

DAYANANDA SAGAR ACADEMY OF TECHNOLOGY & MANAGEMENT



CURRICULUM

Scheme and Syllabus IV Semester

Outcome Based Education

(Academic Year 2024-2025)

Department of Information Science and Engineering

4th Semester B.E

ABOUT THE INSTITUTE

Dayananda Sagar Academy of Technology and Management- DSATM was established in 2011 with 5 UG Programmes and 1 PG Program, the programmes are approved by All India Council for Technical Education (AICTE) New Delhi, Affiliated to Visvesvaraya Technological University (VTU), Belagavi and DSATM is an autonomous institute from 2023-2024.

The Dayananda Sagar Institutions is one of pioneer institutions in India and abroad with six decades of excellence in Academic and Research. The newer campuses were necessary to accommodate the growing need of the technology and innovation.

DSATM nurtures the students in academic, research, sports, cultural and extracurricular activities.

- Creating an academic environment to nurture and develop competent entrepreneurs, leaders and professionals who are socially sensitive and environmentally conscious.
- Integration of Outcome Based Education and cognitive teaching and learning strategies to enhance learning effectiveness.
- Developing necessary infrastructure to cater to the changing needs of Business and Society.
- Optimum utilization of the infrastructure and resources to achieve excellence in all areas of relevance.
- Adopting learning beyond curriculum through outbound activities and creative assignments.
- Imparting contemporary and emerging techno-managerial skills to keep pace with the changing global trends.
- Facilitating greater Industry-Institute Interaction for skill development and employability enhancement.
- Establishing systems and processes to facilitate research, innovation and entrepreneurship for holistic development of students.
- Implementation of Quality Assurance System in all Institutional processes.

VISION OF THE INSTITUTE

To strive at creating the institution a centre of highest calibre of learning, so as to create an overall intellectual atmosphere with each deriving strength from the other to be the best of engineers, scientists with management & design skills.

MISSION OF THE INSTITUTE

- To serve its region, state, the nation and globally by preparing students to make meaningful contributions in an increasing complex global society challenges.
- To encourage, reflection on and evaluation of emerging needs and priorities with state-of-the-art infrastructure at institution.
- To support research and services establishing enhancements in technical, economic, human and cultural development.
- To establish interdisciplinary centre of excellence, supporting/ promoting student's implementation.
- To increase the number of Doctorate holders to promote research culture on campus.
- To establish IIPC, IPR, EDC, innovation cells with functional MOU's supporting student's quality growth.

QUALITY POLICY

Dayananda Sagar Academy of Technology and Management aims at achieving academic excellence through continuous improvement in all spheres of Technical and Management education. In pursuit of excellence cutting – edge and contemporary skills are imparted to the utmost satisfaction of the students and the concerned stakeholders.

ABOUT THE DEPARTMENT

The Information Science and Engineering provides an intellectual framework enabling ideas from Hardware, Software, Computation and the Information Sciences to integrate into and transform disciplines to provide solutions to real-time problems. This programme is specifically designed to meet the requirements of industry, with its graduates expected to become important players in the future of Information Technology. The curriculum is designed to provide both technical and practical knowledge in the field of Information Science & Engineering and their applications along with major specializations based on which students can branch out. Fundamental engineering subjects combined with basic programming languages that provide a basic understanding of engineering concepts are taught, along with courses in advanced computing techniques, machine learning, data science, artificial intelligence, and other cutting-edge topics to equip the graduates with the required skills to manage all domains within Information Science Engineering scope

VISION OF THE DEPARTMENT

Impart magnificent learning atmosphere establishing innovative practices among the students aiming to strengthen their software application knowledge and technical skills.

MISSION OF THE DEPARTMENT

- M1:** To deliver quality technical training on software application domain.
- M2:** To nurture team work in order to transform individual as responsible leader and entrepreneur for future trends.
- M3:** To inculcate research practices in teaching thus ensuring research blend among students.
- M4:** To ensure more doctorates in the department, aiming at professional strength.
- M5:** To inculcate the core information science engineering practices with hardware blend by providing advanced laboratories.
- M6:** To establish innovative labs, start-ups and patent culture.

PROGRAM EDUCATION OBJECTIVES (PEO'S):

PEO1: Graduates shall have successful careers as information science engineers in software application domain and will be able to lead and manage teams across the globe.

PEO2: Graduates shall be professional in engineering practice and shall demonstrate good problem solving, communication skills and contribute to address societal issues.

PEO3: Graduates shall be pursuing distinctive education, entrepreneurship and research in an excellent environment which helps in the process of life-long learning.

PROGRAM OUTCOMES (PO's)

Engineering Graduates will be able to:

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSO's)

PSO1: Apply appropriate programming knowledge in software development, operations and maintenance of real-time applications.

PSO2: Meet the industry requirements in adapting to cutting-edge technologies.

PSO3: Develop business and entrepreneurial ideas to support society requirements.



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

Affiliated to **VTU**
Approved by **AICTE**
Accredited by **NAAC** with **A+** Grade
6 Programs Accredited by **NBA**
(CSE, ISE, ECE, EEE, MECH, CV)

PROPOSED UG CREDIT STRUCTURE IN ALIGNMENT WITH VTU

| Sl.No | Semester | No. of Credits |
|--------------|--------------------------|-----------------------|
| 1 | 1 st Semester | 20 |
| 2 | 2 nd Semester | 20 |
| 3 | 3 rd Semester | 21 |
| 4 | 4 th Semester | 21 |
| 5 | 5 th Semester | 22 |
| 6 | 6 th Semester | 22 |
| 7 | 7 th Semester | 20 |
| 8 | 8 th Semester | 14 |
| Total | | 160 |

PROPOSED UG SCHEME

| Sl. No | Course Category | BOS | TD | Teaching Hours/Week | | | | | Credits |
|--------------|-----------------------|------------------|-----|---------------------|----------|-----------|---------|------------|-----------|
| | | | | Lecture | Tutorial | Practical | Project | Total | |
| | | | | L | T | P | S | (Hrs/week) | |
| 1 | BSC | MAT | MAT | 3 | 0 | 0 | 0 | 3 | 3 |
| 2 | IPCC-1 | CSE | CSE | 3 | 0 | 2 | 0 | 5 | 4 |
| 3 | IPCC-2 | CSE | CSE | 3 | 0 | 2 | 0 | 5 | 4 |
| 4 | PCC-1 | CSE | CSE | 3 | 0 | 0 | 0 | 3 | 3 |
| 5 | PCC-2 | CSE | CSE | 3 | 0 | 0 | 0 | 3 | 3 |
| 6 | PBL | CSE | CSE | 0 | 0 | 2 | 2 | 4 | 2 |
| 7 | AEC | CSE | CSE | 0 | 0 | 2 | 0 | 2 | 1 |
| 8 | SCR/UHV | CSE | CSE | 0 | 0 | 2 | 0 | 2 | 1 |
| 9 | NCCM | NSS / YOGA / PED | | | | | | | |
| 10 | AICTE Activity Points | | | | | | | | |
| Total | | | | | | | | | 21 |

Percentage of Mapping– Theory & Practical - Scheme & Syllabus- 4th Sem

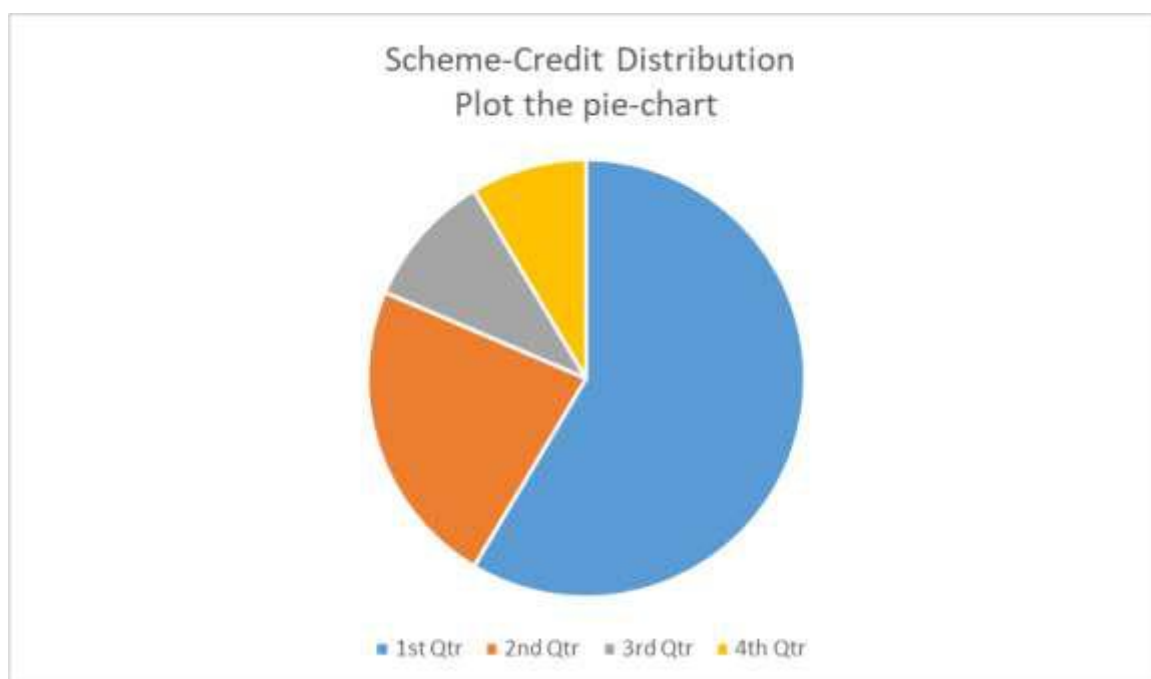
4th Sem

| Sl. No | Course Category | Component | | | |
|-------------------------|-----------------|------------|------------|------------|-------------|
| | | Theory | Practical | Outreach | YOGA/SPORTS |
| 1 | BSC | 100% | -- | -- | -- |
| 2 | IPCC-1 | 60% | 40% | -- | -- |
| 3 | IPCC-2 | 60% | 40% | -- | -- |
| 4 | PCC-1 | 100% | -- | -- | -- |
| 5 | PCC-2 | 100% | -- | -- | -- |
| 6 | PBL | -- | 100% | -- | -- |
| 7 | AEC | -- | 100% | -- | -- |
| 8 | SCR/UHV | -- | -- | 100% | -- |
| 9 | NCMC | -- | -- | -- | 100% |
| Total Percentage | | 53% | 47% | 13% | 13% |

Scheme Distribution

Department of Information Science and Engineering

| Course Component | Credits | % of Credits |
|----------------------------------|-----------|--------------|
| Basic Science (BS) | | |
| Engineering Science (ES) | | |
| Humanities (HU) | 3 | |
| Program core (PC) | 3 + 3 | |
| Program core Integrated (PCI) | 4 + 4 | |
| Program core exclusive Lab | 2 | |
| Program elective (PE) | | |
| Open Elective (OE) | | |
| Internship (INT) | | |
| Ability Enhancement course (AEC) | 1 | |
| Project (PR) | 1 | |
| Total | | |
| | 21 | 100 |





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Scheme of Teaching and Examinations – 2024
Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
(Effective from 2024-25)

4th SEMESTER: Information Science & Engineering (ISE)

| Sl. No | Course Code | Course Title | Course Category | BOS | TD | Teaching Hours/Week | | | | | Credits | Examination | | | |
|--------------|-------------|---|-----------------|-----|-----------|---------------------|----------|-----------|----------|-----------|-----------|--------------------|------------|------------|-------------|
| | | | | | | Lecture | Tutorial | Practical | Project | Total | | SEE Duration (Hrs) | CIE Marks | SEE Marks | Total Marks |
| | | | | | | L | T | P | S | | | | | | |
| 1 | BMATA401 | Statistics and Probability | BSC | MAT | MAT | 3 | 0 | 0 | 0 | 3 | 3 | 3 | 50 | 50 | 100 |
| 2 | BIS402 | Design and Analysis of Algorithms | IPCC-1 | ISE | ISE | 3 | 0 | 2 | 0 | 5 | 4 | 3 | 50 | 50 | 100 |
| 3 | BIS403 | Object Oriented Programming with Java | IPCC-2 | ISE | ISE | 3 | 0 | 2 | 0 | 5 | 4 | 3 | 50 | 50 | 100 |
| 4 | BIS404 | Data Communication | PCC-1 | ISE | ISE | 3 | 0 | 0 | 0 | 3 | 3 | 3 | 50 | 50 | 100 |
| 5 | BIS405 | Database Management Systems | PCC-2 | ISE | ISE | 3 | 0 | 0 | 0 | 3 | 3 | 3 | 50 | 50 | 100 |
| 6 | BIS406 | Full Stack Development | PBL | ISE | ISE | 0 | 2 | 0 | 2 | 4 | 2 | 2 | 50 | 50 | 100 |
| 7 | BIS407 | Competitive Programming | AEC | ISE | ISE | 0 | 0 | 2 | 0 | 2 | 1 | 2 | 50 | 50 | 100 |
| 8 | BUHK408 | Universal Human Values and Clean Technology | UHV | BSC | Any Dept. | 0 | 0 | 2 | 0 | 2 | 1 | 1 | 50 | 50 | 100 |
| Total | | | | | | 15 | 2 | 8 | 2 | 27 | 21 | 20 | 400 | 400 | 800 |

IPCC: Integrated Professional Core Course,

PCC: Professional Core Course

PBL: Project Based Learning

AEC: Ability Enhancement Course,

NCMC: Non-Credit Mandatory Course

L: Lecture,

T: Tutorial,

P: Practical

S= SDA: Skill Development Activity,

CIE: Continuous Internal Evaluation,

SEE: Semester End Evaluation.

Integrated Professional Core Course (IPCC): Refers to Integrated Professional Core Course Theory 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.

Non Credit Mandatory Course (NCMC) - 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.

Newly introduced subjects in the syllabus

| | | 4th Semester |
|----------|--|---|
| 1 | List of Existing Elective Courses | No Elective Courses in 4th Semester |
| 2 | List of New Existing Elective Courses | No Elective Courses in 4th Semester |
| 3 | List of New Industry Aligned Courses | 1. Competitive Programming 2. Full Stack Development |

4th SEMESTER



Dayananda Sagar Academy of Technology & Management

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| | | | | |
|--|---|---------------------------------|--------------|-----------|
| Semester | : | IV | | |
| Course Title | : | Statistics and Probability | | |
| Course Code | : | BMATA401 | | |
| Course Type (Theory/ Practical/ Integrated) | : | Theory | | |
| Course Category | : | BSC | | |
| Stream | : | Common to CSE & Allied branches | CIE | : 50 |
| Teaching hour/week (L:T:P:S) | : | 2:2:0:0 | SEE | : 50 |
| Total Hours | : | 40 Hours | SEE Duration | : 3 Hours |
| Credits: | : | 03 | | |

Course Learning Objectives: Students will be able to

| Sl. No. | Course Objectives |
|---------|---|
| 1 | Acquire basic knowledge of Mathematical concepts for understanding engineering problems |
| 2 | Use concepts of statistics and probability in solving problems |
| 3 | Analyze problems using concepts of statistics and probability |
| 4 | Use MATLAB to obtain solutions to various mathematical problems. |

Teaching-Learning Process

Pedagogy (General Instructions):

These are sample Strategies; that teachers can use to accelerate the attainment of 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/animated 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, develops 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.



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 | Statistics Introduction, curve fitting (Least squares method), fitting of a straight line, fitting of a second-degree parabola, fitting of exponential curves, correlation and correlation coefficient r , regression lines, rank correlation. | 8 |
| Pedagogy | Chalk and board, group discussion, PPT, videos | |
| 2 | Probability Distribution Review of basic probability theory, random variables (discrete and continuous), probability mass and density functions, mathematical expectation, mean and variance, binomial, Poisson, normal, exponential distribution, Weibull and uniform distributions. | 8 |
| Pedagogy | Chalk and board, group discussion, ppt, videos | |
| 3 | Sampling Theory Introduction, sampling distribution, standard error, testing of hypothesis, central limit theorem, levels of significance, z- test for large samples, confidence limits, Student's 't' distribution, Chi-square distribution as a test of goodness of fit, F-Distribution. | 8 |
| Pedagogy | Chalk and board, group discussion, ppt, videos | |

| | | |
|-----------------|--|---|
| 4 | ANOVA The ANOVA technique, basic principle of ANOVA, one-way ANOVA, Two-way ANOVA, Latin-square Design | 8 |
| Pedagogy | Chalk and board, group discussion, ppt, videos | |
| 5 | Time series and Markov chain Time series: Introduction to times series data, Components of a time series, Decomposition of time series, method of semi averages, fitting a various mathematical curve and growth curves. Markov chain: Introduction to stochastic process, probability vectors, stochastic matrices, regular stochastic matrices, Markov chains, higher transition probabilities, stationary distribution of regular Markov chains. | 8 |
| Pedagogy | Chalk and board, group discussion, ppt, videos | |

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

| | |
|---|--|
| 1 | Probability and Statistics, Murray R. Spiegel, John Schiller, R. Alu Srinivasan, Schaum's outline series, Mc Graw Hill Publication, 4 th Edition, 2012. |
| 2 | Research Methodology Methods & Techniques, C R Kothari and Gaurav Garg, New Age International Limited, 3rd Edition, 2014 |
| 3 | Probability & Statistics for Engineers & Scientists, Ronald E. Walpole, Raymond H Myers, Sharon L Myers & Keying Ye, Pearson Education, 9th edition, 2017. |

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

| | |
|---|--|
| 1 | Higher Engineering Mathematics, B. S. Grewal, Khanna publishers, 44th Ed., 2021. |
| 2 | Practical Statistics for Data Scientists, Peter Bruce, Andrew Bruce & Peter Gedeck O'Reilly Media, Inc., 2nd edition 2020. |
| 3 | Fundamentals of Mathematical Statistics, S.C. Gupta and V.K. Kapoor, Chand Publishers, 12 th edition, 2020. |

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 statistics and probability | Remember, Understand | L1, L2 |
| CO2 | Apply techniques of statistics and probability to solve engineering problems | Apply | L3 |
| CO3 | Analyze engineering problems using statistics and probability | Analyze | 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 | | | -- | -- |

