Marks	50
Teaching Hours/Week (L: T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	3
Examination type (SEE)	<b>Theory</b>		
<p><b>Course objectives:</b>  CLO 1. To explain fundamentals of data structures and their applications.  CLO 2. To illustrate representation of Different data structures such as Stack, Queues, Linked Lists, Trees and Graphs.  CLO 3. To Design and Develop Solutions to problems using Linear Data Structures  CLO 4. To discuss applications of Nonlinear Data Structures in problem solving.  CLO 5. To introduce advanced Data structure concepts such as Hashing and Optimal Binary Search Trees</p>			
<p><b>Teaching-Learning Process (General Instructions)</b>  Teachers can use following strategies to accelerate the attainment of the various course outcomes.</p> <ol style="list-style-type: none"> <li>1. Chalk and Talk with Black Board</li> <li>2. ICT based Teaching</li> <li>3. Demonstration based Teaching</li> </ol>			
<b>Module-1</b>		<b>8Hours</b>	
<p><b>INTRODUCTION TO DATA STRUCTURES:</b> Data Structures, Classifications (Primitive &amp; Non-Primitive), Data structure Operations  <b>Review of</b> pointers and dynamic Memory Allocation,  <b>ARRAYS and STRUCTURES:</b> Arrays, Dynamic Allocated Arrays, Structures and Unions, Polynomials, Sparse Matrices, representation of Multidimensional Arrays, Strings  <b>STACKS:</b> Stacks, Stacks Using Dynamic Arrays, Evaluation and conversion of Expressions  Text Book: Chapter-1:1.2 Chapter-2: 2.1 to 2.7 Chapter-3: 3.1,3.2,3.6  Reference Book 1: 1.1 to 1.4</p>			
<b>Module-2</b>		<b>8Hours</b>	
<p><b>QUEUES:</b> Queues, Circular Queues, Using Dynamic Arrays, Multiple Stacks and queues.  <b>LINKED LISTS :</b> Singly Linked, Lists and Chains, Representing Chains in C, Linked Stacks and Queues, Polynomials  Text Book: Chapter-3: 3.3, 3.4, 3.7 Chapter-4: 4.1 to 4.4</p>			
<b>Module-3</b>		<b>8Hours</b>	
<p><b>LINKED LISTS :</b> Additional List Operations, Sparse Matrices, Doubly Linked List.  <b>TREES:</b> Introduction, Binary Trees, Binary Tree Traversals, Threaded Binary Trees.  Text Book: Chapter-4: 4.5,4.7,4.8 Chapter-5: 5.1 to 5.3, 5.5</p>			
<b>Module-4</b>		<b>8Hours</b>	
<p><b>TREES(Cont.):</b> Binary Search trees, Selection Trees, Forests, Representation of Disjoint sets, Counting Binary Trees,  <b>GRAPHS:</b> The Graph Abstract Data Types, Elementary Graph Operations  Text Book: Chapter-5: 5.7 to 5.11 Chapter-6: 6.1, 6.2</p>			
<b>Module-5</b>		<b>8Hours</b>	

<p><b>HASHING:</b> Introduction, Static Hashing, Dynamic Hashing  <b>PRIORITY QUEUES:</b> Single and double ended Priority Queues, Leftist Trees  <b>INTRODUCTION TO EFFICIENT BINARY SEARCH TREES:</b> Optimal Binary Search Trees  Text Book: Chapter 8: 8.1 to 8.3 Chapter 9: 9.1, 9.2 Chapter 10: 10.1</p>
<p><b>Course outcome (Course Skill Set)</b>  At the end of the course the student will be able to:  CO 1. Explain different data structures and their applications.  CO 2. Apply Arrays, Stacks and Queue data structures to solve the given problems.  CO 3. Use the concept of linked list in problem solving.  CO 4. Develop solutions using trees and graphs to model the real-world problem.  CO 5. Explain the advanced Data Structures concepts such as Hashing Techniques and Optimal Binary Search Trees.</p>
<p><b>Assessment Details (both CIE and SEE)</b>  The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.</p> <p><b>Continuous Internal Evaluation:</b></p> <ul style="list-style-type: none"> <li>• For the Assignment component of the CIE, there are 25 marks and for the Internal Assessment Test component, there are 25 marks.</li> <li>• The first test will be administered after 40-50% of the syllabus has been covered, and the second test will be administered after 85-90% of the syllabus has been covered</li> <li>• Any two assignment methods mentioned in the 22OB2.4, if an assignment is project-based then only one assignment for the course shall be planned. The teacher should not conduct two assignments at the end of the semester if two assignments are planned.</li> <li>• For the course, CIE marks will be based on a scaled-down sum of two tests and other methods of assessment.</li> </ul> <p><b>Internal Assessment Test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.</b></p> <p><b>Semester-End Examination:</b>  Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the course (<b>duration 03 hours</b>).</p> <ol style="list-style-type: none"> <li>1. The question paper will have ten questions. Each question is set for 20 marks.</li> <li>2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), <b>should have a mix of topics</b> under that module.</li> <li>3. The students have to answer 5 full questions, selecting one full question from each module.</li> <li>4. Marks scored shall be proportionally reduced to 50 marks</li> </ol>
<p><b>Suggested Learning Resources:</b>  <b>Textbook:</b></p> <ol style="list-style-type: none"> <li>1. Ellis Horowitz, Sartaj Sahni and Susan Anderson-Freed, Fundamentals of Data Structures in C, 2<sup>nd</sup> Ed, Universities Press, 2014</li> </ol>

**Reference Books:**

1. Seymour Lipschutz, Data Structures Schaum's Outlines, Revised 1<sup>st</sup> Ed, McGraw Hill, 2014.
2. Gilberg & Forouzan, Data Structures: A Pseudo-code approach with C, 2<sup>nd</sup> Ed, Cengage Learning, 2014.
3. Reema Thareja, Data Structures using C, 3<sup>rd</sup> Ed, Oxford press, 2012.
4. Jean-Paul Tremblay & Paul G. Sorenson, An Introduction to Data Structures with Applications, 2<sup>nd</sup> Ed, McGraw Hill, 2013
5. A M Tenenbaum, Data Structures using C, PHI, 1989
6. Robert Kruse, Data Structures and Program Design in C, 2<sup>nd</sup> Ed, PHI, 1996.

**Web links and Video Lectures (e-Resources):**

- <http://elearning.vtu.ac.in/econtent/courses/video/CSE/06CS35.html>
- <https://nptel.ac.in/courses/106/105/106105171/>
- <http://www.nptelvideos.in/2012/11/data-structures-and-algorithms.html>
- [https://www.youtube.com/watch?v=3Xo6P\\_V-qns&t=201s](https://www.youtube.com/watch?v=3Xo6P_V-qns&t=201s)
- <https://ds2-iiith.vlabs.ac.in/exp/selection-sort/index.html>
- <https://nptel.ac.in/courses/106/102/106102064/>
- <https://ds1-iiith.vlabs.ac.in/exp/stacks-queues/index.html>
- <https://ds1-iiith.vlabs.ac.in/exp/linked-list/basics/overview.html>
- <https://ds1-iiith.vlabs.ac.in/List%20of%20experiments.html>
- <https://ds1-iiith.vlabs.ac.in/exp/tree-traversal/index.html>
- <https://ds1-iiith.vlabs.ac.in/exp/tree-traversal/depth-first-traversal/dft-practice.html>
- [https://infyspringboard.onwingspan.com/web/en/app/toc/lex\\_auth\\_01350159542807756812559/overview](https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01350159542807756812559/overview)

**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

- Role Play
- Flipped classroom
- Assessment Methods for 25 Marks (opt two Learning Activities)
  - Case Study
  - Programming Assignment
  - Gate Based Aptitude Test
  - MOOC Assignment for selected Module

<b>DATA STRUCTURES LABORATORY</b>			
<b>SEMESTER – III</b>			
<b>Course Code</b>	<b>BCSL305</b>	<b>CIE Marks</b>	50
<b>Number of Contact Hours/Week</b>	0:0:2	<b>SEE Marks</b>	50
<b>Total Number of Lab Contact Hours</b>	28	<b>Exam Hours</b>	03
<b>Credits – 1</b>			
<b>Course Learning Objectives:</b>			
This laboratory course enables students to get practical experience in design, develop, implement, analyze and evaluation/testing of			
<ul style="list-style-type: none"> <li>● Dynamic memory management</li> <li>● Linear data structures and their applications such as stacks, queues and lists</li> <li>● Non-Linear data structures and their applications such as trees and graphs</li> </ul>			
<b>Descriptions (if any):</b>			
<ul style="list-style-type: none"> <li>● Implement all the programs in “C” Programming Language and Linux OS.</li> </ul>			
<b>Programs List:</b>			
1.	Develop a Program in C for the following: <ol style="list-style-type: none"> <li>a) Declare a calendar as an array of 7 elements (A dynamically Created array) to represent 7 days of a week. Each Element of the array is a structure having three fields. The first field is the name of the Day (A dynamically allocated String), The second field is the date of the Day (A integer), the third field is the description of the activity for a particular day (A dynamically allocated String).</li> <li>b) Write functions create(), read() and display(); to create the calendar, to read the data from the keyboard and to print weeks activity details report on screen.</li> </ol>		
2.	Develop a Program in C for the following operations on Strings. <ol style="list-style-type: none"> <li>a. Read a main String (STR), a Pattern String (PAT) and a Replace String (REP)</li> <li>b. Perform Pattern Matching Operation: Find and Replace all occurrences of PAT in STR with REP if PAT exists in STR. Report suitable messages in case PAT does not exist in STR</li> </ol> Support the program with functions for each of the above operations. Don't use Built-in functions.		
3.	Develop a menu driven Program in C for the following operations on STACK of Integers (Array Implementation of Stack with maximum size MAX) <ol style="list-style-type: none"> <li>a. Push an Element on to Stack</li> <li>b. Pop an Element from Stack</li> <li>c. Demonstrate how Stack can be used to check Palindrome</li> <li>d. Demonstrate Overflow and Underflow situations on Stack</li> <li>e. Display the status of Stack</li> <li>f. Exit</li> </ol> Support the program with appropriate functions for each of the above operations		