Weblinks and Video Lectures (e-Resources)

| | |
|---|---|
| 1 | https://onlinecourses.nptel.ac.in/noc21_ma74/preview |
| 2 | https://avcce.digimat.in/nptel/courses/video/111107058/L05.html |
| 3 | https://archive.nptel.ac.in/courses/111/106/111106086/ |

Assessment Pattern (both CIE and SEE)

| Basic Science Courses | | | | | | | | |
|-------------------------------------|--|-------------------------------------|---|----------------------|----------------|----------------------|------------------------------|---|
| 3 credits - Theory | | | | | | | | |
| Assessment Method | Component | Type of Assessments | Syllabus Coverage | Maximum Marks | Average | Reduced Marks | Minimum Passing Marks | Evaluation Details |
| Total CIE Theory + Practical | | | | 50 | | | 20 | |
| CIE | Theory | Internal Assessment Test (IAT) - I | Module – 1, 2 & 3(half module) | 50 | (50+50) / 2 | 25 | 10 | Average of Two Internal test each of 50 Marks scale down the marks to 25 Marks |
| | | Internal Assessment Test (IAT) - II | Module - 3(half module), 4 & 5 | 50 | | | | |
| | Continuous Comprehensive Assessment (CCA) | CCA-1- Pedagogical Initiatives | Considering all the Modules | 50 | (50+50) / 2 | 25 | 10 | |
| | | CCA-2- Pedagogical Initiatives | | 50 | | | | |
| | Total CIE Theory | | | | | | 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"> 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. |

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 7th week of the semester (syllabus completion of 50%)
- Second test after 14th week of semester (syllabus completion of 100%)

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

Continuous and Comprehensive Assessment (CCA):

Two continuous and comprehensive assessments (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 4th week and CCA2 after 9th 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** including project demonstration/competition and report submission.
 - The evaluation of review-1 after 6th week of semester and review-2 after the 12th week of the 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 for 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 15th 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 a 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 the same course outcome, program outcome and Bloom's RBT level. Emphasis to be given for higher-order RBT levels

CIE- Continuous Internal Evaluation (50 Marks)

| | | |
|--|------------------------------------|--|
| | Theory | Practical |
| | Continuous Assessment Tests | Continuous Comprehensive Assessment (CCA) |

| Bloom's Category | IAT-1 50 Marks | IAT-2 50 Marks | CCA-1 50 Marks | CCA-2 50 Marks | Practical Test 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 | | | | | | | | |
| Total | 20 | 20 | 10 | 10 | 20 | 20 | 100 | 100% |

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 | -- | -- | -- | -- | -- | -- | -- |
| Total | 10 | 10 | 10 | 10 | 10 | 50 | 100% |

**INTEGRATED
PROFESSIONAL CORE
COURSE (IPCC)**

IPCC Course – Integrated Professional Core Course

| | |
|---------------------------------|---|
| Teaching Hours/Week (L: T:P: S) | 3:0:2:0 |
| Total Hours of Pedagogy | 40 hours Theory + 20 Hours of Practical Classes |
| Credits: | 04 |
| Theory - Each Module | 8 Hrs |
| Practical's | 8-10 Programs / Experiments |
| CIE Marks | 50 |
| SEE Marks | 50 |
| Total Marks | 100 |
| Exam Hours | 3 |
| Examination nature (SEE) | Theory |

- 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.

Integrated Professional Core Course (IPCC) - 4 Credit Course

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) for the Theory component of the IPCC (Maximum marks 50)

Internal Assessment Test (IAT):

- 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 50 Marks with 01-hour 30 minutes' duration, are to be conducted and average of two tests to be reduced to 15 marks) and 10 marks for Two Continuous Comprehensive

Assessment(CCA) methods.

- The first Internal test at the end of 40-50% coverage of the syllabus
- The second Internal 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.

The IA test questions are to be framed to map the Course Outcomes (COs), Program Outcomes (POs) and the Revised Blooms Taxonomy (RBT) Levels. Emphasis to be given for Higher order Thinking Skills(HOTS).

Continuous Internal Evaluation (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 CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report, **05 Marks** are for conducting the experiment, **05 Marks** for preparation of the laboratory record, **5 Marks** for conducting Open Ended Experiments Each experiment. Marks of all experiments' write-ups are added to 15 marks.
- The Practical laboratory test (**duration 03 hours**) at the end of the 15th week of the semester/after completion of all the experiments (whichever is early) shall be conducted for **50 Marks** and scaled down to **5 Marks**.
- The open-ended experiment after completion of all the experiments shall be conducted for 20 marks with a split-up for 5 Marks for writeup, 10 Marks for Execution, and 5 Marks for Viva-Voce. Marks for writeup, Execution and Viva-Voce is added and scaled down to 05 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.

Semester End Examination (SEE) for IPCC Theory

SEE will be conducted as per the scheduled timetable, with common question papers for the course (duration 03 hours)

- The question paper will have ten questions. Each question is set for 20 marks.
- 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.
- 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.
- The students have to answer 5 full questions, selecting one full question from each module.
- 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.

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 $(CCA1+CCA2)/2$ and scaled down to **10 Marks**.

- CCA1 after 4th week and CCA2 after 9th week. The Assessment will be through 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 6th weeks of semester and review 2 after 12th 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**

Possible Continuous and Comprehensive Assessment (CCA):

- 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,
- The assessment of these techniques shall be in rubrics.
- The faculty can adopt any other CCA method of implementation and its assessment with prior approval of Program Assessment Committee (PAC).

4 Credits Courses – Integrated Professional Core Course (IPCC)

| Assessment Method | Component | Type of Assessments | Syllabus Coverage | Maximum Marks | Average | Reduced Marks | Minimum Passing Marks | Evaluation Details |
|-------------------------------------|--|--|-----------------------------|---------------|-------------|---------------|-----------------------|--|
| Total CIE Theory + Practical | | | | 50 | ---- | ---- | 20 | |
| CIE | Theory | Internal Assessment Test (IAT) - I | Module – 1 to 2.5 | 50 | (50+50) / 2 | 15 | 6 | Average of Two Internal test each of 50 Marks scale down the marks to 15 Marks |
| | | Internal Assessment Test (IAT) - II | Module – 2.5 to 5 | 50 | | | | |
| | Continuous Comprehensive Assessment (CCA) | CCA-1- Pedagogical Initiatives/ Activity based learning | Considering all the Modules | 50 | (50+50) / 2 | 10 | 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/ Activity based learning | | 50 | | | | |
| | Total CIE Theory | | | | | | 25 | 10 |

| | | | | | | | | | |
|------------------|-----------|---------------------------|--|-----|------|----------------------------------|----|--|---|
| CIE | Practical | Conduction of Experiments | Performance- Continuous Evaluation of each experiment | 05 | 15 | Average of all Experiments | 15 | 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 | | | | | |
| | | | Observation book | 05 | | | | | |
| | | Practical Test | Write up | 15 | 50 | --- | 05 | 4 | One Internal Practical Test after the conduction of all experiments for 50 Marks |
| | | | Execution | 25 | | | | | |
| | | | Viva-voce | 10 | | | | | |
| | | Open Ended Experiment | Write up | 05 | 20 | --- | 05 | 2 | One experiment for 20 marks. 20 marks reduced to 05 marks. |
| | | | Execution | 10 | | | | | |
| | | | Viva-voce | 05 | | | | | |
| | | | Total CIE Practical | | | | | | 25 |
| SEE | | 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 | |
| CIE + SEE | | | | 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



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

| | | | | | |
|--|---|--|-----------------|---|---------|
| Semester | : | IV | | | |
| Course Title | : | Design and Analysis of Algorithms | | | |
| Course Code | : | BIS402 | | | |
| Course Type (Theory/Practical/Integrated) | : | Integrated | | | |
| Category | : | IPCC-1 | | | |
| Stream | : | Information Science and Engineering | CIE | : | 50 |
| Teaching hours/week (L:T:P:S) | : | 3:0:2:0 | SEE | : | 50 |
| Total Hours | : | 40 Theory Hours + 20 Practical Hours = 60 Hours | SEE Duration | : | 3 hours |
| Credits | : | 04 | | | |

Course Learning Objectives: Students will be able to:

| Sl. No | Course Objectives |
|--------|---|
| 1 | Learn the fundamental concept of algorithms, its types, parameters, asymptotic notation and various design techniques of algorithms. |
| 2 | Apply the appropriate data structure and algorithm design method for a specified application. |
| 3 | Inspect the problems using various algorithmic design technique methods such as the brute force method, greedy method, divide and conquer, decrease and conquer, transform and conquer, dynamic programming, backtracking and branch and bound. |
| 4 | Design the algorithms for real various real time applications using contemporary computing languages. |
| 5 | Demonstrate the experiments using the various algorithm techniques. |

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 -2024-25
Outcome Based Education and Choice Based Credit System (CBCS)
(Effective from the Academic Year 2024-25)

COURSE CURRICULUM

| Module No. | Topics | Hours |
|-----------------|---|-------|
| 1 | Introduction: Definition of Algorithm, Fundamentals of Algorithmic Problem Solving. Fundamentals of Analysis of Algorithm Efficiency: Analysis Framework, Asymptotic Notations and Basic Efficiency Classes, Mathematical Analysis of Non recursive Algorithms and Recursive Algorithms. Performance Analysis: Space Complexity, Time Complexity. Textbook 1: Chapter 1: 1.1-1.2; Chapter 2: 2.1 - 2.4; Textbook 2: Chapter 1:1.3.1-1.3.2. | 6 |
| Pedagogy | Mind Mapping | |
| 2 | Brute Force: Selection Sort, Bubble Sort, String Matching. Depth First Search (DFS), Breadth First Search (BFS), Applications of DFS and BFS Decrease and conquer: Topological Sorting, Variable size decrease algorithms: Computing a Median and the Selection Problem, Interpolation search Divide and Conquer: Master's Theorem, Merge sort, Quicksort, Strassen's matrix multiplication, Multiplication of large integers, Textbook 1: Chapter 3: 3.1- 3.2, 3.5; Chapter 4: 4.2, 4.5; Chapter 5: 5.1-5.2, 5.4. | 10 |
| Pedagogy | Problem-Solving | |
| 3 | Transform and Conquer: AVL Trees, Heaps and Heapsort Space and Time Trade-offs: Input enhancement in string matching: Boyer Moore Algorithm, Hashing Textbook 1: Chapter 6: 6.3, 6.4; Chapter 7: 7.2-7.3. | 8 |
| Pedagogy | Think-Pair-Share (TPS) | |
| 4 | Dynamic Programming: Knapsack Problem and Memory functions. Warshall's and Floyd's Algorithm, The Travelling Salesperson Problem. Greedy Technique: Kruskal's Algorithm, Prim's Algorithm, Dijkstra's Algorithm, | 8 |

| | | |
|-----------------|--|---|
| | Huffman trees and codes. Textbook 1: Chapter 8: 8.2,8.4; Chapter 9: 9.1- 9.4; Textbook 2: Chapter 5: 5.9 | |
| Pedagogy | Poster Presentation | |
| 5 | <p>Backtracking: N-queen's problem, Sum of subset problem</p> <p>Branch and bound: Assignment problem,</p> <p>Limitations of Algorithm Power: Decision Tress, Basic concepts of P, NP and NP-Complete and NP – Hard Classes.</p> <p>Algorithms as a technology: Communication & Networking, Search engines, Machine learning, Database management, Software tools development, Data organization, GPS navigation systems.</p> <p>Textbook 1: Chapter 12: 12.1-12.2; Chapter 11: 11.2; Textbook 3: chapter 1: 1.2</p> | 8 |
| Pedagogy | Case Studies | |
| | <p>Pedagogical Initiatives (Not limited to):</p> <ul style="list-style-type: none"> • 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 |
|---------|---|-----|
| | Design and implement a C/C++ Program to | |
| 1 | Sort a given set of n integer elements using the Quick Sort method and compute its time complexity. Run the program for varied values of n> 5000 and record the time taken to sort. Plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number generator | CO3 |
| 2 | You are managing a database of Library records where each record consists of a Book name and year. The database is unsorted. Design a program using merge sort to sort these records | CO3 |

| | | |
|----|---|-----|
| | first by year (ascending order) and then by name (alphabetical order) for students with the same grade. | |
| 3 | Solve All-Pairs Shortest Paths problem using Floyd's algorithm. | CO4 |
| 4 | Find the shortest paths from a given vertex to other vertices in a weighted connected graph using Dijkstra's algorithm. | CO4 |
| 5 | Obtain the Topological ordering of vertices in a given digraph. | CO3 |
| 6 | Solve 0/1 Knapsack problem using the Dynamic Programming method. | CO4 |
| 7 | Solve Travelling Sales Person problem using Dynamic programming. | CO4 |
| 8 | a. Find Minimum Cost Spanning Tree of a given connected undirected graph using Kruskal's algorithm. b. Find Minimum Cost Spanning Tree of a given connected undirected graph using Prim's algorithm. | CO5 |
| 9 | Find a subset of a given set $S = \{s_1, s_2, \dots, s_n\}$ of n positive integers whose sum is equal to a given positive integer d . | CO5 |
| 10 | Implement N Queen's problem using Backtracking. | CO4 |

Open-ended Programs

| | | |
|---|--|-----|
| 1 | Consider the scenario of placing wi-fi routers in a straight-line building. Determine the list of positions based on router's range and also locate the exact position where the wi-fi router can be placed to receive good communication. Decide which algorithm technique is suitable for a given scenario and implement the same algorithm using Java programming | CO5 |
| 2 | Design a Java program by applying an optimal solution approach for Matrix Chain Multiplication in dynamic programming. | CO5 |
| 3 | A Technical company has multiple elevators, each elevator needs to respond to requests quickly and efficiently minimizing waiting time. Design and implement an algorithm in Java programming to schedule elevator movements and optimize waiting time. | CO5 |
| 4 | Consider the scenario of a communication network where the sensors transmit the data in a limited bandwidth channel. Design compression algorithm (Huffman Coding) to compress the sensor data to transmit in a limited bandwidth channel and implement in Java programming. | CO5 |

Text Books

| Sl. No. | Title of the Book/Name of the author/Name of the publisher/Edition and Year |
|---------|--|
| 1 | Introduction to the Design and Analysis of Algorithms, Anany Levitin, Pearson, 3rd Edition (Indian), 2017. |
| 2 | Computer Algorithms/C++, Ellis Horowitz, Satraj Sahni and Rajasekaran, Universities Press, 2nd Edition, 2014 |
| 3 | Introduction to Algorithms, Thomas H. Cormen, Charles E. Leiserson, Ronal L. Rivest, Clifford Stein, 3rd Edition, 2010 |

Reference Books

| | |
|---|--|
| 1 | Design and Analysis of Algorithms, S. Sridhar, Oxford (Higher Education) |
|---|--|

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

| CO | Course Outcomes | RBT Level | RBT Level Indicator |
|-----|--|-----------|---------------------|
| CO1 | Understand the fundamental concepts of asymptotic notations and various design techniques of algorithms | U | L2 |
| CO2 | Apply the various data structure operations in problem-solving techniques of algorithms. | A | L3 |
| CO3 | Analyze the performance and computational complexity of different algorithms. | AN | L4 |
| CO4 | Develop the algorithms for various real-time applications using contemporary computing languages. | E | L5 |
| CO5 | Design the experiments using the various algorithm techniques | C | L6 |

Mapping of Course Outcomes to Program Outcomes:

| CO/PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|
| CO1 | | | | | | | | | | | | | | | |
| CO2 | 3 | | | | | | | | | | | | | | |
| CO3 | | 3 | | 3 | | | | | | | | | | | |
| CO4 | | | 3 | | | | | | | | | | | | |
| CO5 | | | | | 3 | | | | 3 | | | 3 | 3 | 3 | |

Weblinks and Video Lectures (e-Resources)

| | |
|----|---|
| 1 | https://nptel.ac.in/courses/106/101/106101060/ |
| 2 | http://openclassroom.stanford.edu/MainFolder/CoursePage.php?course=IntroToAlgorithms |
| 3 | Welcome to Virtual Labs - A MHRD Govt of india Initiative (vlabs.ac.in) |
| 4 | http://elearning.vtu.ac.in/econtent/courses/video/FEP/ADA.html |
| 5 | http://elearning.vtu.ac.in/econtent/courses/video/CSE/06CS43.html |
| 6 | DIJKSTRA'S ALGORITHM: Analysis & Problems -ADA BCS401 Mod4 VTU #VTUPadhai #daa #vtu#bcs401#dijkstra - YouTube |
| 7 | HUFFMAN CODING: Algorithm, Analysis & Problems - ADA BCS401 Mod4 VTU #VTUPadhai #daa #vtu #bcs401 - YouTube |
| 8 | WARSHALL'S & FLOYD'S: Algorithm, Analysis & Examples - ADA BCS401 Mod4 VTU #VTUPadhai#daa#vtu#bcs401 (youtube.com) |
| 9 | BACKTRACKING: N Queens & Subset Sum Problems - ADA BCS401 Mod5 VTU #VTUPadhai #daa #vtu #bcs401 (youtube.com) |
| 10 | BRANCH-AND-BOUND: Knapsack, TSP & Assignment Problem -ADA BCS401 Mod5 VTU #VTUPadhai #daa #vtu#bcs401 (youtube.com) |
| 11 | HORSPOOL ALGORITHM: Advanced Input Enhancement - ADA BCS401 Mod3 VTU #VTUPadhai #daa #vtu - YouTube |
| 12 | HEAPS AND HEAPSORT: Algorithm+ Problems -Transform & Conquer- ADA BCS401 Mod3 VTU #VTUPadhai#daa#vtu (youtube.com) |

CIE- Continuous Internal Evaluation (50 Marks)

| Bloom's Category | Theory | | | | Practical |
|------------------|-----------------------------|----------|-------------------------------------|----------|----------------|
| | Continuous Assessment Tests | | Continuous Comprehensive Assessment | | Practical Test |
| | IAT-1 | IAT-2 | CCA-1 | CCA-2 | |
| | 50 Marks | 50 Marks | 50 Marks | 50 Marks | |
| Remember | 10 | 0 | 5 | 0 | 0 |
| Understand | 15 | 0 | 10 | 0 | 0 |
| Apply | 25 | 25 | 15 | 15 | 10 |
| Analyse | 0 | 15 | 20 | 10 | 5 |
| Evaluate | 0 | 10 | 0 | 10 | 10 |
| Create | 0 | 0 | 0 | 15 | 25 |

CIE Course Assessment Plan

| CO's | Marks Distribution | | | | | | Total Marks | Weightage |
|--------------|--------------------|-----------|-----------------|-----------------|-----------|-----------|-------------|-------------|
| | Test-1 | | | Test-2 | | | | |
| | Module-1 | Module-2 | Module 2 to 2.5 | Module-2.5 to 3 | Module-4 | Module-5 | | |
| CO1 | 6 | 4 | 0 | 0 | 0 | 0 | 10 | 10% |
| CO2 | 21 | 10 | 5 | 0 | 0 | 0 | 36 | 36% |
| CO3 | 0 | 3 | 1 | 5 | 10 | 15 | 34 | 34% |
| CO4 | - | - | - | 5 | 10 | 5 | 20 | 20% |
| CO5 | - | - | - | - | - | - | - | - |
| Total | 27 | 17 | 6 | 10 | 20 | 20 | 100 | 100% |

SEE- Semester End Examination (50 Marks)

| Bloom's Category | SEE Marks (90% Theory+10% Practical Questions) |
|------------------|---|
| Remember | 5% |
| Understand | 10% |
| Apply | 35% |
| Analyse | 25% |
| Evaluate | 10% |
| Create | 15% |

SEE Course Plan

| CO's | Marks Distribution | | | | | | Total Marks | Weightage |
|--------------|--------------------|-----------|-----------------|-----------------|-----------|-----------|-------------|-------------|
| | Module-1 | Module-2 | Module 2 to 2.5 | Module-2.5 to 3 | Module-4 | Module-5 | | |
| CO1 | 5 | - | - | - | 2 | 3 | 10 | 10% |
| CO2 | - | - | 5 | 3 | - | 2 | 10 | 10% |
| CO3 | 10 | 10 | - | 10 | 5 | - | 35 | 35% |
| CO4 | - | 10 | 10 | - | 10 | - | 30 | 30% |
| CO5 | - | - | - | - | 5 | 10 | 15 | 15% |
| Total | 15 | 20 | 15 | 13 | 22 | 15 | 100 | 100% |

Cos Matched with POs

| COs | POs Mapped | PSOs |
|------------|-----------------------|-------------------|
| C01 | -- | -- |
| C02 | P01 | -- |
| C03 | P02, P04 | -- |
| C04 | P03 | -- |
| C05 | P05, P09, P012 | PSO1, PSO2 |



Dayananda Sagar Academy of Technology & Management
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| | | | | |
|--|---|--|-----------------|-----------|
| Semester | : | IV | | |
| Course Title | : | Object Oriented Programming with Java | | |
| Course Code | : | BIS403 | | |
| Course Type (Theory/ Practical/ Integrated) | : | Integrated | | |
| Category | : | IPCC-2 | | |
| Stream | : | Information Science and Engineering | CIE | : 50 |
| Teaching hours/ week (L:T:P:S) | : | 3:0:2:0 | SEE | : 50 |
| Total Hours | : | 40 Theory Hours + 20 Practical Hours = 60 Hours | SEE Duration | : 3 Hours |
| Credits | : | 04 | | |

Course Learning Objectives: Students will be able to:

| Sl. No. | Course Objectives |
|---------|---|
| 1 | Learn the syntax and semantics of Java programming language |
| 2 | Understand Object Oriented Programming Features of JAVA |
| 3 | Apply object-oriented concepts to solve given problems |
| 4 | Analyze Inheritance, Packages, String manipulation, Exceptions, and Multithreaded programming and identify the appropriate concepts to be used. |
| 5 | Design and Develop Solutions to problems using an object 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 Java.
3. Encourage collaborative (Group) Learning for team building.
4. Include 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 -2024-25
Outcome Based Education and Choice Based Credit System (CBCS)
(Effective from the Academic Year 2024-25)

COURSE CURRICULUM

| Module No. | Topics | Hours |
|------------|---|-------|
| 1 | <p>Evolution and an Overview of Java: The Bytecode, The Java Buzzwords, Object-Oriented Programming (Two Paradigms, Abstraction, The Three OOP Principles), Using Blocks of Code, Lexical Issues (Whitespace, Identifiers, Literals, Comments, Separators, The Java Keywords).</p> <p>Data Types, Variables, and Arrays: 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.</p> <p>Operators: Arithmetic Operators, Relational Operators, Boolean Logical Operators, The Assignment Operator, The ? Operator, Operator Precedence, Using Parentheses.</p> <p>Control Statements: Java’s Selection Statements, 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.</p> <p>Textbook 1: Chapter 1, 2, 3, 4, 5</p> | 8 |
| Pedagogy | Blended Learning | |
| 2 | <p>Introduction to Classes: Class Fundamentals, Declaring Objects, Assigning Object Reference Variables, Introducing Methods, Constructors, The this Keyword, Garbage Collection.</p> <p>Methods and Classes: Overloading Methods, Objects as Parameters, Argument Passing, Returning Objects, Recursion, Access Control, Understanding static, Introducing final, Introducing Nested and Inner Classes.</p> <p>Inheritance: Inheritance Basics, Using super, Creating a Multilevel Hierarchy, When Constructors Are Executed, Method Overriding, Dynamic Method Dispatch, Using Abstract</p> | 8 |

| | | |
|-----------------|---|----------|
| | Classes, Using final with Inheritance, Local Variable Type Inference and Inheritance, The Object Class. Textbook 1: Chapter 6,7,8 | |
| Pedagogy | Peer Group Learning | |
| 3 | <p>Interfaces: Interfaces, Default Interface Methods, Use static Methods in an Interface, Private Interface Methods.</p> <p>Packages: Packages, Packages and Member Access, Importing Packages.</p> <p>Exceptions: 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>Textbook 1: Chapter 9,10</p> | 8 |
| Pedagogy | Think-Pair-Share | |
| 4 | <p>String Handling: The String Constructors, String Length, Special String Operations, Character Extraction, String Comparison, Searching Strings, Modifying a String, Data Conversion Using valueOf(), Changing the Case of Characters Within a String, joining strings, StringBuffer, StringBuilder.</p> <p>Textbook 1: Chapter 18</p> | 8 |
| Pedagogy | Mind Mapping | |
| 5 | <p>Multithreaded Programming: The Java Thread Model, The Main Thread, Creating a Thread, Creating Multiple Threads, Using isAlive() and join(), Thread Priorities, Synchronization, Inter-thread Communication, Suspending, Resuming, and Stopping Threads, Obtaining a Thread's State.</p> <p>Textbook 1: Chapter 11</p> | 8 |
| Pedagogy | Problem-Solving | |
| | <p>Pedagogical Initiatives (Not limited to):</p> <ul style="list-style-type: none"> • 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 | Develop a Java program to add TWO matrices of suitable order N (The value of N should be read from command line arguments). | CO5 |
| 2 | Create a stack class capable of holding up to 10 integers, including appropriate methods for stack operations. Implement a Java main method to demonstrate how these stack operations work. | CO5 |
| 3 | Implement a Java program to define a class named "Rectangle" with attributes for width and height. Include methods to compute the area and perimeter of the rectangle, and demonstrate the functionality in the main method. | CO5 |
| 4 | Showcase the concept of polymorphism by designing appropriate methods, defining member data, and writing a main program to create a class named "Person" with methods getFirstName() and getLastName(). Then, create a subclass called "Employee" that introduces an additional method called getEmployeeId() and overrides the getLastName() method to include both the employee's job title and last name. | CO5 |
| 5 | Develop a Java program to define an interface called "Resizable" with a method resize(int radius) to allow an object to be resized. Create a Circle class that implements the Resizable interface and overrides the resize method. Display the circle's radius before and after resizing. | CO5 |
| 6 | Develop a Java program to define a package named "balance" that includes an Account class with a displayBalance() method. Import this package into a separate program to access and use the displayBalance() method of the Account class. | CO5 |
| 7 | Develop a Java program that creates a custom exception for DivisionByZero. Use the try, catch, throw, and finally keywords to handle the exception. | CO5 |
| 8 | Build a Java program for a banking application that throws a custom exception when a person attempts to withdraw an amount that would result in a balance lower than the | CO5 |

| | | |
|----------------------------|---|-----|
| | minimum required balance. | |
| 9 | Implement a program in Java to check whether two given strings are anagram. | CO5 |
| 10 | Develop a Java program to search for a pattern within a given string using 'StringBuffer' class. | CO5 |
| 11 | Implement a Java program to create and start multiple threads that concurrently increment a shared counter variable. | CO5 |
| 12 | Build a Java program with a class "MyThread" that includes a constructor which invokes the base class constructor using super, and then starts the thread. The run method of the class will execute after this. It can be observed that both the main thread and the newly created child thread run concurrently. | CO5 |
| Open Ended Programs | | |
| 1 | Develop a Java program to manage student grades. The program should enable users to input grades for multiple students and compute statistics including the average grade, highest grade, and lowest grade. It should also generate a grade report displaying student's name alongside their respective grade. | CO5 |
| 2 | Imagine you are tasked with sorting a large dataset of records, such as a list of customer transactions, which is too extensive to fit into memory all at once. Implement a Java program to manage this task efficiently. | CO5 |
| 3 | Create a Java program that defines an interface named "Flyable" with a method "fly_obj()". Then, implement this interface in three classes: "Spacecraft", "Airplane", and "Helicopter". Each class should provide its own implementation of the "fly_obj()" method. | CO5 |
| 4 | You have a collection of n nuts, each of a unique size, and n bolts, each also of a unique size. Each nut pairs with exactly one bolt. Your task is to match each nut with its corresponding bolt efficiently. Develop a Java program to solve this nuts and bolts problem. | CO5 |
| 5 | Assume you are developing a web application that processes user input to generate user profiles. Each user profile includes a name, email address, and a short bio. The application needs to ensure the following: 1. Name Validation: The user's name should be properly capitalized (i.e., the first letter of each word should be uppercase, while the rest should be lowercase). 2. Email Normalization: The email address should be normalized to lowercase to ensure | CO5 |

| | | |
|--|---|--|
| | <p>consistency and avoid case sensitivity issues.</p> <p>3. Bio Sanitization: The bio should be sanitized to remove any leading or trailing whitespace, and all extra spaces between words should be reduced to a single space.</p> <p>Develop a Java program for the above application.</p> | |
|--|---|--|

| Text Books | |
|-----------------|---|
| Sl. No. | Title of the Book/Name of the author/Name of the publisher/Edition and Year |
| 1 | Java: The Complete Reference, Herbert Schildt, McGraw-Hill, Twelfth Edition, November 2021, ISBN: 9781260463422 |
| Reference Books | |
| 1 | Programming with Java, E Balagurusamy, McGraw Hill Education, 6th Edition, Mar-2019, ISBN: 9789353162337. |
| 2 | Introduction to JAVA Programming, Y. Daniel Liang: Pearson Education, 11th Edition, 2018 |
| 3 | Thinking in Java, Bruce Eckel, Prentice Hall, Fourth Edition, 2006 (https://sd.blackball.lv/library/thinking_in_java_4th_edition.pdf) |

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

| CO | Course Outcomes | RBT Level | RBT Level Indicator |
|-----|--|-----------|---------------------|
| CO1 | Understand the fundamental principles of object-oriented concepts for the construction of robust programs. | U | L2 |
| CO2 | Apply the knowledge of Java programming in implementing simple real-world problems. | A | L3 |
| CO3 | Analyze OOP concepts, inheritance, packages, exception handling, string handling and multithreading techniques. | An | L4 |
| CO4 | Develop the effective programs using appropriate object-oriented feature. | C | L5 |
| CO5 | Create the optimal solution for the given scenario using java concepts. | C | L6 |

Mapping of Course Outcomes to Program Outcomes:

| CO/PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|
| CO1 | | | | | | | | | | | | | | | |
| CO2 | 3 | | | | | | | | | | | | | | |
| CO3 | | 3 | | | | | | | | | | | | | |
| CO4 | | | 3 | | 3 | | | | | | | 3 | | | |
| CO5 | 3 | 3 | 3 | 3 | 3 | | | 2 | 3 | 3 | 2 | 3 | 3 | 3 | |

Weblinks and Video Lectures (e-Resources)

| | |
|----|---|
| 1 | https://nptel.ac.in/courses/106/105/106105191/ |
| 2 | https://java-iitd.vlabs.ac.in/List%20of%20experiments.html (Virtual Labs) |
| 3 | https://nptel.ac.in/courses/106/105/106105225/ |
| 4 | https://academicearth.org/computer-science/ |
| 5 | https://online.vtu.ac.in/course-details/Programming-In-Java |
| 6 | Introduction to Programming In Java (by Evan Jones, Adam Marcus and Eugene Wu): |
| 7 | https://onlinecourses.nptel.ac.in/noc24_cs105/preview |
| 8 | https://www.geeksforgeeks.org/courses/category/programming- |
| 9 | https://www.udemy.com/course/java-se-programming/?couponCode=HT815INMT81324 |
| 10 | https://www.w3schools.com/java/java_intro.asp |
| 11 | https://www.tutorialspoint.com/java/index.htm |
| 12 | https://www.youtube.com/@VeenaRSV |
| 13 | https://www.classcentral.com/course/java-universidad-carlos-iii-de-madrid-introductio-2813 |
| 14 | https://www.youtube.com/watch?v=BGTx91t8q50 |
| 15 | https://www.youtube.com/watch?v=r_MbozD32eo |

CIE- Continuous Internal Evaluation (50 Marks)

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

CIE Course Assessment Plan

| CO's | Marks Distribution | | | | | | Total Marks | Weightage |
|-------|--------------------|----------|-----------------|-----------------|----------|----------|-------------|-----------|
| | Test-1 | | | Test-2 | | | | |
| | Module-1 | Module-2 | Module 2 to 2.5 | Module-2.5 to 3 | Module-4 | Module-5 | | |
| CO1 | 5 | 5 | | | | 5 | 15 | 15% |
| CO2 | 5 | 10 | 5 | 10 | 10 | 5 | 45 | 45% |
| CO3 | 5 | 5 | | | 5 | 5 | 20 | 20% |
| CO4 | | 5 | 5 | 5 | 5 | | 20 | 20% |
| CO5 | | | | | | | | |
| Total | | | | | | | 100 | 100% |

SEE- Semester End Examination (50 Marks)

| Bloom's Category | SEE Marks (90% Theory+10% Practical Questions) |
|------------------|---|
| Remember | 5% |
| Understand | 15% |
| Apply | 40% |
| Analyse | 20% |
| 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 | 5 | 5 | | 5 | 5 | 10 | 10% |
| CO2 | 5 | 10 | 10 | 10 | 5 | 40 | 10% |
| CO3 | | 5 | | 5 | | 10 | 40% |
| CO4 | | 10 | 5 | 5 | | 20 | 10% |
| CO5 | 2 | 2 | 2 | 2 | 2 | 10 | 20% |
| Total | 12 | 32 | 17 | 27 | 12 | 100 | 10% |

COs Mapped with POs and PSOs:

| CO | PO | PSO |
|-----|----------------------------------|------------|
| CO1 | -- | -- |
| CO2 | PO1 | -- |
| CO3 | PO2 | -- |
| CO4 | PO3,PO5,PO12 | -- |
| CO5 | PO4,PO5,PO8, PO9,PO10,PO11, PO12 | PSO1, PSO2 |

**PROFESSIONAL CORE
COURSE (PCC)**

PCC Course - Professional Core Course

| | |
|---------------------------------|----------|
| Teaching Hours/Week (L: T:P: S) | 3:0:0:0 |
| Total Hours of Pedagogy | 40 hours |
| Credits: | 03 |
| Each Module | 8 Hrs |
| CIE Marks | 50 |
| SEE Marks | 50 |
| Total Marks | 100 |
| Exam Hours | 3 |
| Examination nature (SEE) | Theory |

3 Credit Course – Professional Core Course (PCC)

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:

Internal Assessment Test (IAT):

- For the Internal Assessment Test component of CIE, there are 25 marks and for Assignment component of the CIE, there are 25 marks. Two Tests, each of 50 Marks with 01-hour 30 minutes' duration, are to be conducted and average of two tests to be reduced to 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, 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.

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

Semester-End Examination:

Theory SEE will be conducted as per the scheduled timetable (duration 03 hours).

- The question paper will have ten questions. Each question is set for 20 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 students have to answer 5 full questions, selecting one full question from each module.
- Marks scored shall be proportionally reduced to 50 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 4th week and CCA2 after 9th 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 6th weeks of semester and review 2 after 12th 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**

Possible Continuous and Comprehensive Assessment (CCA):

- 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,
- The assessment of these techniques shall be in rubrics.
- The faculty can adopt any other CCA method of implementation and its assessment with prior approval of Program Assessment Committee (PAC).