4.	Develop a Program in C for converting an Infix Expression to Postfix Expression. Program should support for both parenthesized and free parenthesized expressions with the operators: +, -, *, /, % (Remainder), ^ (Power) and alphanumeric operands.
5.	Develop a Program in C for the following Stack Applications <ol style="list-style-type: none"> <li>Evaluation of Suffix expression with single digit operands and operators: +, -, *, /, %, ^</li> <li>Solving Tower of Hanoi problem with n disks</li> </ol>
6.	Develop a menu driven Program in C for the following operations on Circular QUEUE of Characters (Array Implementation of Queue with maximum size MAX) <ol style="list-style-type: none"> <li>Insert an Element on to Circular QUEUE</li> <li>Delete an Element from Circular QUEUE</li> <li>Demonstrate Overflow and Underflow situations on Circular QUEUE</li> <li>Display the status of Circular QUEUE</li> <li>Exit</li> </ol> Support the program with appropriate functions for each of the above operations
7.	Develop a menu driven Program in C for the following operations on Singly Linked List (SLL) of Student Data with the fields: <i>USN, Name, Programme, Sem, PhNo</i> <ol style="list-style-type: none"> <li>Create a SLL of N Students Data by using <i>front insertion</i>.</li> <li>Display the status of SLL and count the number of nodes in it</li> <li>Perform Insertion / Deletion at End of SLL</li> <li>Perform Insertion / Deletion at Front of SLL(Demonstration of stack)</li> <li>Exit</li> </ol>
8.	Develop a menu driven Program in C for the following operations on Doubly Linked List (DLL) of Employee Data with the fields: <i>SSN, Name, Dept, Designation, Sal, PhNo</i> <ol style="list-style-type: none"> <li>Create a DLL of N Employees Data by using <i>end insertion</i>.</li> <li>Display the status of DLL and count the number of nodes in it</li> <li>Perform Insertion and Deletion at End of DLL</li> <li>Perform Insertion and Deletion at Front of DLL</li> <li>Demonstrate how this DLL can be used as Double Ended Queue.</li> <li>Exit</li> </ol>
9.	Develop a Program in C for the following operations on Singly Circular Linked List (SCLL) with header nodes <ol style="list-style-type: none"> <li>Represent and Evaluate a Polynomial <math>P(x,y,z) = 6x^2y^2z - 4yz^5 + 3x^3yz + 2xy^5z - 2xyz^3</math></li> <li>Find the sum of two polynomials <math>POLY1(x,y,z)</math> and <math>POLY2(x,y,z)</math> and store the result in <math>POLYSUM(x,y,z)</math></li> </ol> Support the program with appropriate functions for each of the above operations
10.	Develop a menu driven Program in C for the following operations on Binary Search Tree (BST) of Integers . <ol style="list-style-type: none"> <li>Create a BST of N Integers: 6, 9, 5, 2, 8, 15, 24, 14, 7, 8, 5, 2</li> <li>Traverse the BST in Inorder, Preorder and Post Order</li> <li>Search the BST for a given element (KEY) and report the appropriate message</li> <li>Exit</li> </ol>
11.	Develop a Program in C for the following operations on Graph(G) of Cities <ol style="list-style-type: none"> <li>Create a Graph of N cities using Adjacency Matrix.</li> <li>Print all the nodes reachable from a given starting node in a digraph using DFS/BFS method</li> </ol>

12.	<p>Given a File of N employee records with a set K of Keys (4-digit) which uniquely determine the records in file F. Assume that file F is maintained in memory by a Hash Table (HT) of m memory locations with L as the set of memory addresses (2-digit) of locations in HT. Let the keys in K and addresses in L are Integers. Develop a Program in C that uses Hash function <math>H: K \rightarrow L</math> as <math>H(K)=K \text{ mod } m</math> (remainder method), and implement hashing technique to map a given key K to the address space L. Resolve the collision (if any) using linear probing.</p>
<p><b>Laboratory Outcomes:</b> The student should be able to:</p>	

- Analyze various linear and non-linear data structures
- Demonstrate the working nature of different types of data structures and their applications
- Use appropriate searching and sorting algorithms for the give scenario.
- Apply the appropriate data structure for solving real world problems

**Conduct of Practical Examination:**

- Experiment distribution
  - For laboratories having only one part: Students are allowed to pick one experiment from the lot with equal opportunity.
  - For laboratories having PART A and PART B: Students are allowed to pick one experiment from PART A and one experiment from PART B, with equal opportunity.
- Change of experiment is allowed only once and marks allotted for procedure to be made zero of the changed part only.
- Marks Distribution (*Need to change in accordance with university regulations*)
  - c) For laboratories having only one part – Procedure + Execution + Viva-Voce: 15+70+15 = 100 Marks
  - d) For laboratories having PART A and PART B
    - i. Part A – Procedure + Execution + Viva = 6 + 28 + 6 = 40 Marks
    - ii. Part B – Procedure + Execution + Viva = 9 + 42 + 9 = 60 Marks

<b>Object Oriented Programming with JAVA</b>		Semester	3
Course Code	BCS306A	CIE Marks	50
Teaching Hours/Week (L: T:P: S)	2:0:2	SEE Marks	50
Total Hours of Pedagogy	28 Hours of Theory + 20 Hours of Practical	Total Marks	100
Credits	03	Exam Hours	03
Examination type (SEE)	Theory		
<b>Note - Students who have undergone “ Basics of Java Programming-BPLCK105C/205C” in first year are not eligible to opt this course</b>			
<b>Course objectives:</b>			
<ul style="list-style-type: none"> <li>● To learn primitive constructs JAVA programming language.</li> <li>● To understand Object Oriented Programming Features of JAVA.</li> <li>● To gain knowledge on: packages, multithreaded programing and exceptions.</li> </ul>			
<b>Teaching-Learning Process (General Instructions)</b>			
These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes and make Teaching –Learning more effective			
<ol style="list-style-type: none"> <li>1. Use Online Java Compiler IDE: <a href="https://www.jdoodle.com/online-java-compiler/">https://www.jdoodle.com/online-java-compiler/</a> or any other.</li> <li>2. Demonstration of programing examples.</li> <li>3. Chalk and board, power point presentations</li> <li>4. Online material (Tutorials) and video lectures.</li> </ol>			
<b>Module-1</b>			
<b>An Overview of Java:</b> Object-Oriented Programming (Two Paradigms, Abstraction, The Three OOP Principles), Using Blocks of Code, Lexical Issues (Whitespace, Identifiers, Literals, Comments, Separators, The Java Keywords).			
<b>Data Types, Variables, and Arrays:</b> The Primitive Types (Integers, Floating-Point Types, Characters, Booleans), Variables, Type Conversion and Casting, Automatic Type Promotion in Expressions, Arrays, Introducing Type Inference with Local Variables.			
<b>Operators:</b> Arithmetic Operators, Relational Operators, Boolean Logical Operators, The Assignment Operator, The ? Operator, Operator Precedence, Using Parentheses.			
<b>Control Statements:</b> Java’s Selection Statements (if, The Traditional switch), Iteration Statements (while, do-while, for, The For-Each Version of the for Loop, Local Variable Type Inference in a for Loop, Nested Loops), Jump Statements (Using break, Using continue, return).			
<b>Chapter 2, 3, 4, 5</b>			
<b>Module-2</b>			
<b>Introducing Classes:</b> Class Fundamentals, Declaring Objects, Assigning Object Reference Variables, Introducing Methods, Constructors, The this Keyword, Garbage Collection.			
<b>Methods and Classes:</b> Overloading Methods, Objects as Parameters, Argument Passing, Returning Objects, Recursion, Access Control, Understanding static, Introducing final, Introducing Nested and Inner Classes.			
<b>Chapter 6, 7</b>			
<b>Module-3</b>			
<b>Inheritance:</b> Inheritance Basics, Using super, Creating a Multilevel Hierarchy, When Constructors Are Executed, Method Overriding, Dynamic Method Dispatch, Using Abstract Classes, Using final with Inheritance, Local Variable Type Inference and Inheritance, The Object Class.			
<b>Interfaces:</b> Interfaces, Default Interface Methods, Use static Methods in an Interface, Private Interface Methods.			
<b>Chapter 8, 9</b>			

<b>Module-4</b>
<p><b>Packages:</b> Packages, Packages and Member Access, Importing Packages.</p> <p><b>Exceptions:</b> Exception-Handling Fundamentals, Exception Types, Uncaught Exceptions, Using try and catch, Multiple catch Clauses, Nested try Statements, throw, throws, finally, Java's Built-in Exceptions, Creating Your Own Exception Subclasses, Chained Exceptions.</p> <p><b>Chapter 9, 10</b></p>
<b>Module-5</b>
<p><b>Multithreaded Programming:</b> The Java Thread Model, The Main Thread, Creating a Thread, Creating Multiple Threads, Using <code>isAlive()</code> and <code>join()</code>, Thread Priorities, Synchronization, Interthread Communication, Suspending, Resuming, and Stopping Threads, Obtaining a Thread's State.</p> <p><b>Enumerations, Type Wrappers and Autoboxing:</b> Enumerations (Enumeration Fundamentals, The <code>values()</code> and <code>valueOf()</code> Methods), Type Wrappers (Character, Boolean, The Numeric Type Wrappers), Autoboxing (Autoboxing and Methods, Autoboxing/Unboxing Occurs in Expressions, Autoboxing/Unboxing Boolean and Character Values).</p> <p><b>Chapter 11, 12</b></p>
<p><b>Course outcome (Course Skill Set)</b></p> <p>At the end of the course, the student will be able to:</p> <ol style="list-style-type: none"> <li>1. Demonstrate proficiency in writing simple programs involving branching and looping structures.</li> <li>2. Design a class involving data members and methods for the given scenario.</li> <li>3. Apply the concepts of inheritance and interfaces in solving real world problems.</li> <li>4. Use the concept of packages and exception handling in solving complex problem</li> <li>5. Apply concepts of multithreading, autoboxing and enumerations in program development</li> </ol>
<p><b>Programming Experiments (Suggested and are not limited to)</b></p> <ol style="list-style-type: none"> <li>1. Develop a JAVA program to add TWO matrices of suitable order N (The value of N should be read from command line arguments).</li> <li>2. Develop a stack class to hold a maximum of 10 integers with suitable methods. Develop a JAVA main method to illustrate Stack operations.</li> <li>3. A class called Employee, which models an employee with an ID, name and salary, is designed as shown in the following class diagram. The method <code>raiseSalary</code> (percent) increases the salary by the given percentage. Develop the Employee class and suitable main method for demonstration.</li> <li>4. A class called MyPoint, which models a 2D point with x and y coordinates, is designed as follows: <ul style="list-style-type: none"> <li>• Two instance variables <code>x</code> (int) and <code>y</code> (int).</li> <li>• A default (or "no-arg") constructor that construct a point at the default location of (0, 0).</li> <li>• A overloaded constructor that constructs a point with the given x and y coordinates.</li> <li>• A method <code>setXY()</code> to set both x and y.</li> <li>• A method <code>getXY()</code> which returns the x and y in a 2-element int array.</li> <li>• A <code>toString()</code> method that returns a string description of the instance in the format "(x, y)".</li> <li>• A method called <code>distance(int x, int y)</code> that returns the distance from this point to another point at the given (x, y) coordinates</li> <li>• An overloaded <code>distance(MyPoint another)</code> that returns the distance from this point to the given MyPoint instance (called another)</li> <li>• Another overloaded <code>distance()</code> method that returns the distance from this point to the origin (0,0)</li> </ul>           Develop the code for the class MyPoint. Also develop a JAVA program (called TestMyPoint) to test all the methods defined in the class. </li> <li>5. Develop a JAVA program to create a class named shape. Create three sub classes namely: circle, triangle and square, each class has two member functions named <code>draw ()</code> and <code>erase ()</code>. Demonstrate</li> </ol>

polymorphism concepts by developing suitable methods, defining member data and main program.

6. Develop a JAVA program to create an abstract class Shape with abstract methods calculateArea() and calculatePerimeter(). Create subclasses Circle and Triangle that extend the Shape class and implement the respective methods to calculate the area and perimeter of each shape.
7. Develop a JAVA program to create an interface Resizable with methods resizeWidth(int width) and resizeHeight(int height) that allow an object to be resized. Create a class Rectangle that implements the Resizable interface and implements the resize methods
8. Develop a JAVA program to create an outer class with a function display. Create another class inside the outer class named inner with a function called display and call the two functions in the main class.
9. Develop a JAVA program to raise a custom exception (user defined exception) for DivisionByZero using try, catch, throw and finally.
10. Develop a JAVA program to create a package named mypack and import & implement it in a suitable class.
11. Write a program to illustrate creation of threads using runnable class. (start method start each of the newly created thread. Inside the run method there is sleep() for suspend the thread for 500 milliseconds).
12. Develop a program to create a class MyThread in this class a constructor, call the base class constructor, using super and start the thread. The run method of the class starts after this. It can be observed that both main thread and created child thread are executed concurrently.