Professional Core Course (PCC) – 3 Credit course – Theory

| Assessment Method | Component | Type of Assessments | Syllabus Coverage | Maximum Marks | Average | Reduced Marks | Minimum Passing Marks | Evaluation Details |
|-------------------------------------|--|--|---|---------------|-------------|---------------|-----------------------|--|
| Total CIE Theory + Practical | | | | 50 | ---- | ---- | 20 | |
| CIE | Theory | Internal Assessment Test (IAT) - I | Module – 1 to 2.5 | 50 | (50+50) / 2 | 25 | 10 | Average of Two Internal test each of 50 Marks scale down the marks to 25 Marks |
| | | Internal Assessment Test (IAT) - II | Module – 2.5 to 5 | 50 | | | | |
| | Continuous Comprehensive Assessment (CCA) | CCA-1- Pedagogical Initiatives / Activity Based learning | Considering all the Modules | 50 | (50+50) / 2 | 25 | 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 / Activity Based learning | | 50 | | | | |
| | Total CIE Theory | | | | | | 50 | 20 |
| SEE | | 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 |
| CIE + SEE | | | | 100 | ---- | ---- | 40 | |



Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

| | | | | | |
|--|---|-------------------------------------|----------|---|---------|
| Semester | : | IV | | | |
| Course Title | : | Data Communication | | | |
| Course Code | : | BIS404 | | | |
| Course Type (Theory/ Practical/ Integrated) | : | Theory | | | |
| Category | : | PCC-1 | | | |
| Stream | : | Information Science and Engineering | CIE | : | 50 |
| Teaching hours/ week (L:T:P:S) | : | 3:0:0:0 | SEE | : | 50 |
| Total Hours | : | 40 Hours | SEE | : | 3 Hours |
| Credits | : | 03 | Duration | : | |

Course Learning Objectives: Students will be able to:

| Sl. No. | Course Objectives |
|---------|--|
| 1 | Define and understand the concept of Data communication, role of protocol, the concept of layering and identify the major functions at each layer. |
| 2 | Describe how bits are represented as a signal on various types of transmission media along with switching concepts of data communication systems. |
| 3 | Demonstrate understanding of basic concepts of error detection, checking, and correction at data link layer and application to flow control protocols. |
| 4 | Demonstrate understanding of basic concepts of network layer protocols |
| 5 | Explore the internal operations of Routing Algorithms, Congestion Control Algorithms, QoS at Network Layer. |

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 -2024-25
Outcome Based Education and Choice Based Credit System (CBCS)
(Effective from the Academic Year 2024-25)

COURSE CURRICULUM

| Module No. | Topics | Hours |
|-----------------|---|-------|
| 1 | <p>Introduction: Data Communication components, Data Representation, Data Flow. Networks: Distributed Processing, Network criteria, Physical Structures, Network Models, categories of Networks, Interconnection of Networks: Internetwork. Protocols and Standards: Protocols, Standards, Standards Organizations, and Internet Standards. Networks Models: Layered Tasks, The OSI Model, Layers in the OSI Model</p> <p>Textbook 1: Chapter 1:1.1,1.2,1.4; Chapter 2:2.1 - 2.3</p> | 8 |
| Pedagogy | Role Play | |
| 2 | <p>Physical Layer and Media-Digital Transmission: Digital-To-Digital Conversion, Analog-To-Digital Conversion, Transmission Modes. Transmission Media: Guided Media, Unguided Media: Wireless. Switching: Circuit-switched Networks, Datagram Network, Virtual-Circuit Networks.</p> <p>Textbook 1: Chapter 4:4.1 - 4.3; Chapter 7: 7.1, 7.2; Chapter 8: 8.1 - 8.3</p> | 8 |
| Pedagogy | Problem Based Learning | |
| 3 | <p>Data Link Layer: Error Detection and Correction-Introduction, Block coding, Linear Block codes, Cyclic codes and Checksum. Data Link control: Framing, Flow and Error control, Protocol, Noiseless Channels, Noisy Channel, HDLC, Point-to-Point Protocol. Multiple Access: Random Access, Controlled Access, Channelization.</p> <p>Textbook 1: Chapter 10: 10.1 - 10.5; Chapter 11:11.1 - 11.7; Chapter 12:12.1 - 12.3</p> | 8 |
| Pedagogy | Flipped Classroom | |
| 4 | <p>Network Layer: Network Layer Design Issues: Store and forward packet switching, Services provided to the Transport layer, Implementation of connection-less services, Implementation of connection oriented services, The Network Layer in the Internet: the IP version 4 protocol, IP Addresses, IP Version 6, Internet control Protocols, Mobile IP, Tunnelling, Internetwork Routing, Packet Fragmentation.</p> <p>Textbook 2: Chapter 5: 5.1, 5.5 (5.5.3-5.5.5), 5.6 (5.6.1-5.6.4, 5.6.9)</p> | 8 |
| Pedagogy | Case Study | |
| 5 | <p>Network Layer: Routing Algorithms: The Optimality Principle, Shortest Path Algorithm, Flooding, Distance Vector Routing, Link State Routing, Congestion Control Algorithms:</p> | 8 |

| | | |
|-----------------|---|--|
| | Approaches to the congestion control, Traffic aware routing, Admission control, Traffic throttling, Load shedding. QoS: Application Requirement, traffic shaping, Packet scheduling, admission control, Integrated services, Differentiated services. Textbook 2: Chapter 5: 5.2 (5.2.1-5.2.5), 5.3, 5.4 | |
| Pedagogy | Collaborative learning | |
| | Pedagogical Initiatives (Not limited to): <ul style="list-style-type: none"> • 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 | |

| Text Books | |
|------------------------|--|
| Sl. No. | Title of the Book/Name of the author/Name of the publisher/Edition and Year |
| 1 | Data Communication and Network by Behrouz A. Forouzan, Mc Graw Hill, 4 th Edition, 2007 |
| 2 | Computer Networks, Andrew S Tanenbaum, Pearson Publishers, 5 th Edition, ISBN-13 978-0132126953, December 2010. |
| Reference Books | |
| 1 | Computer Networks and Internets (5th Edition), Douglas Comer |
| 2 | Networking Complete by Sybex Inc. and Sybex Inc. |

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

| CO | Course Outcomes | RBT Level | RBT Level Indicator |
|------------|--|-------------------|----------------------------|
| CO1 | Understand the basics of data communication, networking, internet and their importance. | Understand | L2 |
| CO2 | Apply various types of transmission media and network devices for evaluating the performance. | Apply | L3 |
| CO3 | Analyse the concept of Error Detection and correction, flow control algorithms used in Data link layers. | Analyse | L4 |
| CO4 | Analyse the Network layer design issues, logical addresses and features for implementing connection-oriented and connectionless services. | Analyse | L4 |
| CO5 | Design and Analyse Routing protocols and Congestion control mechanisms to provide better QoS. | Evaluate | L5 |

Mapping of Course Outcomes to Program Outcomes:

| CO/PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PS01 | PS02 | PS03 |
|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|
| CO1 | | | | | | | | | | | | | | | |
| CO2 | 3 | | | | | | | | | | | | 2 | | |
| CO3 | | 3 | | | | | | | | | | | 2 | | |
| CO4 | | 3 | | | | | | | | | | | 2 | | |
| CO5 | | | 3 | | 2 | | | | | | | 2 | 3 | | |

Weblinks and Video Lectures (e-Resources)

| | |
|---|---|
| 1 | https://nptel.ac.in/courses/106105082 |
| 2 | https://onlinecourses.nptel.ac.in/noc22_ee61/preview |
| 3 | https://www.nptelvideos.com/course.php?id=399 |
| 4 | https://archive.nptel.ac.in/courses/106/105/106105080/ |
| 5 | https://archive.nptel.ac.in/courses/106/105/106105183/ |

CIE- Continuous Internal Evaluation (50 Marks)

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

CIE Course Assessment Plan

| CO's | Marks Distribution | | | | | | Total Marks | Weightage |
|--------------|--------------------|----------|-----------------|-----------------|----------|----------|-------------|-----------|
| | Test-1(50) | | | Test-2(50) | | | | |
| | Module-1 | Module-2 | Module 2 to 2.5 | Module-2.5 to 3 | Module-4 | Module-5 | | |
| CO1 | 10 | 10 | - | - | - | - | 20 | 50 Marks |
| CO2 | 5 | 5 | 10 | - | - | 0 | 20 | |
| CO3 | 5 | 5 | - | 10 | 10 | | 30 | |
| CO4 | - | - | - | - | 10 | 5 | 15 | |
| CO5 | - | - | - | - | - | 15 | 15 | |
| Total | 20 | 20 | 10 | 10 | 20 | 20 | 100 | |

SEE- Semester End Examination (50 Marks)

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

SEE Course Plan

| CO's | Marks Distribution | | | | | | Total Marks | Weightage |
|--------------|--------------------|----------|-----------------|-----------------|----------|----------|-------------|-----------|
| | Module-1 | Module-2 | Module 2 to 2.5 | Module-2.5 to 3 | Module-4 | Module-5 | | |
| CO1 | 5 | 5 | 5 | 0 | 0 | 0 | 15 | 50 Marks |
| CO2 | 5 | 5 | 5 | 0 | 5 | 0 | 20 | |
| CO3 | 5 | 5 | 0 | 5 | 5 | 5 | 25 | |
| CO4 | 5 | 5 | 0 | 5 | 5 | 5 | 25 | |
| CO5 | 0 | 0 | 0 | 0 | 5 | 10 | 15 | |
| Total | 20 | 20 | 10 | 10 | 20 | 20 | 100 | |

COs Mapped with POs and PSOs:

| CO | PO | PSO |
|------------|----------------------|------------|
| C01 | - | - |
| C02 | PO1, PO12 | - |
| C03 | PO1, PO2, PO10, PO12 | - |
| C04 | PO1, PO4, PO12 | - |
| C05 | PO1, PO9, PO10, PO12 | PSO1, PSO2 |



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

| | | | | |
|--|---|-------------------------------------|----------|-----------|
| Semester | : | IV | | |
| Course Title | : | Database Management Systems | | |
| Course Code | : | BIS405 | | |
| Course Type (Theory/ Practical/ Integrated) | : | Theory | | |
| Category | : | PCC-2 | | |
| Stream | : | Information Science and Engineering | CIE | : 50 |
| Teaching hours/ week (L: T:P:S) | : | 3:0:0:0 | SEE | : 50 |
| Total Hours | : | 40 Hours | SEE | : 3 Hours |
| Credits | : | 03 | Duration | |

Course Learning Objectives: Students will be able to:

| Sl. No. | Course Objectives |
|---------|---|
| 1 | Learn the strong foundation in database concepts, relational database design, NOSQL, and database security. |
| 2 | Practice SQL programming through a variety of database problems. |
| 3 | Exemplify the representation of a database system using ER diagrams and to learn normalization techniques. |
| 4 | Demonstrate the use of concurrency and transactions in database. |
| 5 | Design and build database applications for real-world problems. |

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)**.



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(Effective from the Academic Year 2024-25)

COURSE CURRICULUM

| Module No. | Topics | Hours |
|-----------------|---|-------|
| 1 | <p>Introduction to Databases, Database Languages and Architectures: Introduction, Characteristics of database approach, Advantages of using the DBMS approach, Data Models, Schemas, and Instances. Three schema architecture and data independence, database languages, and interfaces, The Database System environment.</p> <p>Data Modelling Using the Entity-Relationship Model: High-Level Conceptual Data Models for Database Design; A Sample Database Application; Entity types, Entity sets and structural constraints, Weak entity types, ER diagrams, Naming Conventions and Design Issues.</p> <p>Mapping Conceptual Design into a Logical Design: Relational Database Design using ER-to-Relational mapping.</p> <p>Textbook 1: Chapter 1: 1.1 - 1.6; Chapter 2: 2.1 - 2.4; Chapter 3: 3.1 - 3.7; Chapter 9: 9.1</p> | 8 |
| Pedagogy | Poster Presentation | |
| 2 | <p>Relational Model and Relational Algebra concepts: Relational Model Constraints and Relational Database Schemas, Update Operations and Dealing with Constraint Violations, Unary Relational Operations: SELECT and PROJECT, Relational Algebra Operations from Set Theory, Binary Relational Operations: JOIN and DIVISION, Examples of Queries in Relational Algebra.</p> <p>SQL:SQL data definition and data types, specifying constraints in SQL, retrieval queries in SQL, INSERT, DELETE, and UPDATE statements in SQL.</p> <p>Textbook 1: Chapter 5: 5.1 - 5.3; Chapter 8: 8.1 - 8.5; Chapter 6: 6.1-6.4</p> | 8 |
| Pedagogy | Think Pair and Share | |
| | SQL: Advanced Queries: More complex SQL retrieval queries, Specifying constraints as assertions and action triggers, Views in SQL. | |

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| 3 | <p>Database Design Theory: Introduction to Normalization using Functional and Multivalued Dependencies: Informal design guidelines for relation schema, Functional Dependencies – Definition, Inference Rules, Equivalence of sets of FDs, Minimal Set of FD's; Normal Forms Based on Primary Keys; General Definitions of Second and Third Normal Forms; Boyce-Codd Normal Form, Fourth Normal Form, Join Dependencies and Fifth Normal Form.</p> <p>Textbook 1: Chapter 7: 7.1 - 7.4; Chapter 14 :14.1 - 14.7</p> | 8 |
| Pedagogy | Query Solving | |
| 4 | <p>Transaction Processing: Introduction to Transaction Processing, Transaction and System concepts, Desirable properties of Transactions, characterizing schedules based on recoverability, characterizing schedules based on Serializability, Transaction support in SQL.</p> <p>Concurrency Control Techniques: Two phase locking techniques for concurrency control, types of locks and system lock tables, Concurrency control based on Timestamp ordering.</p> <p>Textbook 1: Chapter 20: 20.1 - 20.6; Chapter 21: 21.1.1 - 21.1.3, 21.2.1-21.2.2</p> | 8 |
| Pedagogy | Problem-Solving | |
| 5 | <p>Database Security: Security issues, Access control based on privileges, Role Based access control, SQL Injection, Statistical Database security, Flow control, Encryption and Public Key infrastructures.</p> <p>Introduction to NOSQL Databases: Difference between SQL and NoSQL, The CAP Theorem, Document-Based NOSQL Systems and MongoDB, NOSQL Key-Value Stores, Column-Based or Wide Column NOSQL Systems, NOSQL Graph Databases.</p> <p>Textbook 1: Chapter 30: 30.1- 30.7; Chapter 24: 24.1 - 24.6</p> | 8 |
| Pedagogy | Case Studies, Practical Based learning | |
| | <p>Pedagogical Initiatives (Not limited to):</p> <ul style="list-style-type: none"> • 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 | |

| Sl. No. | Open ended Programs | COs |
|---------|--|-----|
| 1 | <p>Create a table called Employee that contain attributes EMPNO, ENAME, JOB, MGR, SALARY, ADDRESS & execute the following.</p> <ol style="list-style-type: none"> 1. Add a column commission with domain to the Employee table. 2. Insert any five records into the table. 3. Update the column details of job 4. Rename the column of Employee table using alter command. 5. Delete the employee whose Empno is 105. 6. Add primary key constraint and not null constraint to the employee table. | CO3 |
| 2 | <p>Consider the schema Employee (E_id, E_name, Age, Salary)</p> <ol style="list-style-type: none"> 1. Create Employee table containing all Records E_id, E_name, Age, Salary. 2. Count number of employee names from employeetable 3. Find the Maximum age from employee table. 4. Find the Minimum age from employeetable. 5. Find salaries of employee in Ascending Order. 6. Find grouped salaries of employees. | CO3 |
| 3 | <p>Consider the following schema for a Library Database:</p> <p>BOOK(Book_id, Title, Publisher_Name, Pub_Year)</p> <p>BOOK_AUTHORS(Book_id, Author_Name)</p> <p>PUBLISHER(Name, Address, Phone)</p> <p>BOOK_COPIES(Book_id, Programme_id, No-of_Copies)</p> <p>BOOK_LENDING(Book_id, Programme_id, Card_No, Date_Out, Due_Date)</p> <p>LIBRARY_PROGRAMME(Programme_id, Programme_Name, Address)</p> <p>Design SQL queries to</p> <ol style="list-style-type: none"> 1. Retrieve details of all books in the library – id, title, name of publisher, authors, number of copies in each Programme, etc. 2. Get the particulars of borrowers who have borrowed more than 3 books, but from Jan 2017 to Jun 2017. 3. Delete a book in BOOK table. Update the contents of other tables to reflect this data manipulation operation. 4. Partition the BOOK table based on year of publication. Demonstrate its working with a simple | CO3 |

| | | |
|---|---|-----|
| | <p>query.</p> <p>5. Create a view of all books and its number of copies that are currently available in the library.</p> | |
| 4 | <p>Design the core concepts on table like nested and correlated nesting queries and also EXISTS and NOT EXISTS keywords.</p> <p>Consider the schema for Company Database:</p> <p>EMPLOYEE (SSN, Name, Address, Sex, Salary, SuperSSN, DNo)</p> <p>DEPARTMENT (DNo, DName, MgrSSN, MgrStartDate)</p> <p>DLOCATION(DNo,DLoc)</p> <p>PROJECT (PNo, PName, PLocation, DNo)</p> <p>WORKS_ON (SSN, PNo, Hours)</p> <p>Develop SQL queries to</p> <ol style="list-style-type: none"> 1. Make a list of all project numbers for projects that involve an employee whose last name is 'Scott', either as a worker or as a manager of the department that controls the project. 2. Show the resulting salaries if every employee working on the 'IoT' project is given a 10 percent raise. 3. Find the sum of the salaries of all employees of the 'Accounts' department, as well as the maximum salary, the minimum salary, and the average salary in this department 4. Retrieve the name of each employee who works on all the projects controlled by department number 5 (use NOT EXISTS operator). 5. For each department that has more than five employees, retrieve the department number and the number of its employees who are making more than Rs.6,00,000. | CO5 |
| 5 | <p>Develop SQL Triggers for insert, delete, and update operations in a database table</p> <p>Create a row level trigger for the customers table that would fire for INSERT or UPDATE or DELETE operations performed on the CUSTOMERS table. This trigger will display the salary difference between the old & new Salary. CUSTOMERS (ID, NAME, AGE, ADDRESS, SALARY)</p> | CO5 |
| 6 | <p>Develop NO SQL for Database and CRUD operations on database table.</p> <p>Install an Open-Source NoSQL Data base MongoDB & perform basic CRUD (Create, Read, Update & Delete) operations. Execute MongoDB basic Queries using CRUD operations.</p> | CO5 |
| 7 | <p>Develop NoSQL database tools Create Document, column and graph-based data.</p> | CO5 |
| 8 | <p>Create View and index for database tables with a large number of records.</p> | CO5 |
| 9 | <p>Design an ER-diagram for the following scenario, Convert the same into a relational model, normalize Relations into a suitable Normal form and then solve the following queries.</p> <p>A country can have many Tourist places. Each Tourist place is identified by using tourist_place_id,</p> | CO5 |

| | | |
|----|---|-----|
| | <p>having a name, belongs to a state, Number of kilometres away from the capital city of that state, history. There are many Tourists visits tourist places every year. Each tourist is identified uniquely by using Tourist_id, having a Name, age, Country and multiple emailids. A tourist visits many Tourist places, it is also required to record the visted_date in the database. A tourist can visit a Tourist place many times at different dates. A Tourist place can be visited by many tourists either in the same date or at different dates. Queries:</p> <ol style="list-style-type: none"> 1. List the state name which is having maximum number of tourist places. 2. List details of Tourist place where maximum number of tourists visited. 3. List the details of tourists visited all tourist places of the state "KARNATAKA". 4. Display the details of the tourists visited at least one tourist place of the state, but visited all states tourist places. 5. Display the details of the tourist place visited by the tourists of all country. | |
| 10 | <p>Consider the following schema:</p> <p>SUPPLIERS (Sid: integer, sname: string, address: string)</p> <p>PARTS (PID: integer, pname: string,color: string)</p> <p>CATALOG (Sid: integer, PID: integer, cost: real)</p> <p>Design a database to satisfy the above requirements and answer the following queries:</p> <ol style="list-style-type: none"> a. Find the names of parts for which there is some supplier. b. Find the names of suppliers who supply every part. c. Find the id's of suppliers who supply only red parts. | CO5 |

Text Books

| Sl. No. | Title of the Book/Name of the author/Name of the publisher/Edition and Year |
|---------|--|
| 1 | Fundamentals of Database Systems, Ramez Elmasri and Shamkant B. Navathe, Pearson ,7th Edition, 2017. |
| 2 | Database management systems, Ramakrishnan, and Gehrke, Tata McGraw Hill,3rd Edition, 2014. |

Reference Books

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|---|--|
| 1 | Data base System Concepts, Silberschatz, Korth and Sudharshan, Tata McGraw Hill, 6th Edition, 2011. |
| 2 | An Introduction to Database Systems, C.J. Date, A. Kannan, S. Swaminathan, Pearson education, 8th Edition, 2009. |

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

| CO | Course Outcomes | RBT Level | RBT Level Indicator |
|-----|--|-----------|---------------------|
| CO1 | Understand and explore the needs and concepts of relational, NoSQL database and Database Security. | U | L1, L2 |
| CO2 | Apply various concepts of databases to obtain relational model and solve SQL queries. | A | L3 |
| CO3 | Design ER diagram & Schema and Analyse normal forms for given application. | An | L4 |
| CO4 | Discover the concepts of transactions, concurrency control along with NOSQL databases. | C | L5 |
| CO5 | Develop database applications for the given mini-world problem using relational and NoSQL database. | C | L6 |

Mapping of Course Outcomes to Program Outcomes:

| CO/PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|
| CO1 | | | | | | | | | | | | | | | |
| CO2 | 3 | 3 | | | | | | | | | | | | | |
| CO3 | | 3 | 3 | 2 | | | | | | | | | | | |
| CO4 | | 3 | 3 | | | | | | | | | | | | |
| CO5 | | | 3 | | 3 | | | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |

Weblinks and Video Lectures (e-Resources)

| | |
|---|--|
| 1 | https://www.coursera.org/courses?query=database%20management |
| | https://onlinecourses.swayam2.ac.in/cec19_cs05/preview |
| 3 | https://nptel.ac.in/courses/106105175 |
| 4 | http://www.w3schools.com/sql/ |
| 5 | http://m5zn.com/newuploads/2015/04/27/pdf/ |
| 6 | https://erdplus.com/ |
| 7 | https://www.geeksforgeeks.org/dbms/ |
| 8 | https://zodml.org/sites/default/files/%20An Introduction to Relational Database %20Theory 0.pdf |
| 9 | https://www.youtube.com/watch?v=4YiIEjKNPrQ |

| | |
|----|---|
| 10 | https://www.youtube.com/watch?v=EGEwkad_IIA |
| 11 | https://www.youtube.com/watch?v=t5hsV9IC1rU |
| 12 | https://www.youtube.com/watch?v=4YiEjkNPrQ |
| 13 | https://www.youtube.com/watch?v=9TwMRs3qTcU |
| 14 | https://www.youtube.com/watch?v=3EJlovevfcA |

CIE- Continuous Internal Evaluation (50 Marks)

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

CIE Course Assessment Plan

| CO's | Marks Distribution | | | | | | Total Marks | Weightage |
|--------------|--------------------|----------|-----------------|-----------------|----------|----------|-------------|-------------|
| | Test-1 | | | Test-2 | | | | |
| | Module-1 | Module-2 | Module 2 to 2.5 | Module-2.5 to 3 | Module-4 | Module-5 | | |
| CO1 | 5 | 5 | - | 3 | - | 2 | 15 | 15% |
| CO2 | 5 | 5 | 5 | 10 | 10 | 10 | 45 | 45% |
| CO3 | 2 | 3 | 2 | 3 | 5 | 5 | 20 | 20% |
| CO4 | - | 5 | 3 | 2 | 5 | 5 | 20 | 20% |
| CO5 | - | - | - | - | - | - | - | - |
| Total | | | | | | | 100% | 100% |

SEE- Semester End Examination (50 Marks)

| Bloom's Category | SEE Marks (90% Theory+10% Practical Questions) |
|------------------|---|
| Remember | 10% |
| Understand | 10% |
| Apply | 40% |
| Analyse | 10% |
| Evaluate | 20% |
| Create | 10% |

SEE Course Plan

| CO's | Marks Distribution | | | | | | Total Marks | Weightage |
|--------------|--------------------|-----------|-----------------|-----------------|-----------|-----------|-------------|------------|
| | Module-1 | Module-2 | Module 2 to 2.5 | Module-2.5 to 3 | Module-4 | Module-5 | | |
| CO1 | 5 | 2 | - | - | 5 | 5 | 10 | 10% |
| CO2 | 5 | 5 | 5 | 10 | 10 | 5 | 40 | 40% |
| CO3 | - | 5 | 3 | - | 5 | - | 10 | 10% |
| CO4 | - | 4 | 6 | 5 | 5 | - | 20 | 20% |
| CO5 | 2 | - | 2 | 2 | 2 | 2 | 10 | 10% |
| Total | 12 | 16 | 16 | 17 | 27 | 12 | 100 | 10% |

COs Mapped to POs and PSOs:

| CO | PO | PSO |
|-----|--------------------------------------|------------|
| CO1 | - | - |
| CO2 | PO1, PO2 | - |
| CO3 | PO2, PO3, PO4 | - |
| CO4 | PO2, PO3 | - |
| CO5 | PO3, PO5, PO8, PO9, PO10, PO11, PO12 | PSO1, PSO2 |

**PROJECT BASED
LEARNING (PBL)**

PBL- Project Based Learning

| | |
|---------------------------------|-----------------------------|
| Teaching Hours/Week (L: T:P: S) | 0:0:2:2 |
| Total Hours of Pedagogy | 25 hours – Theory + Project |
| Credits: | 02 |
| Modules | 5 |
| CIE Marks | 50 |
| SEE Marks | 50 |
| Total Marks | 100 |
| Exam Hours | 3 |
| Examination nature (SEE) | Project Evaluation |

| | CIE | | SEE | |
|----------------|----------------------------------|-----------------|---|------------------|
| | Project Weekly Assessment | | | |
| Project | Project Understanding | 05 Marks | Write up | 10 Marks |
| | Technical Competence | 10 Marks | Presentation & Demonstration | 50 Marks |
| | Innovation | 10 Marks | Project report | 25 Marks |
| | Problem Solving | 15 Marks | Viva-Voce | 15 Marks |
| | Project Demonstration | 10 Marks | Total | 100 Marks |
| | Total | 50 Marks | 100 Marks Reduced to 50 Marks | |

1. Introduction

Project Based Learning is a model for classroom activity that shifts away from the classroom practices of short, isolated, teacher-centered lessons and instead emphasizes learning activities that are long-term, interdisciplinary, and student-centered.

A systematic teaching method that engages students in learning essential knowledge and life-enhancing skills through an extended, student-influenced inquiry process structured around complex, authentic questions and carefully designed products and tasks.

Project learning, also known as project-based learning, is a dynamic approach to teaching, in which students explore real-world problems and challenges, simultaneously developing cross-curriculum skills while working in small collaborative groups.

2. Characteristics of Project-Based Learning:

- Students making decisions within a framework
- A problem or challenge to be solved;
- Students designing the process for reaching a solution
- Students gathering and managing information
- Continuous Evaluation
 - Students regularly reflecting on the process
- A final product to be evaluated for quality
- An atmosphere that tolerates error and change

3. Purpose

- Introducing project-based learning on the curriculum.
- To help students to gain in-depth knowledge of the subject via project.
- During this process, students will be able to learn and understand the various stages of project development.

4. Objectives

- Introducing mini project based on the curriculum.
- Develop in depth knowledge of the topic and technology.
- Use critical thinking skills and make real world connections
- Demonstrate and understand through products.
- Industry and concept-oriented learning.

5. Why Incorporate PBL?

- Promotes collaboration and interaction
- Learners communicate meaningfully and for authentic purposes
- Allows students with a variety of learning styles to demonstrate their acquired knowledge
- Students learn language, content, and skills simultaneously
- Increases learner autonomy
- Provides opportunities for students to pursue their own interests and questions and make decisions about how they will find answers and solve problems.
- Improves education for all students Facilitates student integration of the content of different subjects
- Teaches children to use their own minds well and applies what they learn in school to life-long endeavors.
- Helps students to become technologically literate
- Establishes connections to life outside the classroom, addressing real-world concerns, and developing real-world skills
- Skills learned through PBL are those desired by today's employers.

6. Benefits of PBL

- Offers multiple ways for students to participate and to demonstrate their knowledge.
- Accommodates different kinds of intelligences.
- Shifts students away from doing only what they typically do in a classroom Environment.
- Encourages the mastery of technological tools, thus preparing them for the workforce.
- Serves as a medium for students who don't usually participate.
- Prompts students to collaborate while at the same time support self-directed learning.
- Offers a learning experience that draws on the thinking and shared efforts of several individuals.
- Helps students develop a variety of social skills relating to group work and negotiation.
- Promotes the internalization of concepts, values, and modes of thought, especially those related to cooperation and conflict resolution.

- Establishes a supportive and non-competitive climate for students.
- Provides a means for transferring the responsibility for learning from teachers to students.
- Calls upon students to explain or defend their position to others in their project groups, so that learning is more apt to be personalized and valued.

7. Process

- Project batches will be formed after the commencement of 3rd semester.
- The Students Batch Comprising of 4 members in a batch should be formed by the Project Based Learning co-ordinator.
- Each Semester consists of 16 Weeks of Project based Learning.
- The Level of the Projects to be identified.

Level 1- 2nd Year – 3rd Semester & 4th Semester

Level 2- 3rd year – 5th Semester & 6th Semester

Level 3 – Final Year Project

- The Faculty handling the respective Theory Subject will be the PBL Coordinator and all the three Batches to be handled by the PBL Coordinator with additional faculty.
- The List of Project Batches to be identified by the faculty assigned in consultation with HOD.
- The batch can select any topic from the list circulated by the PBL Coordinator
- The details of students Interaction with the guide shall be maintained by the guide in the prescribed format.
- The Students Project should be continuously evaluated and PBL Coordinator should submit weekly report to the HOD.
- The Rubrics for the PBL should be followed.
- The Students batches shall give the presentation on understanding of the topic and plan for implementation.
- The Evaluation of the Projects is done in Two Phases

7.1 Two phases for Assessment

Phase 1:

1. Phase 1 is for 4 weeks

2. During this phase, the students shall discuss about the Objectives, Literature Survey and plan for project execution.

Phase 2:

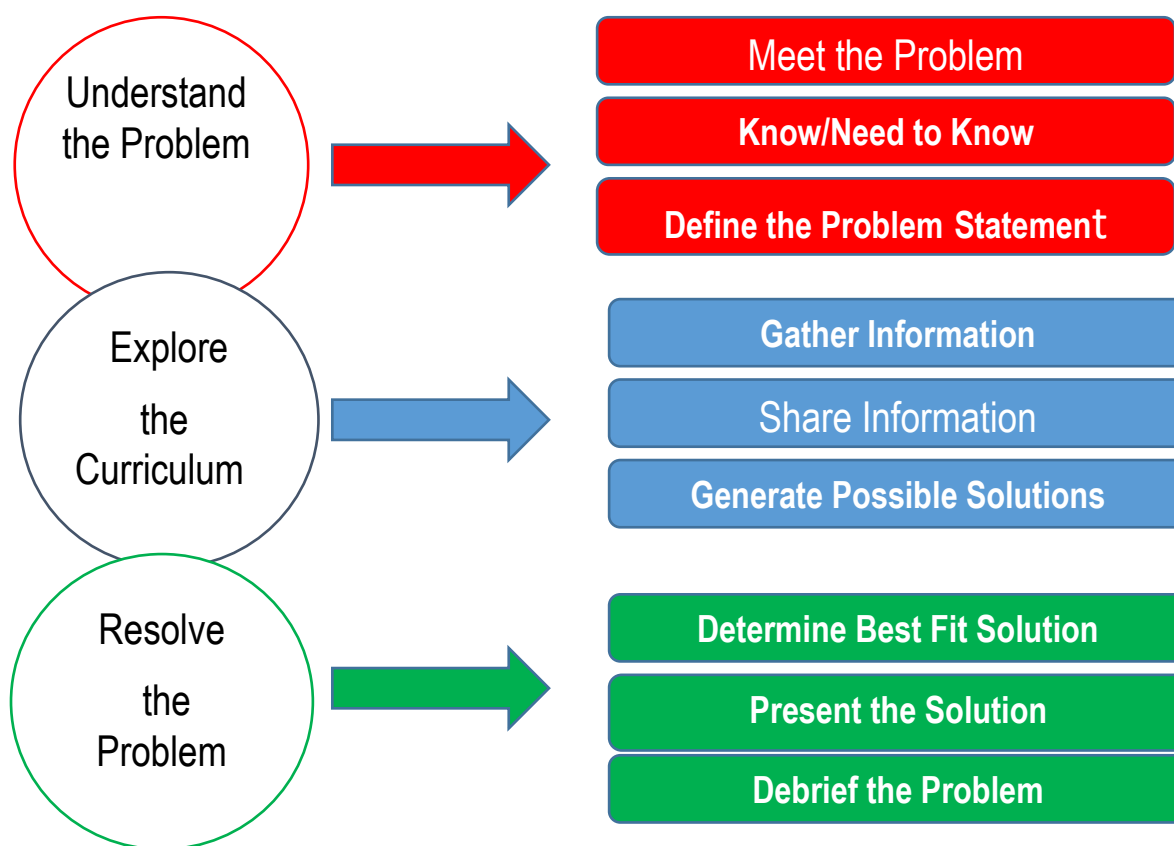
1. Phase 2 is for 11 Weeks

2. During this phase, the students shall carry out the project under regular supervision of the guide/subject expert, Implementation and give final presentation/demonstration with project documents.

The marks distribution for PBL Work:

1. Phase 1 – 25 Marks
2. Phase 2 – 25 Marks

8. PBL Teaching and Learning Template



9. Practice

- Every week 3 hour is exclusively dedicated to Project Based Learning.
- Assess their progress until they resolve the problem and summarise their learning.

- Provide opportunities for in-depth investigations of worthy topics.
- Allow learners to become more autonomous as they construct personally meaningful artefacts that are representations of their learning.
- Motivate students by engaging them in their own learning. PBL affords students opportunities for development.
- Building communication, technical and management skills.

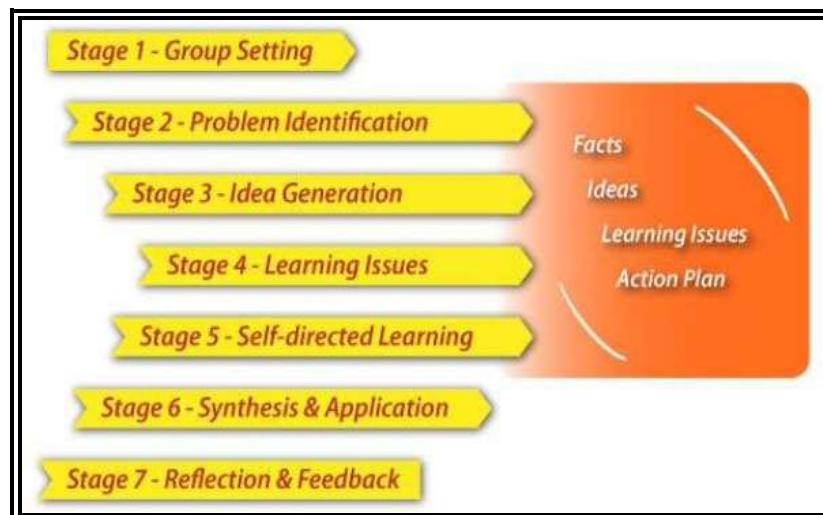
10. Obstacles/Gaps

- Lack of student interest
- Lack of assessment
- Lack of Basic knowledge
- Lack of consistence attendance and monitoring.
- Lack of abundant time allotment and time management

11. How to Overcome?

- Periodic process – stage wise assessment has to be done.
- Basic Knowledge- A complete guidelines and videos will be provided by the faculty who is handling the respective subject and allotted guide.
- Regular evaluation and periodic monitoring is done by 2 stages.
- For Successful execution and demonstration of end-to-end system, exclusive 3hr/week project time is allotted.

12. Block diagram of PBL



13. Impact Analysis

- It encourages students to draw on their own creativity on problem solving and they learn the bridge gap between theory and practice.
- Final products resulting from project-based learning can be shared with the department at large, thus fostering ownership and technically strong with the subject scenario.

14. PBL – Guidelines

The guidelines are for successful completion of the project and to facilitate effective and uniform conduction of projects by the students. It is expected that these guidelines will help in overall improvement in the quality of the project.

14.1 Main phases of the project

| Sl.No | Topics | Duration |
|----------------|--|-----------------|
| Phase-1 | | |
| 1. | Understanding of the project and preparing a project | 3 Weeks |
| 2. | Literature review | 1 Week |
| 3. | Planning | 1 Week |
| Phase-2 | | |
| 4. | Analysis and Design | 3 Weeks |
| 5. | Implementation | 6 Weeks |
| 6. | Testing | 1 Week |
| 7. | Writing the project report | 1 Week |
| Total | | 16 Weeks |

14.2 Final Presentation Structure

1. Title of the project & Batch Information
2. Agenda / Topics
3. Problem Statement / Project Definition
4. Background / Literature Review
5. Methodology
6. Analysis and Design
7. Implementation
8. Testing

9. Conclusion and Scope for Future Works

14.3 Project Based Learning Report Structure

1. Cover Page
2. Certificate
3. Declaration
4. Acknowledgement
5. Table of Contents
6. List of Tables
7. List of Figures
8. Introduction
9. Background / Literature Review
10. Methodology / Solution
11. Analysis and Design
12. Implementation
13. Results
14. Conclusion and Future Works
15. Bibliography / References
16. Appendices

15. Guidelines to prepare the Project report

- Project reports should be typed neatly only on one side of the paper with 1.5 or double line spacing on a A4 size bond paper (210 x 297 mm).
- The margins should be: Left – 1.25", Right – 1", Top and Bottom – 0.75".
- The total number of reports to be prepared are
 - One copy to the department.
 - One copy to the concerned guide
 - One copy to the candidate.
- Before taking the final printout, the approval of the concerned guide is mandatory and suggested corrections, if any, must be incorporated in the Final Report.