**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

**CIE for the theory component of the IPCC (maximum marks 50)**

- IPCC means practical portion integrated with the theory of the course.
- CIE marks for the theory component are **25 marks** and that for the practical component is **25 marks**.
- 25 marks for the theory component are split into **15 marks** for two Internal Assessment Tests (Two Tests, each of 15 Marks with 01-hour duration, are to be conducted) and **10 marks** for other assessment methods mentioned in 22OB4.2. The first test at the end of 40-50% coverage of the syllabus and the second test after covering 85-90% of the syllabus.
- Scaled-down marks of the sum of two tests and other assessment methods will be CIE marks for the theory component of IPCC (that is for **25 marks**).
- The student has to secure 40% of 25 marks to qualify in the CIE of the theory component of IPCC.

**CIE for the practical component of the IPCC**

- **15 marks** for the conduction of the experiment and preparation of laboratory record, and **10 marks** for the test to be conducted after the completion of all the laboratory sessions.
- On completion of every experiment/program in the laboratory, the students shall be evaluated including viva-voce and marks shall be awarded on the same day.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments' write-ups are added and scaled down to **15 marks**.
- The laboratory test (**duration 02/03 hours**) after completion of all the experiments shall be conducted for 50 marks and scaled down to **10 marks**.
- Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IPCC for **25 marks**.
- The student has to secure 40% of 25 marks to qualify in the CIE of the practical component of the IPCC.

**SEE for IPCC**

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the course (**duration 03 hours**)

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
3. The students have to answer 5 full questions, selecting one full question from each module.
4. Marks scored by the student shall be proportionally scaled down to 50 Marks

**The theory portion of the IPCC shall be for both CIE and SEE, whereas the practical portion will have a CIE component only. Questions mentioned in the SEE paper may include questions from the practical component.**

**Suggested Learning Resources:**

**Textbook**

1. Java: The Complete Reference, Twelfth Edition, by Herbert Schildt, November 2021, McGraw-Hill, ISBN: 9781260463422

**Reference Books**

1. Programming with Java, 6th Edition, by E Balagurusamy, Mar-2019, McGraw Hill Education, ISBN: 9789353162337.
2. Thinking in Java, Fourth Edition, by Bruce Eckel, Prentice Hall, 2006 ([https://sd.blackball.lv/library/thinking\\_in\\_java\\_4th\\_edition.pdf](https://sd.blackball.lv/library/thinking_in_java_4th_edition.pdf))

**Web links and Video Lectures (e-Resources):**

- Java Tutorial: <https://www.geeksforgeeks.org/java/>
- Introduction To Programming In Java (by Evan Jones, Adam Marcus and Eugene Wu): <https://ocw.mit.edu/courses/6-092-introduction-to-programming-in-java-january-iap-2010/>
- Java Tutorial: <https://www.w3schools.com/java/>
- Java Tutorial: <https://www.javatpoint.com/java-tutorial>

**Activity Based Learning (Suggested Activities)/ Practical Based learning**

1. Installation of Java (Refer: [https://www.java.com/en/download/help/index\\_installing.html](https://www.java.com/en/download/help/index_installing.html))
2. Demonstration of online IDEs like geeksforgeeks, jdoodle or any other Tools
3. Demonstration of class diagrams for the class abstraction, type visibility, composition and inheritance

**Assessment Method**

- Programming Assignment / Course Project

<b>Python Programming for Data Science</b>		Semester	3
Course Code	<b>BDS306B</b>	CIE Marks	50
Teaching Hours/Week (L: T:P: S)	2:0:2:0	SEE Marks	50
Total Hours of Pedagogy	28 Hours Theory + 20 Hours Practical	Total Marks	100
Credits	03	Exam Hours	03
Examination type (SEE)	Theory		
<b>Note - Students who have undergone “ Introduction to Python Programming-BPLCK105B/205B” in first year are not eligible to opt this course</b>			
<p><b>Course Learning objectives:</b></p> <p>CLO 1: To understand Python constructs and use them to build the programs.</p> <p>CLO 2: To analyse different conditional statements and their applications in programs.</p> <p>CLO 3: To learn and use basic data structures in python language.</p> <p>CLO 4: To learn and demonstrate array manipulations by reading data from files</p> <p>CLO 5: To understand and use different data in a data analytics context.</p>			
<p><b>Teaching-Learning Process (General Instructions)</b></p> <p>These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.</p> <ol style="list-style-type: none"> <li>1. Chalk and board, power point presentations</li> <li>2. Online material (Tutorials) and video lectures.</li> <li>3. Demonstration of programming examples.</li> </ol>			
<b>Module-1</b>		<b>6 hr</b>	
<p>Introduction to python: Elements of python language, python block structure, variables and assignment statement, data types in python, operations, simple input/output print statements, formatting print statement.</p> <p><b>Text Book 1: Chapter 3 ( 3.2, 3.3, 3.4, 3.6, 3.7, 3.9 and 3.10)</b></p>			
<b>Module-2</b>		<b>5 hr</b>	
<p>Decision structure: forming conditions, if statement, the if-else and nested if-else, looping statements: introduction to looping, python built in functions for looping, loop statements, jump statement.</p> <p><b>Text Book 1: Chapter 4 (4.2 to 4.6) , Chapter 5 (5.1 to 5.4)</b></p>			
<b>Module-3</b>		<b>5 hr</b>	
<p>Lists: lists, operation on list, Tuples: introduction, creating, indexing and slicing, operations on tuples. sets: creating, operation in sets, introduction dictionaries, creating, operations, nested dictionary, looping over dictionary.</p> <p><b>Text Book 1: Chapter 7 ( 7.2 to 7.3) , Chapter 8 (8.1 to 8.4) and Chapter 9( 9.1 to 9.3, 9.7 to 9.12)</b></p>			
<b>Module-4</b>		<b>6 hr</b>	
<p><b>The NumPy Library:</b> Narray: the heart of the library, Basic operations, indexing, slicing and iterating, conditions and boolean arrays, array manipulation, general concepts, reading and writing array data on files. <b>The pandas Library:</b> an introduction to Data structure, other functionalities on indexes, operations between data structures, function application and mapping.</p>			



	<b>Text Book 2: Chapter 3 and Chapter 4.</b>	
	<b>Module-5</b>	<b>6 hr</b>
	<p><b>The pandas : Reading and Writing data:</b> i/o API tools, CSV and textual files, Reading data in CSV or text files, reading and writing HTML files, reading data from XML files, Microsoft excel files, JSON data, Pickle python object serialization. <b>Pandas in Depth : data manipulation:</b> data preparation, concatenating data transformation discretization binning, permutation, string manipulation, data aggregation group iteration.</p> <p><b>Text Book 2: Chapter 5 and Chapter 6</b></p>	
	<p><b>Course outcome (Course Skill Set)</b></p> <p>At the end of the course, the student will be able to :</p> <p>CO1: Describe the constructs of python programming</p> <p>CO2: Use looping and conditional constructs to build programs.</p> <p>CO3: Apply the concept of data structure to solve the real world problem.</p> <p>CO4: Use the NumPy constructs for matrix manipulations</p> <p>CO5: Apply the Panda constructs for data analytics.</p>	
	<p><b>Assessment Details (both CIE and SEE)</b></p> <p>The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.</p> <p><b>Continuous Internal Evaluation:</b></p> <ul style="list-style-type: none"> <li>● For the Assignment component of the CIE, there are 25 marks and for the Internal Assessment Test component, there are 25 marks.</li> <li>● The first test will be administered after 40-50% of the syllabus has been covered, and the second test will be administered after 85-90% of the syllabus has been covered</li> <li>● Any two assignment methods mentioned in the 220B2.4, if an assignment is project-based then only one assignment for the course shall be planned. The teacher should not conduct two assignments at the end of the semester if two assignments are planned.</li> <li>● For the course, CIE marks will be based on a scaled-down sum of two tests and other methods of assessment.</li> </ul> <p><b>Internal Assessment Test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.</b></p> <p><b>Semester-End Examination:</b></p> <p>Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the course (<b>duration 03 hours</b>).</p> <ol style="list-style-type: none"> <li>1. The question paper will have ten questions. Each question is set for 20 marks.</li> <li>2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), <b>should have a mix of topics</b> under that module.</li> <li>3. The students have to answer 5 full questions, selecting one full question from each module.</li> <li>4. Marks scored shall be proportionally reduced to 50 marks</li> </ol>	

<p><b>Suggested Learning Resources:</b></p> <p><b>Text Books:</b></p> <ol style="list-style-type: none"> <li>1. S. Sridhar, J. Indumathi, V.M. Hariharan “Python Programming” Pearson publishers, 1st edition 2023.</li> <li>2. Fabio Nelli, “<b>Python Data Analytics</b>”, Apress, Publishing, 1st Edition, 2015.</li> </ol> <p>Reference Book:</p> <ol style="list-style-type: none"> <li>1. Paul Deitel and Harvey deitel, “<b>Intro to Python for Computer Science and Data science</b>”, 1st edition Pearson Publisher 2020.</li> </ol>
<p><b>Web links and Video Lectures (e-Resources):</b></p>
<ul style="list-style-type: none"> <li>• Nptel: Introduction to Python for Data Science <a href="https://www.youtube.com/watch?v=tA42nHmEKw&amp;list=PLh2mXjKcTPSACrQxPM2_10jus5HX88ht7">https://www.youtube.com/watch?v=tA42nHmEKw&amp;list=PLh2mXjKcTPSACrQxPM2_10jus5HX88ht7</a></li> </ul>
<p><b>Activity Based Learning (Suggested Activities in Class)/ Practical Based learning</b></p> <ul style="list-style-type: none"> <li>• Assessment Methods <ul style="list-style-type: none"> <li>○ Programming Assignment (10 Marks)</li> </ul> </li> </ul>

## Practical Component

Sl.NO	Experiments
1	Develop a python program to read <b>n</b> digit integer number, and separate the integer number and display each digit. [Hint: input:5678 output: 5 6 7 8, use: floor and mod operators)
2	Develop a python program to accept 4 numbers and display them in sorted order using a minimum number of <b>if else</b> statements.
3	Develop python scripts to Calculate the mean, median, mode, variance and standard deviation of <b>n</b> integer numbers.
4	Develop a program for checking if a given <b>n</b> digit number is palindrome or not. [hint: input 1221 output: palindrome, use //and % operator with loop statement]
5	Develop a python script to display a multiplication table for given integer <b>n</b> .
6	Develop a python script to rotate right about a given position in that list and display them. [hint: input [1,4,5,-10] position: 2, output: [-10,5,4,1]]
7	DevelopWrite a python script to interchange the digits of a given integer number. [hint: input: 23456, interchange: 3 and 5 output: 25436]

8	Develop a python program to capitalize a given list of strings. [hint: [hello, good, how, simple] output: [Hello, Good, How, Simple]
9	Using a dictionary, Develop a python program to determine and print the number of duplicate words in a sentence.
10	Develop python program to read Numpy array and print row (sum,mean std) and column (sum,mean,std)
11	Develop a python program to read and print in the console CSV file.
12	Develop a python program to read a HTML file with basic tags, and construct a dictionary and display the same in the console.

#### Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

#### CIE for the theory component of the IPCC (maximum marks 50)

- IPCC means practical portion integrated with the theory of the course.
- CIE marks for the theory component are **25 marks** and that for the practical component is **25 marks**.
- 25 marks for the theory component are split into **15 marks** for two Internal Assessment Tests (Two Tests, each of 15 Marks with 01-hour duration, are to be conducted) and **10 marks** for other assessment methods mentioned in 22OB4.2. The first test at the end of 40-50% coverage of the syllabus and the second test after covering 85-90% of the syllabus.
- Scaled-down marks of the sum of two tests and other assessment methods will be CIE marks for the theory component of IPCC (that is for **25 marks**).
- The student has to secure 40% of 25 marks to qualify in the CIE of the theory component of IPCC.

#### CIE for the practical component of the IPCC

- **15 marks** for the conduction of the experiment and preparation of laboratory record, and **10 marks** for the test to be conducted after the completion of all the laboratory sessions.
- On completion of every experiment/program in the laboratory, the students shall be evaluated including viva-voce and marks shall be awarded on the same day.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments' write-ups are added and scaled down to **15 marks**.
- The laboratory test (**duration 02/03 hours**) after completion of all the experiments shall be conducted for 50 marks and scaled down to **10 marks**.
- Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IPCC for **25 marks**.
- The student has to secure 40% of 25 marks to qualify in the CIE of the practical component of the IPCC.

#### SEE for IPCC

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the course (**duration 03 hours**)

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
3. The students have to answer 5 full questions, selecting one full question from each module.
4. Marks scored by the student shall be proportionally scaled down to 50 Marks

**The theory portion of the IPCC shall be for both CIE and SEE, whereas the practical portion will have a CIE component only. Questions mentioned in the SEE paper may include questions from the practical component.**

<b>Data Analytics with R</b>		Semester	3
Course Code	<b>BDS306C</b>	CIE Marks	50
Teaching Hours/Week (L: T:P: S)	2;0;2;0	SEE Marks	50
Total Hours of Pedagogy	28 Hours Theory + 20 Hours Practical	Total Marks	100
Credits	03	Exam Hours	03
Examination type (SEE)	Theory		
<p><b>Course Learning objectives:</b>            CLO 1: To Gain the knowledge of R Programming Concepts            CLO 2: To Explain the concepts of Data Visualization            CLO 3: To Explain the concept of Statistics in R.            CLO 4: To Work with R charts and Graphs</p>			
<p><b>Teaching-Learning Process (General Instructions)</b></p> <ol style="list-style-type: none"> <li>1. Chalk and board, power point presentations</li> <li>2. Online material (Tutorials) and video lectures.</li> <li>3. Demonstration of programing examples.</li> </ol>			
<b>Module-1</b>		<b>5 hours</b>	
<p><b>Basics of R</b>            Introducing R, Initiating R, Packages in R, Environments and Functions, Flow Controls, Loops, Basic Data Types in R, Vectors            Chapter 1: 1.1 to 1.7 Chapter 2: 2.1,2.2</p>			
<b>Module-2</b>		<b>5 hours</b>	
<p><b>Basics of R Continued</b>            Matrices and Arrays, Lists, Data Frames, Factors, Strings, Dates and Times            Chapter 2: 2.3,2.4,2.5,2.6,2.7.2.8.1,2.8.2</p>			
<b>Module-3</b>		<b>6 Hours</b>	
<p><b>Data Preparation</b>            Datasets, Importing and Exporting files, Accessing Databases, Data Cleaning and Transformation            Chapter 3: 3.1,3.2,3.3,3.4</p>			
<b>Module-4</b>		<b>6 Hours</b>	
<p><b>Graphics using R</b>            Exploratory Data Analysis, Main Graphical Packages, Pie Charts, Scatter Plots, Line Plots, Histograms, Box Plots, Bar Plots, Other Graphical packages            Chapter 4: 4.1 to 4.9</p>			
<b>Module-5</b>		<b>6 Hours</b>	
<p><b>Statistical Analysis using R</b>            Basic Statistical Measures, Normal distribution, Binomial distribution, Correlation Analysis, Regression Analysis-Linear Regression Analysis of Variance            Chapter 5: 5.1, 5.3, 5.4, 5.5, 5.6.1, 5.7</p>			

**Course outcome (Course Skill Set)**

At the end of the course, the student will be able to :

CO1: Describe the structures of R Programming.

CO2: Illustrate the basics of Data Preparation with real world examples.

CO3: Apply the Graphical Packages of R for visualization.

CO4: Apply various Statistical Analysis methods for data analytics.

**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

**Continuous Internal Evaluation:**

- For the Assignment component of the CIE, there are 25 marks and for the Internal Assessment Test component, there are 25 marks.
- The first test will be administered after 40-50% of the syllabus has been covered, and the second test will be administered after 85-90% of the syllabus has been covered
- Any two assignment methods mentioned in the 22OB2.4, if an assignment is project-based then only one assignment for the course shall be planned. The teacher should not conduct two assignments at the end of the semester if two assignments are planned.
- For the course, CIE marks will be based on a scaled-down sum of two tests and other methods of assessment.

**Internal Assessment Test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.**

**Semester-End Examination:**

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the course (**duration 03 hours**).

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
3. The students have to answer 5 full questions, selecting one full question from each module.
4. Marks scored shall be proportionally reduced to 50 marks

**Suggested Learning Resources:****Text Books:**

R Programming: An Approach to Data Analytics, G. Sudhamathy and C. Jothi Venkateswaran, MJP Publishers, 2019

**Reference Books:**

1..An Introduction to R, Notes on R: A Programming Environment for Data Analysis and Graphics. W. N. Venables, D.M. Smith and the R Development Core Team. Version 3.0.1 (2013-05-16)

2. Cotton, R. (2013). Learning R: A Step by Step Function Guide to Data Analysis. 1<sup>st</sup> ed. O'Reilly Media Inc

**Web links and Video Lectures (e-Resources):**

1. URL: <https://cran.r-project.org/doc/manuals/r-release/R-intro.pdf>
2. [http://www.tutorialspoint.com/r/r\\_tutorial.pdf](http://www.tutorialspoint.com/r/r_tutorial.pdf)
3. [https://users.php.ufl.edu/rlp176/Courses/PHC6089/R\\_notes/intro.html](https://users.php.ufl.edu/rlp176/Courses/PHC6089/R_notes/intro.html)
4. [https://cran.r-project.org/web/packages/explore/vignettes/explore\\_mtcars.html](https://cran.r-project.org/web/packages/explore/vignettes/explore_mtcars.html)
5. [https://www.w3schools.com/r/r\\_stat\\_data\\_set.asp](https://www.w3schools.com/r/r_stat_data_set.asp)
6. <https://rpubs.com/BillB/217355>

**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

- Programming Assignment (10 Marks)

## Practical Component

Sl.NO	Experiments
1	Demonstrate the steps for installation of R and R Studio. Perform the following: <ol style="list-style-type: none"> <li>a) Assign different type of values to variables and display the type of variable. Assign different types such as Double, Integer, Logical, Complex and Character and understand the difference between each data type.</li> <li>b) Demonstrate Arithmetic and Logical Operations with simple examples.</li> <li>c) Demonstrate generation of sequences and creation of vectors.</li> <li>d) Demonstrate Creation of Matrices</li> <li>e) Demonstrate the Creation of Matrices from Vectors using Binding Function.</li> <li>f) Demonstrate element extraction from vectors, matrices and arrays</li> </ol>
2	Assess the Financial Statement of an Organization being supplied with 2 vectors of data: Monthly Revenue and Monthly Expenses for the Financial Year. You can create your own sample data vector for this experiment) Calculate the following financial metrics: <ol style="list-style-type: none"> <li>a. Profit for each month.</li> <li>b. Profit after tax for each month (Tax Rate is 30%).</li> <li>c. Profit margin for each month equals to profit after tax divided by revenue.</li> <li>d. Good Months – where the profit after tax was greater than the mean for the year.</li> <li>e. Bad Months – where the profit after tax was less than the mean for the year.</li> <li>f. The best month – where the profit after tax was max for the year.</li> <li>g. The worst month – where the profit after tax was min for the year.</li> </ol> <p><b>Note:</b></p> <ol style="list-style-type: none"> <li>a. All Results need to be presented as vectors</li> <li>b. Results for Dollar values need to be calculated with \$0.01 precision, but need to be presented in Units of \$1000 (i.e 1k) with no decimal points</li> <li>c. Results for the profit margin ratio need to be presented in units of % with no decimal point.</li> <li>d. It is okay for tax to be negative for any given month (deferred tax asset)</li> <li>e. Generate CSV file for the data.</li> </ol>
3	Develop a program to create two 3 X 3 matrices A and B and perform the following operations a) Transpose of the matrix b) addition c) subtraction d) multiplication
4	Develop a program to find the factorial of given number using recursive function calls.

5	Develop an R Program using functions to find all the prime numbers up to a specified number by the method of Sieve of Eratosthenes.																		
6	The built-in data set mammals contain data on body weight versus brain weight. Develop R commands to: a) Find the Pearson and Spearman correlation coefficients. Are they similar? b) Plot the data using the plot command. c) Plot the logarithm (log) of each variable and see if that makes a difference.																		
7	Develop R program to create a Data Frame with following details and do the following operations. <table border="1"> <thead> <tr> <th>itemCode</th> <th>itemCategory</th> <th>itemPrice</th> </tr> </thead> <tbody> <tr> <td>1001</td> <td>Electronics</td> <td>700</td> </tr> <tr> <td>1002</td> <td>Desktop Supplies</td> <td>300</td> </tr> <tr> <td>1003</td> <td>Office Supplies</td> <td>350</td> </tr> <tr> <td>1004</td> <td>USB</td> <td>400</td> </tr> <tr> <td>1005</td> <td>CD Drive</td> <td>800</td> </tr> </tbody> </table> a) Subset the Data frame and display the details of only those items whose price is greater than or equal to 350. b) Subset the Data frame and display only the items where the category is either "Office Supplies" or "Desktop Supplies" c) Create another Data Frame called "item-details" with three different fields itemCode, ItemQtyonHand and ItemReorderLvl and merge the two frames	itemCode	itemCategory	itemPrice	1001	Electronics	700	1002	Desktop Supplies	300	1003	Office Supplies	350	1004	USB	400	1005	CD Drive	800
itemCode	itemCategory	itemPrice																	
1001	Electronics	700																	
1002	Desktop Supplies	300																	
1003	Office Supplies	350																	
1004	USB	400																	
1005	CD Drive	800																	
8	Let us use the built-in dataset air quality which has Daily air quality measurements in New York, May to September 1973. Develop R program to generate histogram by using appropriate arguments for the following statements. a) Assigning names, using the air quality data set. b) Change colors of the Histogram c) Remove Axis and Add labels to Histogram d) Change Axis limits of a Histogram e) Add Density curve to the histogram																		
9	Design a data frame in R for storing about 20 employee details. Create a CSV file named "input.csv" that defines all the required information about the employee such as id, name, salary, start_date, dept. Import into R and do the following analysis. a) Find the total number rows & columns b) Find the maximum salary c) Retrieve the details of the employee with maximum salary d) Retrieve all the employees working in the IT Department. e) Retrieve the employees in the IT Department whose salary is greater than 20000 and write these details into another file "output.csv"																		
10	Using the built in dataset mtcars which is a popular dataset consisting of the design and fuel consumption patterns of 32 different automobiles. The data was extracted from the 1974 Motor Trend US magazine, and comprises fuel consumption and 10 aspects of automobile design and performance for 32 automobiles (1973-74 models). Format A data frame with 32 observations on 11 variables : [1] mpg Miles/(US) gallon, [2] cyl Number of cylinders [3] disp Displacement (cu.in.), [4] hp Gross horsepower [5] drat Rear axle ratio,[6] wt Weight (lb/1000) [7] qsec 1/4 mile time, [8] vs V/S, [9] am Transmission (0 = automatic, 1 = manual), [10] gear Number of forward gears, [11] carb Number of carburetors  Develop R program, to solve the following: a) What is the total number of observations and variables in the dataset? b) Find the car with the largest hp and the least hp using suitable functions c) Plot histogram / density for each variable and determine whether continuous variables are normally distributed or not. If not, what is their skewness? d) What is the average difference of gross horse power(hp) between automobiles with 3 and 4 number of cylinders(cyl)? Also determine the difference in their standard deviations. e) Which pair of variables has the highest Pearson correlation?																		