- For making copies dry tone Xerox is suggested.
- An abstract (synopsis) not exceeding 100 words, indicating salient features of the work.

16. Outcome of the project

- Students will gain the knowledge and understand
- To think creatively, work collaboratively.
- Solve complex problems using digital technology.
- Students learn and desire to engage continuous gain about knowledge such as design, analysis, development, implementation and testing.
- Strong written communication skills and the ability to write technical documents that include specification, design, and implementation of a mini project.

Project - Based Learning Rubric

| Score Levels | Content | Conventions | Organization | Presentation |
|--------------|--|--|--|--|
| 5 | <ul style="list-style-type: none"> ▪ Is well thought out and supports the solution to the challenge or question ▪ Reflects application of critical thinking ▪ Has clear goal that is related to the topic ▪ Is pulled from a variety of sources ▪ Is accurate | <ul style="list-style-type: none"> ▪ No spelling, grammatical, or punctuation errors ▪ High-level use of vocabulary and word choice | <ul style="list-style-type: none"> ▪ Information is clearly focused in an organized and thoughtful manner. ▪ Information is constructed in a logical pattern to support the solution. | <ul style="list-style-type: none"> ▪ Multimedia is used to clarify and illustrate the main points. ▪ Format enhances the content. ▪ Presentation captures audience attention. ▪ Presentation is organized and well laid out. |
| 4 | <ul style="list-style-type: none"> ▪ Is well thought out and supports the solution ▪ Has application of critical thinking that is apparent ▪ Has clear goal that is related to the topic ▪ Is pulled from several sources ▪ Is accurate | <ul style="list-style-type: none"> ▪ Few (1 to 3) spelling, grammatical, or punctuation errors ▪ Good use of vocabulary and word choice | <ul style="list-style-type: none"> ▪ Information supports the solution to the challenge or question. | <ul style="list-style-type: none"> ▪ Multimedia is used to illustrate the main points. ▪ Format is appropriate for the content. ▪ Presentation captures audience attention. ▪ Presentation is well organized. |
| 3 | <ul style="list-style-type: none"> ▪ Supports the solution ▪ Has application of critical thinking that is apparent ▪ Has no clear goal ▪ Is pulled from a limited number of sources | <ul style="list-style-type: none"> ▪ Minimal (3 to 5) spelling, grammatical, or punctuation errors ▪ Low-level use of vocabulary and word choice | <ul style="list-style-type: none"> ▪ Project has a focus but might stray from it at times. ▪ Information appears to have a pattern, but the pattern is not consistently carried out in the project | <ul style="list-style-type: none"> ▪ Multimedia loosely illustrates the main points. ▪ Format does not suit the content. ▪ Presentation does not capture audience attention. ▪ Presentation is loosely |

| | | | | |
|---|--|---|--|--|
| 2 | <ul style="list-style-type: none">▪ Provides inconsistent information for solution▪ Has no apparent application of critical thinking▪ Has no clear goal▪ Is pulled from few sources▪ Has significant factual errors, misconceptions, or misinterpretations | <ul style="list-style-type: none">▪ More than 5 spelling, grammatical, or punctuation errors▪ Poor use of vocabulary and word choice | <ul style="list-style-type: none">▪ Content is unfocused and haphazard.▪ Information does not support the solution to the challenge or question.▪ Information has no apparent pattern. | <ul style="list-style-type: none">▪ Presentation appears sloppy and/or unfinished.▪ Multimedia is overused or underused.▪ Format does not enhance content.▪ Presentation has no clear organization. |
|---|--|---|--|--|

Subject Identified for Project Based Learning

| | |
|---|---|
| Semester | IV |
| Subject Identified for PBL | Full Stack Development |
| Prerequisite | HTML, CSS, Database Management System and Python Programming |
| Justification for the selected subject | <ol style="list-style-type: none">1. Develop comprehensive skillset by learning frontend and backend development.2. Prepare students for roles as fullstack developer, backend specialist or Django expert.3. Provides a strong foundation for more advanced topics such as cloud computing, DevOps, and machine learning. |
| List of possible projects | <ol style="list-style-type: none">1. Weather Dashboard2. IoT Device Management Dashboard3. Augmented Reality (AR) Web Application4. E-learning System with Adaptive Learning features5. Cryptocurrency Exchange Platform6. Realtime Collaboration Tools like To-Do list7. Fitness Tracker with Activity Analysis8. Event Calendar9. Social Media Analytics Tool10. Voice Controlled Web Application11. Cyber security Threat Detection Response System12. Predictive Maintenance Platform for Industrial IoT NOT LIMITED TO |

Signature of the Guide

Signature of HOD



Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

| | | | | | | |
|--|---|------------------------|--|----------|---|---------|
| Semester | : | IV | | | | |
| Course Title | : | Full Stack Development | | | | |
| Course Code | : | BIS406 | | | | |
| Course Type (Theory/ Practical/ Integrated) | : | Practical | | | | |
| Category | : | PBL | | | | |
| Stream | : | ISE | | CIE | : | 50 |
| Teaching hours/ week (L:T:P:S) | : | 0:0:0:2 | | SEE | : | 50 |
| Total Hours | : | 30 Hours | | SEE | : | 2 Hours |
| Credits | : | 02 | | Duration | | |

Course Learning Objectives: Students will be able to:

| Sl. No | Course Objectives |
|--------|---|
| 1 | Understand Full Stack Web development concepts. |
| 2 | Apply the Django framework concepts to design the responsive web pages. |
| 3 | Demonstrate the use of state management and admin interfaces automation in Django. |
| 4 | Design and implement Django applications containing dynamic pages with SQL databases. |

Teaching-Learning Process

Pedagogical Initiatives:

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

- Adopt different teaching methods to attain the course outcomes.
- Include videos to demonstrate various concepts in C.
- Encourage collaborative (Group) Learning to encourage team building.
- Ask at least three **HOTS (Higher-order Thinking Skills)** module-wise questions to promote critical thinking.
- 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.
- Show different ways to solve a problem and encourage the students to come up with creative and optimal solutions.
- Discuss various case studies to map with real-world scenarios and improve the understanding.
- Devise innovative pedagogy to improve **Teaching-Learning Process (TLP)**.



DSATM

Scheme of Teaching and Examinations for BE Programme -2024-25
Outcome Based Education and Choice Based Credit System (CBCS)
(Effective from the Academic Year 2024-25)

COURSE CURRICULUM

| Module No. | Topics | Hours |
|------------|---|-------|
| 1 | Django Basics and MVC Pattern Understanding web frameworks: Overview of Django evolution and MVC pattern Views in Django, Function-based views and class-based views, Mapping URLs to views, URLConfs in Django, Error handling and wildcard patterns in URLs. | 5 |
| Pedagogy | Quiz | |
| 2 | Django Templates, Models and Admin Interfaces: Django Templates, Template system basics, Using Django template system effectively, Template tags, filters and template inheritance Configuring databases in Django, defining models, basic data access (CRUD operations), Schema evolution and migrations Activating and using Django admin interfaces, Customizing admin interfaces, Form processing and model forms. | 5 |
| Pedagogy | Quiz, Model Design | |
| 3 | Advanced Django Concepts and Integration: Generic Views and State Persistence, Using generic views for CRUD operations, MIME types and generating non-HTML content, Syndication feed framework and sitemap framework, Introduction to AJAX in Django, Using jQuery for AJAX requests, Practical integration examples like autocomplete. | 5 |
| Pedagogy | Demonstration | |
| | Pedagogical Initiatives (Not limited to): <ul style="list-style-type: none">• 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 | |

| Text Books | |
|-----------------|---|
| Sl. No. | Title of the Book/Name of the author/Name of the publisher/Edition and Year |
| 1 | The Definitive Guide to Django: Web Development Done Right, Adrian Holovaty, Jacob Kaplan Moss, Springer-Verlag Berlin and Heidelberg GmbH & Co. KG Publishers, Second Edition, 2009. |
| 2 | Django Java Script Integration: AJAX and jQuery, Jonathan Hayward , Pack Publishing, First Edition, 2011 |
| Reference Books | |
| 1 | Aidas Bendroraitis, Jake Kronika, Django 3 Web Development Cookbook, Packt Publishing, Fourth Edition, 2020 |
| 2 | Antonio Mele, Django3 by Example, Pack Publishers, 3rd Edition, 2020 |

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

| CO | Course Outcomes | RBT Level | RBT Level Indicator |
|-----|--|-----------|---------------------|
| CO1 | Understand the operation of full-stack web development using the Model-View-Template (MVT) architecture with Django. | U | L2 |
| CO2 | Apply Django framework libraries to design and build models, forms and webpages and render non-HTML contents such as CSV and PDF files. | A | L3 |
| CO3 | Analyze the significance of Template Inheritance and Generic Views in crafting full-stack web applications. | An | L4 |
| CO4 | Implement jQuery-based AJAX integration into Django applications to construct responsive full-stack web applications. | C | L6 |

Mapping of Course Outcomes to Program Outcomes:

| CO/PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|
| CO1 | | | | | | | | | | | | | | | |
| CO2 | 3 | | | | | | | | | | | | 3 | | |
| CO3 | | 3 | | | | | | | | | | | | | |
| CO4 | | | | | 3 | | | 3 | 3 | 3 | 3 | 3 | | 3 | |

COs Mapped to POs and PSOs:

| CO | PO | PSO |
|------------|-----------------------------|------------|
| CO1 | - | - |
| CO2 | PO1 | PSO1 |
| CO3 | PO2 | - |
| CO4 | PO5, PO8,PO9,PO10,PO11,PO12 | PSO2 |

Weblinks and Video Lectures (e-Resources)

| | |
|----------|---|
| 1 | https://freevideolectures.com/course/3700/django-tutorials |
| 2 | https://www.youtube.com/watch?v=2BqoLiMT3Ao |
| 3 | https://freevideolectures.com/course/3700/django-tutorials |
| 4 | https://freevideolectures.com/course/3700/django-tutorials |
| 5 | https://freevideolectures.com/course/3700/django-tutorials |



Dayananda Sagar Academy of Technology & Management
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Affiliated to VTU
Approved by AICTE
Accredited by NAAC with A+ Grade
6 Programs Accredited by NBA
(CSE, ISE, ECE, EEE, MECH, CV)

Project Based Learning - Batch

From,

Date:

Name: & USN:

Name: & USN:

Name: & USN:

Name: & USN:

Semester:

Respected Sir/Madam,

Sub: Regarding PBL Batch

With respect to the above subject, we are the students mentioned above would like to form the batch for carrying out the mini project on.....

Thanking you,

Yours faithfully

| Sl. No. | Name of the student | Signature |
|---------|---------------------|-----------|
| 1. | | |
| 2. | | |
| 3. | | |
| 4. | | |

Signature of the Guide

Name of the Guide & Designation

Department of Information Science and Engineering



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(CSE, ISE, ECE, EEE, MECH, CV)

Project Based Learning – Student(s) – Guide – Interaction

| | | |
|--------------------------------------|--|--|
| Date | | |
| PBL Batch No. | | |
| Title of the project | | |
| Week No. | | |
| Content of the Discussion | | |
| Suggestion by the guide | | |
| Name of Signature of students | | |
| | | |
| | | |
| | | |

Signature of the Guide

Signature of PBL Coordinator

Signature of HOD



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Project Based Learning – Continuous Evaluation

| Batch No. | Name | USN | Marks assigned | Remarks by the guide on the progress of the project |
|------------------|-------------|------------|-----------------------|--|
| | | | | |
| | | | | |
| | | | | |
| | | | | |

Signature of the Guide

Signature of PBL Coordinator

Signature of HOD



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Project Based Learning – Review

CONTINUOUS INTERNAL ASSESSMENT

| Batch No. | Name of the Student | USN | Phase I (25 Marks) | | Phase II (25 Marks) | | Final CIE Marks (Phase I & Phase II) (50 Marks) |
|-----------|---------------------|-----|---|------------------------------|---------------------------|-------------------------|---|
| | | | Abstract / Understanding of the Project (5 Marks) | Analysis & Design (20 Marks) | Implementation (20 Marks) | Demonstration (5 Marks) | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

Signature of the Guide

Signature of PBL Coordinator

Signature of HOD

**ABILITY ENHANCEMENT
COURSE (AEC)**

AEC Course – Ability Enhancement Course

| | |
|---------------------------------|-------------------------------------|
| Teaching Hours/Week (L: T:P: S) | 0:0:2:0 |
| Total Hours of Pedagogy | 24 hours Practical |
| Credits: | 01 |
| Programs / Experiments | 12 |
| CIE Marks | 50 |
| SEE Marks | 50 |
| Total Marks | 100 |
| Exam Hours | 3 |
| Examination nature (SEE) | Practical (Internal Examiners only) |



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

ABILITY ENHANCEMENT COURSE

EXPERIENTIAL LEARNING

1. (a) Define Objectives

| | |
|--|--|
| Identify Goals: Determine what skills and knowledge you want students to acquire through Experiential Learning. | |
| Learning Goal (LG)-1 | Understand advanced data structures and algorithms needed for competitive programming. |
| Learning Goal (LG) -2 | Apply advanced data structures and dynamic programming techniques to design efficient algorithms to solve complex problems. |
| Learning Goal (LG) -3 | Analyze different algorithms to efficiently determine the most appropriate for solving a given problem. |
| Learning Goal (LG)-4 | Evaluate the performance of the designed solution and optimize the code for better performance and lower complexity. |
| Learning Goal (LG)-5 | Design compact and efficient solutions to problems in a time-efficient manner. |

(b) Course Outcomes

| | |
|--|--|
| Identify Goals: Determine what skills and knowledge you want students to acquire through Experiential Learning. | |
| Course Outcomes (CO)-1 | Understand and explain advanced programming concepts and algorithms necessary for competitive programming. |
| Course Outcomes (CO)-2 | Apply a variety of algorithms including sorting, searching, dynamic programming, greedy algorithms, and divide-and-conquer strategies to solve specific problems. |
| Course Outcomes (CO)-3 | Analyze complex problems, break them into manageable components, and devise effective solutions. |
| Course Outcomes (CO)-4 | Evaluate the performance of the solution and make necessary optimizations to improve efficiency. |
| Course Outcomes (CO)-5 | Develop efficient solutions to given problems using different approaches and achieving desirable results. |

(c) Alignment

Align with Curriculum: Ensure these goals align with the overall educational objectives of the engineering program.

| Sl.No | Learning Goals | Course Outcomes | Assessment | In-Class Activity | Out-of-Class Activity | Weightage |
|-------|----------------|-----------------|-----------------|----------------------|-----------------------|-----------|
| 1. | LO-1 | CO1 | Exam(CIE, SEE) | Debugging Activity | MOOC Course | 10 |
| 2. | LO-2 | CO2 | Exam(CIE, SEE) | Think-Pair and Share | Coding Exercises | 20 |
| 3. | LO-3 | CO3 | Exam(CIE, SEE) | Problem-Solving | Coding Exercises | 25 |
| 4. | LO-4 | CO4 | Exam(CIE, SEE) | Problem-Solving | Online Competitions | 20 |
| 5. | LO-5 | CO5 | Project Reviews | Problem-Solving | Projects | 25 |

2. Curriculum Design

(a) Course integration

Course Integration: Identify which courses can incorporate experiential learning activities. This can include project-based courses, labs, internships, and workshops.

| Sl. No. | Course Name | Course Code | Justification for selecting the Course for Experiential Learning |
|---------|-------------------------|-------------|---|
| 1 | Competitive Programming | BIS407 | Competitive Programming helps students achieve proficiency in Programming Languages and gain In-Depth Understanding of Data Structures and algorithms. Students can quickly identify and apply suitable algorithms and data structures for different types of problems, and optimize code for both time and space complexity to meet competitive programming constraints. Students will be well-prepared to participate in competitive programming contests and tackle various algorithmic challenges |

| | | | |
|--|--|--|--|
| | | | effectively. It improves mathematical, and analytical skills, error debugging and Soft Skills. |
|--|--|--|--|

(b) Develop Modules

Develop Modules: Create specific modules within these courses that focus on hands-on experiences.

| Module No | Lecture No. | Session Topics | RBT Levels | Activities Planned | Course Outcome Mapping | Mode of Delivery | Planned Date | Actual Date |
|-----------|-------------|--|------------|---|------------------------|---|--------------|-------------|
| 1 | | <p>Searching and Sorting: Counting Sort, Radix Sort, Shell Sort, Bucket sort</p> <p>Advanced Data Structures: Single and double ended Priority Queues, Leftist Trees, Optimal Binary Search Trees, B-Trees, B + trees, n-ary trees, Segment Trees, Fenwick Trees (Binary Indexed Trees), Tries, Disjoint Set Union (Union-Find), Sparse Tables</p> <p>Graph Algorithms: Strongly Connected Components</p> | L2, L3, L5 | <p>Coding activity using appropriate techniques and algorithms to solve coding problems on geeksforgeeks and hackerrank platform</p> <p>https://www.geeksforgeeks.org/top-50-searching-coding-problems-for-interviews/?ref=ml_lbp</p> <p>https://www.geeksforgeeks.org/top-50-string-coding-problems-for-interviews/?ref=ml_lbp</p> <p>https://www.geeksforgeeks.org/top-50-graph-coding-problems-for-interviews/?ref=ml_lbp</p> | CO1, CO2, CO4 | Chalk and Talk, PPTs, Case-studies, Hands-on coding exercises | | |

| | | | | | | | |
|---|---|------------|---|---------------|---|--|--|
| 2 | <p>Dynamic Programming: Longest Common Subsequence (LCS), Longest Increasing Subsequence (LIS), Matrix Chain Multiplication, Coin Change Problem</p> <p>String Algorithms: String Matching (Knuth-Morris-Pratt (KMP), Rabin-Karp, Z Algorithm), Aho-Corasick Algorithm for Pattern Searching, Boyer-Moore</p> | L3, L4, L6 | <p>https://www.geeksforgeeks.org/top-50-dynamic-programming-coding-problems-for-interviews/</p> <p>https://www.geeksforgeeks.org/top-50-string-coding-problems-for-interviews/?ref=ml_lbp</p> | CO2, CO3, CO5 | Chalk and Talk, PPTs, Case-studies, Hands-on coding exercises | | |
|---|---|------------|---|---------------|---|--|--|

Reference Books/ Materials

1. Introduction to Algorithms, Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein (CLRS), MIT press, 2022.
2. Algorithms, Robert Sedgwick and Kevin Wayne, Addison-wesley professional, 2011.
3. Competitive Programming 3: The New Lower Bound of Programming Contests., Steven, Halim, and Halim Felix. (2013).
4. Guide to competitive programming, Laaksonen, Antti. Cham: Springer, 2020.