11	Demonstrate the progression of salary with years of experience using a suitable data set (You can create your own dataset). Plot the graph visualizing the best fit line on the plot of the given data points. Plot a curve of Actual Values vs. Predicted values to show their correlation and performance of the model. Interpret the meaning of the slope and y-intercept of the line with respect to the given data. Implement using lm function. Save the graphs and coefficients in files. Attach the predicted values of salaries as a new column to the original data set and save the data as a new CSV file.
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#### Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

#### CIE for the theory component of the IPCC (maximum marks 50)

- IPCC means practical portion integrated with the theory of the course.
- CIE marks for the theory component are **25 marks** and that for the practical component is **25 marks**.
- 25 marks for the theory component are split into **15 marks** for two Internal Assessment Tests (Two Tests, each of 15 Marks with 01-hour duration, are to be conducted) and **10 marks** for other assessment methods mentioned in 22OB4.2. The first test at the end of 40-50% coverage of the syllabus and the second test after covering 85-90% of the syllabus.
- Scaled-down marks of the sum of two tests and other assessment methods will be CIE marks for the theory component of IPCC (that is for **25 marks**).
- The student has to secure 40% of 25 marks to qualify in the CIE of the theory component of IPCC.

#### CIE for the practical component of the IPCC

- **15 marks** for the conduction of the experiment and preparation of laboratory record, and **10 marks** for the test to be conducted after the completion of all the laboratory sessions.
- On completion of every experiment/program in the laboratory, the students shall be evaluated including viva-voce and marks shall be awarded on the same day.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments' write-ups are added and scaled down to **15 marks**.
- The laboratory test (**duration 02/03 hours**) after completion of all the experiments shall be conducted for 50 marks and scaled down to **10 marks**.
- Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IPCC for **25 marks**.
- The student has to secure 40% of 25 marks to qualify in the CIE of the practical component of the IPCC.

#### SEE for IPCC

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the course (**duration 03 hours**)

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
3. The students have to answer 5 full questions, selecting one full question from each module.
4. Marks scored by the student shall be proportionally scaled down to 50 Marks

**The theory portion of the IPCC shall be for both CIE and SEE, whereas the practical portion will have a CIE component only. Questions mentioned in the SEE paper may include questions from the practical component.**

<b>BSCK307 – Social Connect &amp; Responsibility 2022 Scheme &amp; syllabus for 3<sup>rd</sup> sem</b>		Semester	<b>3<sup>rd</sup></b>
Course Code	<b>BSCK307</b>	CIE Marks	<b>100</b>
Teaching Hours/Week (L:T:P: S)	0:0:3:1	SEE Marks	-----
Total Hours of Pedagogy	40 hour Practical Session +15 hour Planning	Total Marks	<b>100</b>
Examination nature (No SEE – Only CIE)	For CIE Assessment - Activities Report Evaluation by College NSS Officer / HOD / Sports Dept / Any Dept.		
Credits	01 - Credit		

**Course objectives: The course will enable the students to:**

1. Provide a formal platform for students to communicate and connect to the surrounding.
2. create a responsible connection with the society.
3. Understand the community in general in which they work.
4. Identify the needs and problems of the community and involve them in problem –solving.
5. Develop among themselves a sense of social & civic responsibility & utilize their knowledge in finding practical solutions to individual and community problems.
6. Develop competence required for group-living and sharing of responsibilities & gain skills in mobilizing community participation to acquire leadership qualities and democratic attitudes.

**General Instructions - Pedagogy :**

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

1. In addition to the traditional lecture method, different types of innovative teaching methods may be adopted so that the activities will develop students' theoretical and applied social and cultural skills.
2. State the need for activities and its present relevance in the society and Provide real-life examples.
3. Support and guide the students for self-planned activities.
4. You will also be responsible for assigning homework, grading assignments and quizzes, and documenting students' progress in real activities in the field.
5. Encourage the students for group work to improve their creative and analytical skills.

**Contents :**

The course is mainly activity-based that will offer a set of activities for the student that enables them to connect with fellow human beings, nature, society, and the world at large.

The course will engage students for interactive sessions, open mic, reading group, storytelling sessions, and semester-long activities conducted by faculty mentors.

In the following a set of activities planned for the course have been listed:

**Social Connect & Responsibility - Contents****Part I:****Plantation and adoption of a tree:**

Plantation of a tree that will be adopted for four years by a group of BE / B.Tech students. (ONE STUDENT ONE TREE)  
They will also make an excerpt either as a documentary or a photo blog describing the plant's origin, its usage in daily life, its appearance in folklore and literature - - Objectives, Visit, case study, report, outcomes.

**Part II :****Heritage walk and crafts corner:**

Heritage tour, knowing the history and culture of the city, connecting to people around through their history, knowing the city and its craftsman, photo blog and documentary on evolution and practice of various craft forms - - Objectives, Visit, case study, report, outcomes.

**Part III :****Organic farming and waste management:**

Usefulness of organic farming, wet waste management in neighboring villages, and implementation in the campus -

Objectives, Visit, case study, report, outcomes.

#### **Part IV:**

##### **Water conservation:**

Knowing the present practices in the surrounding villages and implementation in the campus, documentary or photoblog presenting the current practices – Objectives, Visit, case study, report, outcomes.

#### **Part V :**

##### **Food walk:**

City's culinary practices, food lore, and indigenous materials of the region used in cooking – Objectives, Visit, case study, report, outcomes.

#### **Course outcomes (Course Skill Set):**

At the end of the course, the student will be able to:

CO1: Communicate and connect to the surrounding.

CO2: Create a responsible connection with the society.

CO3: Involve in the community in general in which they work.

CO4: Notice the needs and problems of the community and involve them in problem –solving.

CO5: Develop among themselves a sense of social & civic responsibility & utilize their knowledge in finding practical solutions to individual and community problems.

CO6: Develop competence required for group-living and sharing of responsibilities & gain skills in mobilizing community participation to acquire leadership qualities and democratic attitudes.

#### **Activities:**

Jamming session, open mic, and poetry: Platform to connect to others. Share the stories with others. Share the experience of Social Connect. Exhibit the talent like playing instruments, singing, one-act play, art-painting, and fine art.

#### **PEDAGOGY:**

The pedagogy will include interactive lectures, inspiring guest talks, field visits, social immersion, and a course project. Applying and synthesizing information from these sources to define the social problem to address and take up the solution as the course project, with your group. Social immersion with NGOs/social sections will be a key part of the course. Will all lead to the course project that will address the needs of the social sector?

#### **COURSE TOPICS:**

The course will introduce social context and various players in the social space, and present approaches to discovering and understanding social needs. Social immersion and inspiring conversational will culminate in developing an actual, idea for problem-based intervention, based on an in-depth understanding of a key social problem.

#### **Duration :**

A total of 40 - 50 hrs engagement per semester is required for the 3rd semester of the B.E. /B.Tech. program. The students will be divided into groups. Each group will be handled by faculty mentor. Faculty mentor will design the activities (particularly Jamming sessions open mic ,and poetry) Faculty mentors has to design the evaluation system as per VTU guidelines of scheme & syllabus.

#### **Guideline for Assessment Process:**

##### **Continuous Internal Evaluation (CIE):**

After completion of the course, the student shall prepare, with daily diary as reference, a comprehensive report in consultation with the mentor/s to indicate what he has observed and learned in the social connect period. The report should be signed by the mentor. The report shall

be evaluated on the basis of the following criteria and/or other relevant criteria pertaining to the activity completed. Marks allotted for the diary are out of 50. Planning and scheduling the social connect Information/Data collected during the social connect Analysis of the information/data and report writing Considering all above points allotting the marks as mentioned below

**Excellent : 80 to 100**

**Good : 60 to 79**

**Satisfactory : 40 to 59**

**Unsatisfactory and fail : <39**

### Special Note :

**NO SEE – Semester End Exam – Completely Practical and activities based evaluation**

## Pedagogy – Guidelines :

It may differ depending on local resources available for the study as well as environment and climatic differences, location and time of execution.

Sl No	Topic	Group size	Location	Activity execution	Reporting	Evaluation Of the Topic
1.	<b>Plantation and adoption of a tree:</b>	May be individual or team	Farmers land/ parks / Villages / roadside/ community area / College campus etc.....	Site selection /proper consultation/Continuous monitoring/ Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics Of scheme and syllabus by Faculty
2.	<b>Heritage walk and crafts corner:</b>	May be individual or team	Temples / monumental places / Villages/ City Areas / Grama panchayat/ public associations/Government Schemes officers/ campus etc.....	Site selection /proper consultation/Continuous monitoring/ Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics Of scheme and syllabus by Faculty
3.	<b>Organic farming and waste management:</b>	May be individual or team	Farmers land / parks / Villages visits / roadside/ community area / College campus etc.....	Group selection / proper consultation / Continuous monitoring / Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics Of scheme and syllabus by Faculty
4.	<b>Water conservation: &amp; conservation techniques</b>	May be individual or team	Villages/ City Areas / Grama panchayat/ public associations/Government Schemes officers / campus etc.....	site selection / proper consultation/Continuous monitoring/ Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics Of scheme and syllabus by Faculty
5.	<b>Food walk: Practices in society</b>	May be individual or team	Villages/ City Areas / Grama panchayat/ public associations/Government Schemes officers/ campus etc.....	Group selection / proper consultation / Continuous monitoring / Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics Of scheme and syllabus by Faculty

## Plan of Action (Execution of Activities )

Sl.NO	Practice Session Description	
1	Lecture session in field to start activities	
2	Students Presentation on Ideas	
3	Commencement of activity and its progress	
4	Execution of Activity	
5	Execution of Activity	
6	Execution of Activity	
7	Execution of Activity	
8	Case study based Assessment, Individual performance	
9	Sector/ Team wise study and its consolidation	
10	Video based seminar for 10 minutes by each student At the end of semester with Report.	
<ul style="list-style-type: none"> <li>Each student should do activities according to the scheme and syllabus.</li> <li>At the end of semester student performance has to be evaluated by the faculty for the assigned activity progress and its completion.</li> <li>At last consolidated report of all activities from 1<sup>st</sup> to 5<sup>th</sup>, compiled report should be submitted as per the instructions and scheme.</li> </ul> <p>-----</p>		
<b>Assessment Details for CIE (both CIE and SEE)</b>		
<b>Weightage</b>	<b>CIE – 100%</b>	<ul style="list-style-type: none"> <li>Implementation strategies of the project (NSS work).</li> <li>The last report should be signed by NSS Officer, the HOD and principal.</li> <li>At last report should be evaluated by the NSS officer of the institute.</li> <li>Finally the consolidated marks sheet should be sent to the university and also to be made available at LIC visit.</li> </ul>
Field Visit, Plan, Discussion	10 Marks	
Commencement of activities and its progress	20 Marks	
Case study based Assessment Individual performance with report	20 Marks	
Sector wise study & its consolidation 5*5 = 25	25 Marks	
Video based seminar for 10 minutes by each student At the end of semester with Report. <b>Activities 1 to 5, 5*5 = 25</b>	25 Marks	
<b>Total marks for the course in each semester</b>	<b>100 Marks</b>	
<p><b>For each activity, 20 marks CIE will be evaluated for IA marks at the end of semester, Report and assessment copy should be made available in the department.</b></p> <p>Students should present the progress of the activities as per the schedule in the prescribed practical session in the field. There should be positive progress in the vertical order for the benefit of society in general through activities.</p>		

<b>Data Analytics with Excel</b>		Semester	<b>3</b>
Course Code	<b>BCS358A</b>	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	0:0:2:0	SEE Marks	50
Credits	01	Exam Hours	100
Examination type (SEE)	Practical		
<p>Course objectives:</p> <ul style="list-style-type: none"> <li>● To Apply analysis techniques to datasets in Excel</li> <li>● Learn how to use Pivot Tables and Pivot Charts to streamline your workflow in Excel</li> <li>● Understand and Identify the principles of data analysis</li> <li>● Become adept at using Excel functions and techniques for analysis</li> <li>● Build presentation ready dashboards in Excel</li> </ul>			
Sl.NO	Experiments		
1	<b>Getting Started with Excel:</b> Creation of spread sheets, Insertion of rows and columns, Drag & Fill, use of Aggregate functions.		
2	<b>Working with Data :</b> Importing data, Data Entry & Manipulation, Sorting & Filtering.		
3	<b>Working with Data:</b> Data Validation, Pivot Tables & Pivot Charts.		
4	<b>Data Analysis Process:</b> Conditional Formatting, What-If Analysis, Data Tables, Charts & Graphs.		
5	<b>Cleaning Data with Text Functions:</b> use of UPPER and LOWER, TRIM function, Concatenate.		
6	<b>Cleaning Data Containing Date and Time Values:</b> use of DATEVALUE function, DATEADD and DATEDIF, TIMEVALUE functions.		
7	<b>Conditional Formatting:</b> formatting, parsing, and highlighting data in spreadsheets during data analysis.		
8	<b>Working with Multiple Sheets:</b> work with multiple sheets within a workbook is crucial for organizing and managing data, perform complex calculations and create comprehensive reports.		
9	Create worksheet with following fields: Empno, Ename, Basic Pay(BP), Travelling Allowance(TA), Dearness Allowance(DA), House Rent Allowance(HRA), Income Tax(IT), Provident Fund(PF), Net Pay(NP). Use appropriate formulas to calculate the above scenario. Analyse the data using appropriate chart and report the data.		
10	Create worksheet on Inventory Management: Sheet should contain Product code, Product name, Product type, MRP, Cost after % of discount, Date of purchase. Use appropriate formulas to calculate the above scenario. Analyse the data using appropriate chart and report the data.		

11	Create worksheet on Sales analysis of Merchandise Store: data consisting of Order ID, Customer ID, Gender, age, date of order, month, online platform, Category of product, size, quantity, amount, shipping city and other details. Use of formula to segregate different categories and perform a comparative study using pivot tables and different sort of charts.
12	Generation of report & presentation using Autofilter & macro.

**Course outcomes (Course Skill Set):**

At the end of the course the student will be able to:

- Use advanced functions and productivity tools to assist in developing worksheets.
- Manipulate data lists using Outline and PivotTables.
- Use Consolidation to summarise and report results from multiple worksheets.
- Apply Macros and Autofilter to solve the given real world scenario.

**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

**Continuous Internal Evaluation (CIE):**

CIE marks for the practical course are **50 Marks**.

The split-up of CIE marks for record/ journal and test are in the ratio **60:40**.

- Each experiment is to be evaluated for conduction with an observation sheet and record write-up. Rubrics for the evaluation of the journal/write-up for hardware/software experiments are designed by the faculty who is handling the laboratory session and are made known to students at the beginning of the practical session.
- Record should contain all the specified experiments in the syllabus and each experiment write-up will be evaluated for 10 marks.
- Total marks scored by the students are scaled down to **30 marks** (60% of maximum marks).
- Weightage to be given for neatness and submission of record/write-up on time.
- Department shall conduct a test of 100 marks after the completion of all the experiments listed in the syllabus.
- In a test, test write-up, conduction of experiment, acceptable result, and procedural knowledge will carry a weightage of 60% and the rest 40% for viva-voce.
- The suitable rubrics can be designed to evaluate each student's performance and learning ability.
- The marks scored shall be scaled down to **20 marks** (40% of the maximum marks).

The Sum of scaled-down marks scored in the report write-up/journal and marks of a test is the total CIE marks scored by the student.

**Semester End Evaluation (SEE):**

- SEE marks for the practical course are 50 Marks.
- SEE shall be conducted jointly by the two examiners of the same institute, examiners are appointed by the Head of the Institute.
- The examination schedule and names of examiners are informed to the university before the conduction of the examination. These practical examinations are to be conducted between the schedule mentioned in the academic calendar of the University.



- All laboratory experiments are to be included for practical examination.
- (Rubrics) Breakup of marks and the instructions printed on the cover page of the answer script to be strictly adhered to by the examiners. **OR** based on the course requirement evaluation rubrics shall be decided jointly by examiners.
- Students can pick one question (experiment) from the questions lot prepared by the examiners jointly.
- Evaluation of test write-up/ conduction procedure and result/viva will be conducted jointly by examiners.

• General rubrics suggested for SEE are mentioned here, writeup-20%, Conduction procedure and result in -60%, Viva-voce 20% of maximum marks. SEE for practical shall be evaluated for 100 marks and scored marks shall be scaled down to 50 marks (however, based on course type, rubrics shall be decided by the examiners)

• Change of experiment is allowed only once and 15% of Marks allotted to the procedure part are to be made zero.

The minimum duration of SEE is 02 hours

#### **Suggested Learning Resources:**

- **Berk & Carey** - Data Analysis with Microsoft® Excel: Updated for Office 2007®, Third Edition, © 2010 Brooks/Cole, Cengage Learning, ISBN-13: 978-0-495-39178-4
- **Wayne L. Winston** - Microsoft Excel 2019: Data Analysis And Business Modeling, PHI, ISBN: 9789389347180
- **Aryan Gupta** - Data Analysis in Excel: The Best Guide. (<https://www.simplilearn.com/tutorials/excel-tutorial/data-analysis-excel>)

<b>Ethics and Public Policy for AI</b>		Semester	
Course Code	<b>BAI358B</b>	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	<b>1:0:0</b>	SEE Marks	50
Total Hours of Pedagogy	14	Total Marks	100
Credits	03	Exam Hours	2
Examination type (SEE)	Theory		
<p><b>Course objectives:</b></p> <ul style="list-style-type: none"> <li>• <i>To understand Ethical Framework for a Good AI Society, establishing Rules for trustworthy AI</i></li> <li>• <i>To Designing ethics for good society</i></li> <li>• <i>To familiar with Tools, methods and practices for designing AI for social good</i></li> <li>• <i>To familiar with Innovation and future AI</i></li> <li>• <i>To understand the Case Study: Ai in health care, knowing Regulation and Governance of AI ethics</i></li> </ul>			
<p><b>Teaching-Learning Process (General Instructions)</b>                      These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.</p> <ol style="list-style-type: none"> <li>1. Chalk and Talk</li> <li>2. Real time Examples</li> <li>3. Natural Approaches</li> </ol>			
<b>Module-1</b>			
<p><b>An Ethical Framework for a Good AI Society:</b> opportunities, Risks, principles and Recommendations.  <b>Establishing the rules for building trustworthy AI</b></p> <p>Textbook1: Chapter 3, chapter 4</p>			
<b>Module-2</b>			
<p><b>Translating principles into practices of digital ethics:</b> five risks of being Unethical  <b>The Ethics of Algorithms: Key problems and Solution</b>  <b>How to Design AI for Social Good:</b> Seven Essential Factors</p> <p>Textbook1: Chapter 6, Chapter 8, Chapter 9</p>			
<b>Module-3</b>			
<p><b>How to design AI for social good: seven essential factors</b>  <b>From What to How:</b> An Initial Review of publicly available AI Ethics tools, Methods and Research to Translate principles into Practices</p> <p>Textbook1: Chapter 9, Chapter 10</p>			
<b>Module-4</b>			
<p><b>Innovating with Confidence:</b> Embedding AI Governance and fairness in financial Services Risk management framework,  <b>What the near future of AI could be.</b></p> <p>Textbook1: Chapter 20, chapter 22</p>			
<b>Module-5</b>			
<p><b>Human-AI Relationship, AI and Workforce, Autonomous Machines and Moral Decisions,</b>  <b>AI in HealthCare:</b> balancing Progress and Ethics,</p>			

<p><b>Regulation and Governance of AI Ethics</b></p> <p>Textbook2 : Chapter 5,Chapter 8, Chapter 9</p>
<p><b>Course outcome (Course Skill Set)</b></p> <p>At the end of the course, the student will be able to :</p> <ol style="list-style-type: none"> <li>1. <b>Describe Ethical Framework for a Good AI Society, establishing Rules for trustworthy AI</b></li> <li>2. <b>Explain ethics for good society</b></li> <li>3. <b>Illustrate various Tools, methods and practices for designing AI for social good</b></li> <li>4. <b>Describe the Innovation and future AI</b></li> <li>5. <b>Illustrate Regulation and Governance of AI ethics in Healthcare domain.</b></li> </ol>
<p><b>Assessment Details (both CIE and SEE)</b></p> <p>The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.</p> <p><b>Continuous Internal Evaluation:</b></p> <ul style="list-style-type: none"> <li>● For the Assignment component of the CIE, there are 25 marks and for the Internal Assessment Test component, there are 25 marks.</li> <li>● The first test will be administered after 40-50% of the syllabus has been covered, and the second test will be administered after 85-90% of the syllabus has been covered</li> <li>● Any two assignment methods mentioned in the 22OB2.4, if an assignment is project-based then only one assignment for the course shall be planned. The teacher should not conduct two assignments at the end of the semester if two assignments are planned.</li> <li>● For the course, CIE marks will be based on a scaled-down sum of two tests and other methods of assessment.</li> </ul> <p><b>Internal Assessment Test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.</b></p> <p><b>Semester-End Examination:</b></p> <p>Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the course (<b>duration 03 hours</b>).</p> <ol style="list-style-type: none"> <li>1. The question paper will have ten questions. Each question is set for 20 marks.</li> <li>2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), <b>should have a mix of topics</b> under that module.</li> <li>3. The students have to answer 5 full questions, selecting one full question from each module.</li> <li>4. Marks scored shall be proportionally reduced to 50 marks</li> </ol>
<p><b>Suggested Learning Resources:</b></p> <p><b>Books</b></p> <ol style="list-style-type: none"> <li>1. "Ethics, governance and Policies in Artificial Intelligence", Author-Editor : Luciano Floridi, Springer, 1<sup>st</sup> Edition 2021, vol 144, Oxford Internet Institute, University of Oxford, UK, ISSN 0921-8599, e-ISSN 2542-8349 Philosophical Studies series, ISBN 978-3-030-81906-4 e-ISSN 978-3-030-81907-1, <a href="https://doi.org/10.1007/978-3-030-81907-1">://doi.orghttps/10.1007/978-3-030-81907-1</a>, 2021.</li> <li>2. "Ethics and AI: Navigating the Moral Landscape of Digital Age", Author: Aaron Aboagye,</li> </ol>