MOOC Courses

1. <https://www.coursera.org/learn/algorithms-greedy>
2. <https://www.coursera.org/specializations/algorithms>
3. <https://www.coursera.org/specializations/data-structures-algorithms>
4. <https://www.udemy.com/courses/search/?src=ukw&q=The+Bible+of+Competitive+Programming+%26+Coding+Interviews>
5. <https://www.udemy.com/course/the-bible-of-competititve-programming-part-2/?couponCode=IND21PM>
6. <https://online.codingblocks.com/courses/competitive-programming-course-online>
7. <https://www.geeksforgeeks.org/courses/competitive-programming-cp>

Top 15 websites for Coding Challenges and Competitions

1. GeeksForGeeks
2. The ACM-ICPC International Collegiate Programming Competitions
3. Google Kick Start
4. Google Code Jam

5. Google Hash Code
6. The ICFP Programming Competitions
7. Facebook Hacker Cup
8. Microsoft Imagine Cup
9. Codeforces Coding Competitions
10. Codechef Coding Competitions
11. Topcoder Coding Competitions
12. Atcoder Coding Competitions
13. HackerEarth
14. HackerRank
15. Leetcode

3. Mapping of Learning objectives with Learning Outcomes

| Course/Modules | Learning Objective | Learning Outcome | Assessment Method |
|----------------|--------------------|------------------|-------------------|
| Module 1: | LO-1, LO-2, LO-4 | CO-1, CO-2, CO-4 | Problem-solving |
| Module 2: | LO-2, LO-3, LO-5 | CO-2, CO-3, CO-5 | Problem-solving |

4. Partnerships and Resources

Industry Collaboration: Establish partnerships with local industries and organizations to provide real-world projects, internships, and site visits.

| Sl.No | Name of the Industry Collaboration | Projects undertaken / Industrial Visit | Domain | Project Outcomes |
|-------|------------------------------------|--|--------|------------------|
| | | | | |
| | | | | |
| | | | | |

Implement Experiential Activities

| PBL Component | Details |
|----------------------------|--|
| Project Title | Sorting visualizer, Graph traversal simulator, Web Development Projects, Graph-based projects, Dynamic Programming based projects |
| Real-World Problem | <p>The following projects can be considered as real-world problems. [Not Limited to]</p> <ul style="list-style-type: none"> Real-Time Contest Simulator with Automated Judging Algorithm Visualizer: Interactive Tool for Understanding Algorithmic Concepts Pathfinding Visualizer Route Optimization for Delivery Services Graph Database for Recommendations Game Level Generation Graph-based Search Engine Knapsack Problem Solver Matrix Chain Multiplication Optimizer Sequence Alignment Tool |
| Learning Objectives | <p>Subject Areas: Data Structures, Dynamic Programming, Graphs,</p> <p>Skills Developed: Programming languages like Java, C++, Python</p> |
| Timeline | <p>Start Date: First day of the semester</p> <p>Milestones/Checkpoints:</p> |

| | |
|-------------------------------|--|
| | <p>1. Understand the SDLC process of the project: 1-3weeks</p> <p>2. Design and Implement the project: 4-8 weeks</p> <p>3. Evaluate the working of the project: 9-10 weeks</p> <p>4. Demonstrate and report submission: 11-12 weeks</p> <p>End Date: Last day of the semester</p> |
| Resources Needed | <p>Materials: [List materials]</p> <p>Technology: [List technology]</p> <p>Guest Speakers/Experts: [List experts]</p> |
| Team Formation | <p>Group Size: 4members</p> <p>Team Roles: Analysis, Design, Develop and Test</p> |
| Background Information | Basic programming skills, basic Data Structures and algorithms, Strings |
| Research Methods | <p>Primary Sources: [List methods such as interviews, surveys]</p> <p>Secondary Sources: [List methods such as articles, books, videos]</p> |
| Team Meetings | <p>Frequency: Once in a Month</p> <p>Structure: Based on their SDLC stage the review for the progress and suggestions given</p> |
| Collaboration Tools | <p>Digital Platforms: Google, Competitive Platforms.</p> <p>Communication Methods: In-Person meetings, presentations, demonstrations.</p> |
| Project Deliverables | Reports, Presentations, Prototypes, Project |

| | |
|----------------------------|--|
| Presentation Format | Options: PowerPoint, Team Demonstration Audience: classmates Schedule: Presentation schedule: 11th week |
| Project Exhibition | Defining the Purpose and Theme Setting Goals Form an Organizing Committee: Invite Participants Choose a Venue Set a Budget for the exhibition Create a Timeline to host |

Experiential Learning - Batch

From,

Date:

Name: & USN:

Name: & USN:

Name: & USN:

Name: & USN:

Semester:

Respected Sir/Madam,

Sub: Regarding Experiential Learning Batch

With respect to the above subject, we are the students mentioned above would like to form the batch for carrying out the mini project on.....

Thanking you,

Yours faithfully

| Sl. No. | Name of the student | Signature |
|---------|---------------------|-----------|
| 1. | | |
| 2. | | |
| 3. | | |
| 4. | | |

Signature of the Guide

Name of the Guide & Designation

Department of Information Science and Engineering

Experiential Learning (EL) – Student(s) – Guide – Interaction

| | | |
|--------------------------------------|--|--|
| Date | | |
| EL Batch No. | | |
| Title of the project | | |
| Week No. | | |
| Content of the Discussion | | |
| Suggestion by the guide | | |
| Name of Signature of students | | |
| | | |
| | | |
| | | |

Signature of the Guide

Signature of HOD

Assessment

Rubrics for Project-Based Learning Assessment

| Sl. No | Name of the Student | USN | Criteria | Exemplary (4) | Proficient (3) | Developing (2) | Beginning (1) | Total |
|--------|---------------------|-----|------------------------------|--|--|---|---|-------|
| | | | Project Understanding | Demonstrates deep understanding of project goals and requirements; identifies key issues and objectives. | Shows good understanding of project goals and requirements; recognizes most key issues and objectives. | Displays basic understanding of project goals and requirements; some key issues and objectives are unclear. | Lacks clear understanding of project goals and requirements; key issues and objectives are misunderstood. | |
| | | | Technical Competence | Mastery of technical skills required for the project; applies skills effectively and efficiently. | Good technical skills; applies skills competently with few errors. | Basic technical skills; occasionally makes errors in application. | Limited technical skills; frequently makes errors in application. | |
| | | | | Highly creative and original ideas; | Somewhat creative and original ideas; | Limited creativity and originality; shows | Lacks creativity and originality; no | |

| | | | | | | | | |
|--|--|--|---------------------------|--|--|--|--|--|
| | | | Innovation | shows significant innovation and out-of-the-box thinking. | demonstrates innovation in some aspects. | minimal innovation. | evidence of innovative thinking. | |
| | | | Problem Solving | Identifies problems accurately and develops effective, comprehensive solutions. | Identifies problems correctly and develops good solutions. | Identifies problems but solutions are somewhat effective or incomplete. | Struggles to identify problems and develop effective solutions. | |
| | | | Project Management | Manages project timelines, resources, and tasks exceptionally well; meets all deadlines. | Manages project timelines, resources, and tasks effectively; meets most deadlines. | Manages project timelines, resources, and tasks with some difficulty; misses some deadlines. | Poor management of project timelines, resources, and tasks; frequently misses deadlines. | |
| | | | Documentation | Thorough, clear, and well-organized documentation; all necessary details included. | Clear and organized documentation; most necessary details included. | Basic documentation; some necessary details are missing or unclear. | Poor documentation; lacks necessary details and organization. | |
| | | | | Engaging and | Good presentation; | Basic presentation; | Ineffective | |

| | | | | | | | | |
|--|--|--|----------------------------|--|---|---|---|--|
| | | | Presentation Skills | well-organized presentation; communicates ideas clearly and effectively. | communicates ideas clearly but lacks some engagement or organization. | some ideas are unclear or poorly organized. | presentation; ideas are unclear and poorly organized. | |
| | | | Collaboration | Works exceptionally well with team members; shows strong teamwork and leadership skills. | Works well with team members; demonstrates good teamwork. | Works with team members but has some difficulties in collaboration. | Struggles to work with team members; lacks teamwork and collaboration skills. | |
| | | | Faculty Assessment | Meets or exceeds faculty expectations in all areas; shows exceptional performance. | Meets faculty expectations in most areas; shows good performance. | Meets some faculty expectations; shows average performance. | Does not meet faculty expectations; shows poor performance. | |
| | | | Reflection | Provides deep insights and critical analysis of | Provides good insights and analysis of own work; demonstrates | Provides basic insights and analysis of own work; shows some | Provides minimal or no insights and analysis of own | |

**UNIVERSAL HUMAN
VALUES & CLEAN
TECHNOLOGY (UHV)**



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

| | | | | |
|--|---|--|-----------------|-----------------|
| Semester | : | IV | | |
| Course Title | : | Universal Human Values (UHV) and Clean Technology | | |
| Course Code | : | BUHK408 | | |
| Course Type (Theory/ Practical/ Integrated) | : | | | |
| Category | : | UHV | | |
| Stream | : | Information Science and Engineering | CIE | : 50 |
| Teaching hours/ week (L:T:P:S) | : | | SEE | : 50 |
| Total Hours | : | 15 Hours | SEE | : 1 Hour |
| Credits | : | 01 | Duration | |

Course Learning Objectives: Students will be able to:

| Sl.No. | Course Objectives |
|---------------|---|
| 1 | Understand the need for developing a holistic perspective of life. |
| 2 | Analyze the scope of life – individual, family, society and nature/existence. |
| 3 | Develop more confidence and commitment to understand, learn and act accordingly. |
| 4 | Promote sustainability, resource efficiency, and environmental protection while maintaining economic growth and human well-being. |

Teaching-Learning Process (General Instructions)

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

1. The methodology of this course is exploration and thus universally adaptable. It involves a systematic and rational study of the human being vis-à-vis the rest of existence.
2. The course is in the form of 30 lectures (discussions)
3. It is free from any dogma or value prescriptions.
4. It is a process of self-investigation and self-exploration, and not of giving sermons. Whatever is found as truth or reality is stated as a proposal and the students are facilitated to verify it in their own right, based on their Natural Acceptance and subsequent Experiential Validation – the whole existence is the lab and every activity is a source of reflection.
5. This process of self-exploration takes the form of a dialogue between the teacher and the students to begin with, and then to continue within the student in every activity, leading to continuous self-evolution.
6. This self-exploration also enables them to critically evaluate their pre-conditionings and present beliefs.



Scheme of Teaching and Examinations for BE Programme -2024-25
Outcome Based Education and Choice Based Credit System (CBCS)
 (Effective from the Academic Year 2024-25)

COURSE CURRICULUM

| Module No. | Topics | Hours |
|-----------------|---|-------|
| 1 | <p>Introduction to Value Education: Understanding Value Education, Self-exploration as the Process for Value Education, The Basic Human Aspirations- Continuous Happiness and Prosperity, Method to Fulfil the Basic Human Aspirations.</p> <p>Textbook 1: Chapter 1- Chapter 4</p> | 3 |
| Pedagogy | Think Pair and Share | |
| 2 | <p>Understanding the Harmony at Various Levels: Understanding Human being as the Co-existence of the Self ('I') and the Body. Harmony in the Self (I) – Understanding Myself, Harmony with the Body – Understanding Sanyama and Svāsthya</p> <p>Textbook 1: Chapter 5 –Chapter 7</p> | 3 |
| Pedagogy | Poster presentation | |
| 3 | <p>Understanding the Harmony in Family and Society: Harmony in the Family – Understanding Values in Human Relationships, Harmony in the Society – From Family Order to World Family Order.</p> <p>Textbook 1: Chapter 8; Chapter 9</p> | 3 |
| Pedagogy | Presentation | |
| 4 | <p>Implications of Right Understanding: Providing the Basis for Universal Human Values and Ethical Human Conduct, Professional Ethics in the Light of Right Understanding.</p> <p>Textbook 1: Chapter 12; Chapter 14</p> | 3 |
| Pedagogy | Case study | |
| 5. | <p>Clean Technology:</p> <p>Introduction to sustainable energy and environment: Energy and development, energy reserves and resources, classification of energy resources, concept of sustainability.</p> <p>Energy Conservation: Energy management strategy, energy conservation.</p> <p>Data Centre Overview: Data centre infrastructure, main substance, data centre Archetypes</p> <p>Textbook 2: Chapter 1: 1.1-1.3; chapter 12: 12.2, 12.5; Textbook 3: Chapter 1:1.1- 1.3.</p> | 3 |

| Text Books | |
|-----------------|--|
| Sl. No. | Title of the Book/Name of the author/Name of the publisher/Edition and Year |
| 1 | The Textbook A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G P Bagaria, Excel Books, 2 nd Revised Edition, New Delhi, 2019. |
| 2. | Sustainable Energy and the Environment:A Clean Technology Approach,N.D.Kaushika et.al., Springer publisher,2016. |
| 3. | Advanced Concepts for Renewable Energy Supply of Data Centers,Jaume Salom, et.al.,River Publishers,2017. |
| Reference Books | |
| 1 | Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004. |
| 2 | Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amar kantik, 1999. |
| 3. | The Teacher"s Manual for A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G ,3 rd revised edition ,2023 |

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

| CO | Course Outcomes | RBT Level | RBT Level Indicator |
|-----|---|-----------|---------------------|
| CO1 | Understand the significance of value inputs in a classroom and start applying them in their life and profession | U | L2 |
| CO2 | Identify the role of harmony in family, society and universal order. | A | L3 |
| CO3 | Analyse between values and skills, happiness and accumulation of Physical facilities, the Self and the Body, Intention and Competence of an individual, etc. | An | L4 |
| CO4 | Evaluate the role of human being in the abetment of pollution | E | L5 |
| CO5 | Create awareness in understanding the types of renewable energy benefits of harvesting renewable energy. | C | L6 |

Mapping of Course Outcomes to Program Outcomes:

| CO/PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|
| CO1 | | | | | | | | | | | | | | | |
| CO2 | | | | | | 3 | | | | | | | | | |
| CO3 | | | | | | 3 | | | | | | | | | |
| CO4 | | | | | | | 3 | | | 3 | | | | | |
| CO5 | | | | | | 3 | 3 | 3 | | 3 | | | 3 | | |

Weblinks and Video Lectures (e-Resources)

| | |
|----|---|
| 1 | https://nptel.ac.in/courses/109104068 |
| 2 | https://www.youtube.com/watch?v=FbC9ZhaVc3Y |
| 3 | https://www.youtube.com/watch?v=N6foRtAwVyU&list=PLWDeKF97v9SMKcx1CKpONmPxLZYgjKVG8 |
| 4 | https://www.youtube.com/watch?v=0tdgOzp5VWs&list=PLWDeKF97v9SMKcx1CKpONmPxLZYgjKVG8&index=3 |
| 5 | https://www.youtube.com/watch?v=XS-eXqppf_w&t=4s |
| 6. | https://archive.nptel.ac.in/courses/103/107/103107157/ |
| 7. | https://www.youtube.com/watch?v=uCuLBaNONW0 |

CIE- Continuous Internal Evaluation (50 Marks)

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

CIE Course Assessment Plan

| CO's | Marks Distribution | | | | | | Total Marks | Weightage |
|--------------|--------------------|----------|-----------------|-----------------|----------|----------|-------------|-------------|
| | Test-1(50) | | | Test-2(50) | | | | |
| | Module-1 | Module-2 | Module 2 to 2.5 | Module-2.5 to 3 | Module-4 | Module-5 | | |
| CO1 | 5 | 5 | | | | | 15 | 15% |
| CO2 | 5 | 10 | 5 | 10 | 10 | 5 | 45 | 45% |
| CO3 | 5 | 5 | | | 5 | 5 | 20 | 20% |
| CO4 | | 5 | 5 | 5 | 5 | | 20 | 20% |
| CO5 | | | | | | 5 | | |
| Total | | | | | | | 100 | 100% |

SEE- Semester End Examination (50 Marks)

| Bloom's Category | SEE Marks (90% Theory+10% Practical Questions) |
|------------------|---|
| Remember | 5% |
| Understand | 15% |
| Apply | 40% |
| Analyse | 20% |
| 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 | 5 | 5 | | 5 | 5 | 10 | 10% |
| CO2 | 5 | 10 | 10 | 10 | 5 | 40 | 10% |
| CO3 | | 5 | | 5 | | 10 | 40% |
| CO4 | | 10 | 5 | 5 | | 20 | 10% |
| CO5 | 2 | 2 | 2 | 2 | 2 | 10 | 20% |
| Total | 12 | 32 | 17 | 27 | 12 | 100 | 10% |

COs Mapped to POs and PSOs:

| CO | PO | PSO |
|-----|---------------------|------|
| CO1 | - | - |
| CO2 | PO6 | - |
| CO3 | PO6 | - |
| CO4 | PO7, PO10 | - |
| CO5 | PO6, PO7, PO8, PO10 | PSO1 |

DAYANANDA SAGAR ACADEMY OF TECHNOLOGY & MANAGEMENT



CURRICULUM

Scheme and Syllabus III Semester

Outcome Based Education

(Academic Year 2024-2025)

Department of Information Science and Engineering

3rd Semester B.E

ABOUT THE INSTITUTE

Dayananda Sagar Academy of Technology and Management- DSATM was established in 2011 with 5 UG Programmes and 1 PG Program, the programmes are approved by All India Council for Technical Education (AICTE) New Delhi, Affiliated to Visvesvaraya Technological University (VTU), Belagavi and DSATM is an autonomous institute from 2023-2024.

The Dayananda Sagar Institutions is one of pioneer institutions in India and abroad with six decades of excellence in Academic and Research. The newer campuses were necessary to accommodate the growing need of the technology and innovation.

DSATM nurtures the students in academic, research, sports, cultural and extracurricular activities.