<b>Project Management with Git</b>		Semester	<b>3</b>
Course Code	<b>BCS358C</b>	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	0: 0 : 2: 0	SEE Marks	50
Credits	01	Exam Marks	100
Examination type (SEE)	Practical		
<b>Course objectives:</b>			
<ul style="list-style-type: none"> <li>• .To familiar with basic command of Git</li> <li>• To create and manage branches</li> <li>• To understand how to collaborate and work with Remote Repositories</li> <li>• To familiar with virion controlling commands</li> </ul>			
<b>Sl.NO</b>	<b>Experiments</b>		
1	<b>Setting Up and Basic Commands</b> Initialize a new Git repository in a directory. Create a new file and add it to the staging area and commit the changes with an appropriate commit message.		
2	<b>Creating and Managing Branches</b> Create a new branch named "feature-branch." Switch to the "master" branch. Merge the "feature-branch" into "master."		
3	<b>Creating and Managing Branches</b> Write the commands to stash your changes, switch branches, and then apply the stashed changes.		
4	<b>Collaboration and Remote Repositories</b> Clone a remote Git repository to your local machine.		
5	<b>Collaboration and Remote Repositories</b> Fetch the latest changes from a remote repository and rebase your local branch onto the updated remote branch.		
6	<b>Collaboration and Remote Repositories</b> Write the command to merge "feature-branch" into "master" while providing a custom commit message for the merge.		
7	<b>Git Tags and Releases</b> Write the command to create a lightweight Git tag named "v1.0" for a commit in your local repository.		
8	<b>Advanced Git Operations</b>		

	Write the command to cherry-pick a range of commits from "source-branch" to the current branch.
9	<b>Analysing and Changing Git History</b>  Given a commit ID, how would you use Git to view the details of that specific commit, including the author, date, and commit message?
10	<b>Analysing and Changing Git History</b>  Write the command to list all commits made by the author "JohnDoe" between "2023-01-01" and "2023-12-31."
11	<b>Analysing and Changing Git History</b>  Write the command to display the last five commits in the repository's history.
12	<b>Analysing and Changing Git History</b>  Write the command to undo the changes introduced by the commit with the ID "abc123".
<b>Course outcomes (Course Skill Set):</b> At the end of the course the student will be able to: <ul style="list-style-type: none"><li>● Use the basics commands related to git repository</li><li>● Create and manage the branches</li><li>● Apply commands related to Collaboration and Remote Repositories</li><li>● Use the commands related to Git Tags, Releases and advanced git operations</li><li>● Analyse and change the git history</li></ul>	

**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

**Continuous Internal Evaluation (CIE):**

CIE marks for the practical course are **50 Marks**.

The split-up of CIE marks for record/ journal and test are in the ratio **60:40**.

- Each experiment is to be evaluated for conduction with an observation sheet and record write-up. Rubrics for the evaluation of the journal/write-up for hardware/software experiments are designed by the faculty who is handling the laboratory session and are made known to students at the beginning of the practical session.
- Record should contain all the specified experiments in the syllabus and each experiment write-up will be evaluated for 10 marks.
- Total marks scored by the students are scaled down to **30 marks** (60% of maximum marks).
- Weightage to be given for neatness and submission of record/write-up on time.
- Department shall conduct a test of 100 marks after the completion of all the experiments listed in the syllabus.
- In a test, test write-up, conduction of experiment, acceptable result, and procedural knowledge will carry a weightage of 60% and the rest 40% for viva-voce.
- The suitable rubrics can be designed to evaluate each student's performance and learning ability.
- The marks scored shall be scaled down to **20 marks** (40% of the maximum marks).

The Sum of scaled-down marks scored in the report write-up/journal and marks of a test is the total CIE marks scored by the student.

**Semester End Evaluation (SEE):**

- SEE marks for the practical course are 50 Marks.
- SEE shall be conducted jointly by the two examiners of the same institute, examiners are appointed by the Head of the Institute.
- The examination schedule and names of examiners are informed to the university before the conduction of the examination. These practical examinations are to be conducted between the schedule mentioned in the academic calendar of the University.

- All laboratory experiments are to be included for practical examination.
- (Rubrics) Breakup of marks and the instructions printed on the cover page of the answer script to be strictly adhered to by the examiners. **OR** based on the course requirement evaluation rubrics shall be decided jointly by examiners.
- Students can pick one question (experiment) from the questions lot prepared by the examiners jointly.
- Evaluation of test write-up/ conduction procedure and result/viva will be conducted jointly by examiners.

General rubrics suggested for SEE are mentioned here, writeup-20%, Conduction procedure and result in -60%, Viva-voce 20% of maximum marks. SEE for practical shall be evaluated for 100 marks and scored marks shall be scaled down to 50 marks (however, based on course type, rubrics shall be decided by the examiners)

Change of experiment is allowed only once and 15% of Marks allotted to the procedure part are to be made zero.

The minimum duration of SEE is 02 hours

**Suggested Learning Resources:**

- Version Control with Git, 3rd Edition, by Prem Kumar Ponuthorai, Jon Loeliger Released October 2022, Publisher(s): O'Reilly Media, Inc.
- Pro Git book, written by Scott Chacon and Ben Straub and published by Apress, <https://git-scm.com/book/en/v2>
- [https://infyspringboard.onwingspan.com/web/en/app/toc/lex\\_auth\\_0130944433473699842782\\_shared/overview](https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_0130944433473699842782_shared/overview)
- [https://infyspringboard.onwingspan.com/web/en/app/toc/lex\\_auth\\_01330134712177459211926\\_shared/overview](https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01330134712177459211926_shared/overview)



# Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	1 <sup>st</sup>			
Course Title	:	Engineering Mathematics – I for CSE Stream			
Course Code	:	BMATS101			
Course Type (Theory/ Practical/ Integrated)	:	Theory			
Course Category	:	ASC			
Stream	:	CSE & Allied branches	CIE	:	50 Marks
Teaching hour/week (L: T:P:S)	:	3:2:0:0	SEE	:	50 Marks
Total Hours	:	50 Hrs	SEE Duration	:	3 Hours
Credits	:	4			

**Course Learning Objectives:** Students will be taught

Sl.No	Course Objectives
1	Acquire basic knowledge of mathematical concepts for understanding engineering problems
2	Use concepts of calculus, differential equations and numerical methods in solving problems
3	Analyze problems using concepts of calculus, differential equations and numerical methods
4	Use MATLAB to obtain solutions of various mathematical problems

### Teaching-Learning Process Pedagogy (General Instructions):

These are sample Strategies; which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecture method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Show Video/animation films to explain the infrastructures and the mechanism involved in the principle.
3. Encourage collaborative (Group) Learning in the class.
4. Ask at least three HOT (Higher-order Thinking) questions in the class, which promotes critical thinking.
5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
6. Topics will be introduced in multiple representations.
7. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.
9. Individual teachers can device innovative pedagogy to improve teaching-learning.





DSATM

Scheme of Teaching and Examinations for BE Programme -2023-24  
Outcome Based Education and Choice Based Credit System (CBCS)  
(Effective from the Academic Year 2023-24)

**COURSE SYLLABUS**

<b>Module No.</b>	<b>Contents of the Module</b>	<b>Hours</b>
1	<b>Partial differentiation</b> Partial derivatives, total derivatives-differentiation of composite functions, maxima and minima for a function two variables, Jacobians, Hessian matrix.	10
<b>Pedagogy</b>	<b>Chalk and board, group discussion, ppt, videos</b>	
2	<b>Ordinary Differential Equations of first order</b> Linear differential equation, Bernoulli's equation, exact differential equations and reducible to exact differential equation, Newton's law of cooling- problems, rate of decay of radioactive materials, chemical reactions and solutions, LR circuits	10
<b>Pedagogy</b>	<b>Chalk and board, group discussion, ppt, videos</b>	
3	<b>Ordinary Differential Equations of second and higher order</b> Second and higher order differential equations, inverse differential operator, Legendre's differential equations, method of variation of parameters, LC Circuits and LCR Circuits, deflection of beams	10
<b>Pedagogy</b>	<b>Chalk and board, group discussion, ppt, videos</b>	
4	<b>Numerical solution of Ordinary Differential Equations</b> Introduction to Taylor's series, Taylor's series method, Modified Euler's method, Runge-Kutta method of fourth order, Milne's predictor and corrector method, Milne's method for second order differential equations.	10
<b>Pedagogy</b>	<b>Chalk and board, group discussion, ppt, videos</b>	
5	<b>Partial differential equations</b> Formation of partial differential equation, solution of PDE by direct integration, numerical solution of Laplace equation using standard five-point formula, numerical solution of heat equation by Schmidt explicit formula, numerical solution of the wave equation.	10
<b>Pedagogy</b>	<b>Chalk and board, group discussion, ppt, videos</b>	

### List of Experiments or Programs

Sl.No	Experiments/Programs	COs
	NIL	

#### Text Books

##### Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)

1	Advanced Engineering Mathematics, Erwin Kreyzig, Wiley Publications, 10 <sup>th</sup> Edition, 2015
2	Numerical Methods, M. K. Jain, S. R. K. Iyengar, R. K. Jain, New Age Publications, 6 <sup>th</sup> Edition, 2012
3	Theory and problems of Differential and integral calculus, Frank Ayres and Elliott Mendelson, Schaum's outline series, McGraw Hill publications, 3 <sup>rd</sup> Edition, 1990
4	Higher Engineering Mathematics, B. S. Grewal, Khanna Publications, 44 <sup>th</sup> Edition, 2021

#### Reference Books

##### Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)

1	Advanced mathematics for Engineers and Scientists, Murray R Spiegel, Schaum's outline series, McGraw Hill publications.
2	Higher Engineering Mathematics, H. K. Dass and Er. Rajnish Verma, S. Chand Publication, 3 <sup>rd</sup> Edition
3	Higher Engineering Mathematics, B.V. Ramana, McGraw-Hill Education, 11 <sup>th</sup> Edition, 2017
4	Engineering Mathematics, Srimanta Pal & Subodh C. Bhunia, Oxford University Press, 3 <sup>rd</sup> Edition, 2016.
5	A Textbook of Engineering Mathematics, N.P Bali and Manish Goyal, Laxmi Publications, 10 <sup>th</sup> Edition, 2022.

**Course Outcomes: At the end of the course, the student will be able to:**

CO	Course Outcomes	RBT Level	Level Indicator
CO1	Understand the basic concepts of calculus, differential equations and numerical methods	Understand	L2
CO2	Apply techniques of concepts of calculus, differential equations and numerical methods to solve Engineering Problems	Apply	L3
CO3	Analyze Engineering problems using concepts of calculus, differential equations and numerical methods	Analyse	L4
CO4	Develop mathematical solutions to various real time problems using MATLAB	Evaluate	L5

**Mapping of Course Outcomes to Program Outcomes:**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1													--	--
CO2	3												--	--
CO3		2											--	--
CO4			2		2				1	1			--	--

<b>Weblinks and Video Lectures (e-Resources)</b>	
1	<a href="https://archive.nptel.ac.in/courses/111/101/111101153/">https://archive.nptel.ac.in/courses/111/101/111101153/</a>
2	<a href="https://nptel.ac.in/courses/111103021">https://nptel.ac.in/courses/111103021</a>
3	<a href="https://nptel.ac.in/courses/111106101">https://nptel.ac.in/courses/111106101</a>
4	<a href="https://archive.nptel.ac.in/courses/111/107/111107105/">https://archive.nptel.ac.in/courses/111/107/111107105/</a>

Assessment Pattern (both CIE and SEE)

Applied Science Courses								
3 credits - Theory								
Assessment Method	Component	Type of Assessments	Syllabus Coverage	Maximum Marks	Average	Reduced Marks	Minimum Passing Marks	Evaluation Details
<b>Total CIE Theory + Practical</b>				<b>50</b>			<b>20</b>	
<b>CIE</b>	<b>Theory</b>	Internal Assessment Test (IAT) - I	Module – 1, 2 & 3(half module)	50	(50+50) / 2	<b>25</b>	10	Average of Two Internal test each of 50 Marks scale down the marks to 25 Marks Two CCA methods as per VTU Clause 22OB4.2 of regulations to be adopted. If CCA chosen is Project Based Learning, then one assessment method may be adopted
		Internal Assessment Test (IAT) - II	Module - 3(half module), 4 & 5	50				
	<b>Continuous Comprehensive Assessment (CCA)</b>	CCA-1- Pedagogical Initiatives	Considering all the Modules	50	(50+50) / 2	<b>25</b>	10	
		CCA-2- Pedagogical Initiatives		50				
	<b>Total CIE Theory</b>						<b>50</b>	

SEE		Theory exam	Entire theory syllabus including questions from lab component	100	----	50	20	SEE Exam is theory Exam conducted for 100 Marks, scored Marks are scaled down to 50 Marks
CIE + SEE				100	----	----	40	
				<ul style="list-style-type: none"> <li>• The Minimum Marks to be secured in CIE to appear for SEE shall be 10 (40% of Maximum Marks – 25) in the Theory Component and 10 (40% of Maximum Marks – 25) in the Practical component.</li> <li>• The Laboratory Component for the IPCC shall be for CIE only.</li> <li>• However, in SEE, the Questions from the Laboratory Component shall be included in the respective Modules only.</li> </ul>				

**The Minimum Marks to be secured in CIE to appear for SEE shall be 10 (40% of Maximum Marks – 25) in the Theory Component and 10 (40% of Maximum Marks -25) in the Practical Component. The Laboratory Component of the IPCC shall be for CIE only. However, in SEE the questions from the Laboratory Component shall be included in the respective Modules only.**

**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum Marks (20 Marks out of 50).

The minimum passing mark for the SEE is 35% of the maximum Marks (18 Marks out of 50).

A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 Marks out of 100) in the total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

**Possible continuous and comprehensive assessment:**

Project based, Problem Based, Building Models, Lab-to-Land, Mobile Studio, Design and Programming Contest, Certification, Concept Map (Collage presentation/poster presentation), Case studies, Think-Pair-Share, Flipped classroom, storytelling. The assessment of these techniques can be either based on Quiz or rubrics.

The faculty can adopt any other CCA method of implementation and its assessment with prior approval of Program Assessment Committee (PAC).

**Continuous Internal Evaluation (CIE):**

The CIE Marks for the theory component of the IC shall be **25 Marks** and for the laboratory component **25 Marks**.

**CIE for the theory component of the IC**

**Internal Assessment test:**

**The IA test questions are to be framed to map the Course Outcomes (COs), Program Outcomes (POs) and the Blooms RBT Levels. Emphasis to be given for higher order RBT levels**

Two Tests each of **50 Marks** scaled down to **25 Marks**

- First test after 7<sup>th</sup> week of the semester (syllabus completion of 50%)
- Second test after 14<sup>th</sup> week of semester (syllabus completion of 100%)

The average score of two tests is taken and scaled down to **25 Marks**.

**Continuous and Comprehensive Assessment (CCA):**

Two of continuous and comprehensive assessment (CCA) to be conducted to attain COs and POs, evaluated each for **50 Marks**. Total Marks scored will be CCA1+CCA2 and scaled down to **25 Marks**.

- CCA1 after 4<sup>th</sup> week and CCA2 after 9<sup>th</sup> week. The evaluation includes either through quiz or rubrics
- CCA as project-based learning,
  - CCA is evaluated for **50 Marks** with review 1 of **20 Marks** after and review 2 of **30 Marks** includes project demonstration/competition and report submission.
  - The evaluation of review 1 after 6<sup>th</sup> weeks of semester and review 2 after 12<sup>th</sup> week of semester with project demonstration and submission of the report

Total score for CCA is **25 Marks**

Total Marks scored for theory component of CIE (IAT+ CCA) is **50 Marks**

### **CIE for the practical component of the IC**

- On completion of every experiment/program in the laboratory, the students shall be evaluated and Marks shall be awarded on the same day. The **10 Marks** are for conducting the experiment and preparation of the laboratory record, the other **10 Marks shall be for the test** conducted at the end of the semester and **5 Marks** for conducting Open Ended Experiments.
- The CIE Marks awarded in the case of the practical component shall be based on the continuous evaluation of the laboratory report and the conduction. Each experiment report can be evaluated for 05 Marks conduction(Observation Book) and 5 Marks for Record Book. Marks of all experiments' write-ups and conduction are added and scaled to **10 Marks**.
- The Practical laboratory test (**duration 03 hours**) at the end of the 15<sup>th</sup> week of the semester/after completion of all the experiments (whichever is early) shall be conducted for **50 Marks** and scaled down to **10 Marks**.
- Open Ended Experiments are conducted after the completion of regular Experiments/Programs for 20 Marks and scaled down to **5 Marks**
- Scaled-down Marks of write-up, evaluations and tests, will be added as CIE Marks for the laboratory component of IC/IPCC for **25 Marks**.
- The minimum Marks to be secured in CIE to appear for SEE shall be 10 (40% of maximum Marks) in the theory component and 10 (40% of maximum Marks) in the practical component.
- The laboratory component of the IC/IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included. The maximum of 05 questions is to be set from the practical component of IC/IPCC, the total Marks of all questions should not be more than 25 Marks.

The theory component of the IC shall be for both CIE and SEE.

### **Semester End Examination (SEE):**

- Theory SEE will be conducted as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)
- The question paper shall be set for 100 Marks. The medium of the question paper shall be English. The duration of SEE is 03 hours.
- The question paper will have 10 questions. Two questions per module. Each question is set for 20 Marks. The student has to answer 5 full questions, selecting one full question from each module summing up to maximum score of 100 Marks. Marks **scored out of 100 shall proportionally be reduced to 50 Marks**.
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module. The two questions should be of same course outcome, program outcome and Blooms RBT level. Emphasis to be given for higher order RBT levels

### CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Theory				Practical
	Continuous Assessment Tests		Continuous Comprehensive Assessment (CCA)		Practical Test
	IAT-1	IAT-2	CCA-1	CCA-2	
	50 Marks	50 Marks	50 Marks	50 Marks	50 Marks
Remember			30		
Understand	10	10	20		
Apply	30	30			
Analyse	10	10			
Evaluate				50	
Create					

### CIE Course Assessment Plan

CO's	Marks Distribution						Total Marks	Weightage
	Test-1			Test-2				
	Module-1	Module-2	Module-3	Module-3	Module-4	Module-5		
CO1	5	5	5		5	5	25	25%
CO2	10	10	5	5	10	10	50	50%
CO3	5	5		5	5	5	25	25%
CO4								
CO5								
CO6								
<b>Total</b>	<b>20</b>	<b>20</b>	<b>10</b>	<b>10</b>	<b>20</b>	<b>20</b>	<b>100</b>	



**SEE- Semester End Examination (50 Marks)**

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	
Understand	5
Apply	35
Analyse	10
Evaluate	
Create	

**SEE Course Plan**

CO's	Marks Distribution					Total Marks	Weightage
	Module-1	Module-2	Module-3	Module-4	Module-5		
CO1	5					5	10%
CO2	5	5	10	5	10	35	70%
CO3		5			5	10	20%
CO4							
CO5							
CO6							
<b>Total</b>	<b>10</b>	<b>10</b>	<b>10</b>	<b>10</b>	<b>10</b>	<b>50</b>	

**Course Contents and Lecture Schedule**

Module No.	Topics	No. of Lectures
1	Introduction to the Course and syllabus	1
1	Partial derivatives- Definition and problems	1
1	Problems continued on above	1
1	Total Derivatives- problems	1
1	Partial Differentiation of Composite functions	1
1	Jacobians – Definition and problems	1
1	Definition and problems	1
1	Maxima and Minima for a function of two variables	1
1	Problems continued on above	1
1	Hessian matrix and problems	1
2	Linear differential equations of first order and first degree	1
2	Bernoulli's equation and problems	1
2	Exact equations and reducible to exact	1
2	Newton's law of cooling and problems	1

2	Rate of decay of radioactive materials	1
2	Chemical reactions and solutions	1
2	Problems continued on the above	1
2	LR Circuits	1
2	Problems continued on the above	1
2	Problems continued on the above	1
3	Second and higher order differential equations	1
3	Inverse differential operator, three types, problems on type-I,	1
3	Problems on type-II	1
3	Problems on type-III	1
3	Legendre's differential equation and problems	1
3	Method of variation of parameters-problems	1
3	LCR Circuits-problems	1
3	Deflection of beams-problems	1
3	Problems on the above type	1
3	Problems on the above type	1
4	Introduction to Taylor's series	1
4	Numerical solution of ODE by Taylor's series method	1
4	Modified Euler's method and problems	1
4	Problems continued on the above	1
4	Runge-Kutta method of fourth order	1
4	Problems continued on the above	1
4	Milne's predictor and corrector method and problems	1
4	Problems continued on the above	1
4	Milne's method for second order differential equations	1
4	Problems continued on the above	1
5	Formation of partial differential equation-elimination of arbitrary constants	1
5	Formation of Partial Differential Equation-elimination of arbitrary functions	1
5	solution of PDE by direct integration	1
5	Problems continued on the above	1
5	Numerical solution of Laplace equation using standard five-point formula,	1
5	Problems continued on the above	1
5	Numerical solution of heat equation by Schmidt explicit formula	1
5	Problems continued on the above	1
5	Numerical solution of the wave equation	1
5	Problems continued on the above	1
		<b>50 Hrs</b>