- Creating an academic environment to nurture and develop competent entrepreneurs, leaders and professionals who are socially sensitive and environmentally conscious.
- Integration of Outcome Based Education and cognitive teaching and learning strategies to enhance learning effectiveness.
- Developing necessary infrastructure to cater to the changing needs of Business and Society.
- Optimum utilization of the infrastructure and resources to achieve excellence in all areas of relevance.
- Adopting learning beyond curriculum through outbound activities and creative assignments.
- Imparting contemporary and emerging techno-managerial skills to keep pace with the changing global trends.
- Facilitating greater Industry-Institute Interaction for skill development and employability enhancement.
- Establishing systems and processes to facilitate research, innovation and entrepreneurship for holistic development of students.
- Implementation of Quality Assurance System in all Institutional processes.

VISION OF THE INSTITUTE

To strive at creating the institution a centre of highest calibre of learning, so as to create an overall intellectual atmosphere with each deriving strength from the other to be the best of engineers, scientists with management & design skills.

MISSION OF THE INSTITUTE

- To serve its region, state, the nation and globally by preparing students to make meaningful contributions in an increasing complex global society challenges.
- To encourage, reflection on and evaluation of emerging needs and priorities with state-of-the-art infrastructure at institution.
- To support research and services establishing enhancements in technical, economic, human and cultural development.
- To establish interdisciplinary centre of excellence, supporting/ promoting student's implementation.
- To increase the number of Doctorate holders to promote research culture on campus.
- To establish IIPC, IPR, EDC, innovation cells with functional MOU's supporting student's quality growth.

QUALITY POLICY

Dayananda Sagar Academy of Technology and Management aims at achieving academic excellence through continuous improvement in all spheres of Technical and Management education. In pursuit of excellence cutting – edge and contemporary skills are imparted to the utmost satisfaction of the students and the concerned stakeholders.

ABOUT THE DEPARTMENT

The Information Science and Engineering provides an intellectual framework enabling ideas from Hardware, Software, Computation and the Information Sciences to integrate into and transform disciplines to provide solutions to real-time problems. This programme is specifically designed to meet the requirements of industry, with its graduates expected to become important players in the future of Information Technology. The curriculum is designed to provide both technical and practical knowledge in the field of Information Science & Engineering and their applications along with major specializations based on which students can branch out. Fundamental engineering subjects combined with basic programming languages that provide a basic understanding of engineering concepts are taught, along with courses in advanced computing techniques, machine learning, data science, artificial intelligence, and other cutting-edge topics to equip the graduates with the required skills to manage all domains within Information Science Engineering scope.

VISION OF THE DEPARTMENT

Impart magnificent learning atmosphere establishing innovative practices among the students aiming to strengthen their software application knowledge and technical skills.

MISSION OF THE DEPARTMENT

- M1:** To deliver quality technical training on software application domain.
- M2:** To nurture team work in order to transform individual as responsible leader and entrepreneur for future trends.
- M3:** To inculcate research practices in teaching thus ensuring research blend among students.
- M4:** To ensure more doctorates in the department, aiming at professional strength.
- M5:** To inculcate the core information science engineering practices with hardware blend by providing advanced laboratories.
- M6:** To establish innovative labs, start-ups and patent culture.

PROGRAM EDUCATION OBJECTIVES (PEO'S):

PEO1: Graduates shall have successful careers as information science engineers in software application domain and will be able to lead and manage teams across the globe.

PEO2: Graduates shall be professional in engineering practice and shall demonstrate good problem solving, communication skills and contribute to address societal issues.

PEO3: Graduates shall be pursuing distinctive education, entrepreneurship and research in an excellent environment which helps in the process of life-long learning.

PROGRAM OUTCOMES (PO's)

Engineering Graduates will be able to:

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSO's)

PSO1: Apply appropriate programming knowledge in software development, operations and maintenance of real-time applications.

PSO 2: Meet the industry requirements in adapting to cutting edge technologies.

PSO3: Develop business and entrepreneurial ideas to support society requirements.



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

Affiliated to **VTU**
Approved by **AICTE**
Accredited by **NAAC** with **A+** Grade
6 Programs Accredited by **NBA**
(CSE, ISE, ECE, EEE, MECH, CV)

PROPOSED UG CREDIT STRUCTURE IN ALIGNMENT WITH VTU

| Sl.No | Semester | No. of Credits |
|--------------|--------------------------|-----------------------|
| 1 | 1 st Semester | 20 |
| 2 | 2 nd Semester | 20 |
| 3 | 3 rd Semester | 21 |
| 4 | 4 th Semester | 21 |
| 5 | 5 th Semester | 22 |
| 6 | 6 th Semester | 22 |
| 7 | 7 th Semester | 20 |
| 8 | 8 th Semester | 14 |
| | Total | 160 |

PROPOSED UG SCHEME

| Sl. No | Course Category | BOS | TD | Teaching Hours/Week | | | | | Credits |
|--------|-----------------------|------------------|-----|---------------------|----------|-----------|---------|--------------|-----------|
| | | | | Lecture | Tutorial | Practical | Project | Total | |
| | | | | L | T | P | S | (Hrs/week) | |
| 1 | BSC | MAT | MAT | 3 | 0 | 0 | 0 | 3 | 3 |
| 2 | IPCC-1 | CSE | CSE | 3 | 0 | 2 | 0 | 5 | 4 |
| 3 | IPCC-2 | CSE | CSE | 3 | 0 | 2 | 0 | 5 | 4 |
| 4 | PCC-1 | CSE | CSE | 3 | 0 | 0 | 0 | 3 | 3 |
| 5 | PCC-2 | CSE | CSE | 3 | 0 | 0 | 0 | 3 | 3 |
| 6 | PBL | CSE | CSE | 0 | 0 | 2 | 2 | 4 | 2 |
| 7 | AEC | CSE | CSE | 0 | 0 | 2 | 0 | 2 | 1 |
| 8 | SCR/UHV | CSE | CSE | 0 | 0 | 2 | 0 | 2 | 1 |
| 9 | NCMC | NSS / YOGA / PED | | | | | | | |
| 10 | AICTE Activity Points | | | | | | | | |
| | | | | | | | | Total | 21 |

Percentage of Mapping– Theory & Practical - Scheme & Syllabus- 3rd & 4th Sem

3rd Sem & 4th Sem

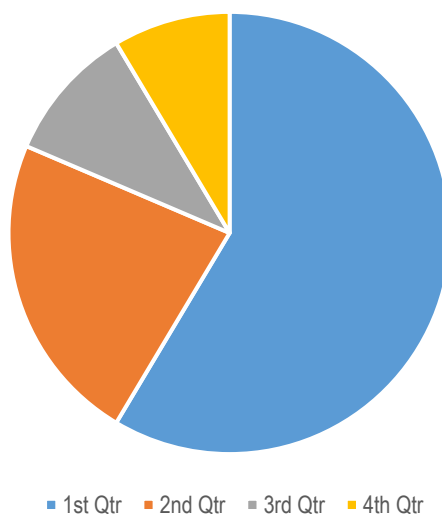
| Sl. No | Course Category | Component | | | |
|-------------------------|-----------------|------------|------------|------------|-------------|
| | | Theory | Practical | Outreach | YOGA/SPORTS |
| 1 | BSC | 100% | -- | -- | -- |
| 2 | IPCC-1 | 60% | 40% | -- | -- |
| 3 | IPCC-2 | 60% | 40% | -- | -- |
| 4 | PCC-1 | 100% | -- | -- | -- |
| 5 | PCC-2 | 100% | -- | -- | -- |
| 6 | PBL | -- | 100% | -- | -- |
| 7 | AEC | -- | 100% | -- | -- |
| 8 | SCR/UHV | -- | -- | 100% | -- |
| 9 | NCMC | -- | -- | -- | 100% |
| Total Percentage | | 53% | 47% | 13% | 13% |

Scheme Distribution

Department of Information Science & Engineering - 3rd Semester

| Course Component | Credits | % of Credits |
|---------------------------------------|-----------|--------------|
| Basic Science (BS) | | |
| Engineering Science (ES) | | |
| Humanities (HU) | 3 | |
| Program core (PC) | 3 + 3 | |
| Program core Integrated (PCI) | 4 + 4 | |
| Program core exclusive Lab | 2 | |
| Program elective (PE) | | |
| Open Elective (OE) | | |
| Internship (INT) | | |
| Social Connect Responsibilities (SCR) | 1 | |
| Ability Enhancement course (AEC) | 1 | |
| Project (PR) | | |
| Total | 21 | 100 |

Scheme-Credit Distribution
Plot the pie-chart





Dayananda Sagar Academy of Technology & Management

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Affiliated to **VTU**
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 6 Programs Accredited by **NBA**
 (CSE, ISE, ECE, EEE, MECH, CIVIL)

Scheme of Teaching and Examinations – 2024 Outcome Based Education (OBE) and Choice Based Credit System (CBCS) (Effective from 2024-25)

3rd SEMESTER: Information Science & Engineering (ISE)

| Sl. No | Course Code | Course Title | Course Category | BOS | TD | Teaching Hours/Week | | | | | Credits | Examination | | | |
|--------------|-------------|--|-----------------|-----|-----------|---------------------|----------|-----------|----------|-----------|-----------|--------------------|------------|------------|-------------|
| | | | | | | Lecture | Tutorial | Practical | Project | Total | | SEE Duration (Hrs) | CIE Marks | SEE Marks | Total Marks |
| | | | | | | L | T | P | S | | | | | | |
| 1 | BMATA301 | Linear Algebra and Discrete Mathematics | BSC | MAT | MAT | 3 | 0 | 0 | 0 | 3 | 3 | 3 | 50 | 50 | 100 |
| 2 | BIS302 | Data Structures and Applications | IPCC-1 | ISE | ISE | 3 | 0 | 2 | 0 | 5 | 4 | 3 | 50 | 50 | 100 |
| 3 | BIS303 | Digital Design and Computer Organization | IPCC-2 | ISE | ISE | 3 | 0 | 2 | 0 | 5 | 4 | 3 | 50 | 50 | 100 |
| 4 | BIS304 | Software Engineering | PCC-1 | ISE | ISE | 3 | 0 | 0 | 0 | 3 | 3 | 3 | 50 | 50 | 100 |
| 5 | BIS305 | Operating Systems | PCC-2 | ISE | ISE | 3 | 0 | 0 | 0 | 3 | 3 | 3 | 50 | 50 | 100 |
| 6 | BIS306 | Advanced Python Programming | PBL | ISE | ISE | 0 | 2 | 0 | 2 | 4 | 2 | 2 | 50 | 50 | 100 |
| 7 | BIS307 | Web Programming | AEC | ISE | ISE | 0 | 0 | 2 | 0 | 2 | 1 | 2 | 50 | 50 | 100 |
| 8 | BSCK308 | Social Connect and Responsibility | SCR | BSC | Any Dept. | 0 | 0 | 2 | 0 | 2 | 1 | 1 | 100 | - | 100 |
| 9 | BYOK309 | Yoga | NCMC* | | PD | 1 | 0 | 0 | 0 | 1 | 0 | 0 | - | - | - |
| | BNSK309 | NSS | | | NSS | 1 | 0 | 0 | 0 | 1 | 0 | 0 | - | - | - |
| | BPEK309 | Physical Education | | | PD | 1 | 0 | 0 | 0 | 1 | 0 | 0 | - | - | - |
| Total | | | | | | 16 | 2 | 8 | 2 | 28 | 21 | | 450 | 350 | 800 |

* Non-Credit Mandatory Course

IPCC: Integrated Professional Core Course,

PCC: Professional Core Course

PBL: Project Based Learning

AEC: Ability Enhancement Course,

NCMC: Non-Credit Mandatory Course

L: Lecture,

T: Tutorial,

P: Practical

S= SDA: Skill Development Activity,

CIE: Continuous Internal Evaluation,

SEE: Semester End Evaluation.

Integrated Professional Core Course (IPCC): Refers to Integrated Professional Core Course Theory 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.

Non Credit Mandatory Course (NCMC) - 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.

Newly introduced subjects in the syllabus

| | | 3rd Semester |
|-----------|--|--|
| 1. | List of Existing Elective Courses | No Elective Course in 3rd Semester |
| 2. | List of New Existing Elective Courses | No Elective Courses in 3rd Semester |
| 3. | List of New Industry Aligned Courses | 1. Web Programming 2. Advanced Python Programming with Data Visualization |

3rd SEMESTER



Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

| | | | | | |
|--|---|---|-----------------|---|----------|
| Semester | : | III | | | |
| Course Title | : | Linear Algebra and Discrete Mathematics | | | |
| Course Code | : | BMATA301 | | | |
| Course Type (Theory/ Practical/ Integrated) | : | Theory | | | |
| Course Category | : | BSC | | | |
| Stream | : | Information Science and Engineering | CIE | : | 50 Marks |
| Teaching hour/week (L:T:P:S) | : | 2:2:0:0 | SEE | : | 50 Marks |
| Total Hours | : | 40 Hours | SEE Duration | : | 3 Hours |
| Credits: | : | 03 | | | |

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 linear algebra and discrete mathematics in solving problems |
| 3 | Analyze problems using concepts of linear algebra and discrete mathematics |
| 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

| Module No. | Contents of the Module | Hours |
|-----------------|---|-------|
| 1 | Matrix Theory Elementary transformations on a matrix, echelon form & rank of a matrix, consistency of system of linear equations, Gauss elimination, Gauss – Seidel method to solve system of linear equations. eigen values and eigen vectors of a matrix, Rayleigh power method to determine the dominant eigen value of a matrix, diagonalization of matrices. | 8 |
| Pedagogy | Chalk and board, group discussion, ppt, videos | |
| 2 | Vector Spaces Introduction to vector spaces, subspaces, linear combination, linear span, linear dependence and independence, basis and dimension, linear mappings, Rank-Nullity theorem. | 8 |
| Pedagogy | Chalk and board, group discussion, ppt, videos | |
| 3 | Linear Transformation and Inner Product Spaces Matrix representation of linear transformations, singular and non-singular linear transformations, invertible linear transformations, inner products, inner product spaces, length and orthogonality, orthogonal sets and bases, projections, Gram-Schmidt process | 8 |
| Pedagogy | Chalk and board, group discussion, ppt, videos | |
| 4 | Fundamentals of logic Basic connectives and truth tables, logical equivalence-laws of logic, predicates, quantifiers, logical equivalence involving quantifiers, logical implication-rules of inference, proofs of theorems | 8 |
| Pedagogy | Chalk and board, group discussion, ppt, videos | |
| 5 | Relations and functions Cartesian products and relations, properties, computer recognitions-zero-one matrices, partial orders, equivalence relations, partitions, Hasse diagrams. Functions: one-one and onto functions, composition of functions and invertible functions. | 8 |
| Pedagogy | Chalk and board, group discussion, ppt, videos | |

| Text Books | |
|--|--|
| Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year) | |
| 1 | Linear Algebra and its applications, David C. Lay, Steven R. Lay, Judi J Mc. Donald Pearson Education, 6 th Edition, 2021. |
| 2 | Theory and problems of linear algebra, Seymour Lipschutz, Marc Lipso, Schaum's outline series, McGraw-Hill Education, 6 th edition, 2017. |
| 3 | Discrete Mathematics and its Applications, Kenneth H Rosen, McGraw Hill publications, 7 th edition. |

| Reference 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 th Edition, 2018. |
| 2 | Higher Engineering Mathematics, B. S. Grewal, Khanna publishers, 44 th Edition, 2021 |
| 3 | Linear Algebra: An Introduction, Richard Bronson & Gabriel B. Costa, Academic Press, 2 nd edition, 2014. |
| 4 | Discrete Mathematics, J.K Sharma, MacMilan Publishers India, 3 rd Edition, 2011. |

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 Linear Algebra and Discrete Mathematics | R, U | L1, L2 |
| CO2 | Apply techniques of Linear Algebra and Discrete Mathematics to solve Engineering Problems | A | L3 |
| CO3 | Analyze Engineering problems using Linear Algebra and Discrete Mathematics | AN | L4 |
| CO4 | Develop mathematical solutions to various real time problems using MATLAB | E | 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 | | 2 | | | | 1 | 1 | | | -- | -- |

Weblinks and Video Lectures (e-Resources)

| | |
|---|---|
| 1 | https://youtu.be/9h_Q-R6sXbM?si=PGTNmtJNzEWxQOQS |
| 2 | https://youtu.be/9MCjyQSRmR8?si=fToiea0CcJxnH7kz |
| 3 | https://youtu.be/oaOm2pnKkyY?si=HonXdjTwda_9IBL3 |
| 4 | https://youtu.be/Lj9Awpd5ltc?si=qeviX5wRiQxiWCEL |

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 |
| Total CIE Theory + Practical | | | | 50 | | | 20 | |
| CIE | Theory | Internal Assessment Test (IAT) - I | Module - 1 , 2 and Module 3 half | 50 | (50+50) / 2 | 25 | 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 & 4 and 5 | 50 | | | | |
| | Continuous Comprehensive Assessment (CCA) | CCA-1- Pedagogical Initiatives | Considering all the Modules | 50 | (50+50) / 2 | 25 | 10 | |
| | | CCA-2- Pedagogical Initiatives | | 50 | | | | |
| | Total CIE Theory | | | | | | 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"> • 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. | | | | |

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 8th week of the semester (syllabus completion of 50%)
- Second test after 14th week of semester (syllabus completion of 50%)

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 4th week and CCA2 after 9th 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 6th weeks of semester and review 2 after 12th 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 15th 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

| | |
|--|---|
| | <p>summing up to maximum score of 100 Marks. Marks scored out of 100 shall proportionally be reduced to 50 Marks.</p> <ul style="list-style-type: none"> 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 | | 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 | | | | | | | |
| Total | 25 | 25 | 25 | 25 | 50 | 150 | |

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 | -- | -- | -- | -- | -- | -- | -- |
| Total | 10 | 10 | 10 | 10 | 10 | 50 | 100% |

**INTEGRATED
PROFESSIONAL CORE
COURSE (IPCC)**

IPCC Course – Integrated Professional Core Course

| | |
|---------------------------------|---|
| Teaching Hours/Week (L: T:P: S) | 3:0:2:0 |
| Total Hours of Pedagogy | 40 hours Theory + 20 Hours of Practical Classes |
| Credits: | 04 |
| Theory - Each Module | 8 Hrs |
| Practical's | 8-10 Programs / Experiments |
| CIE Marks | 50 |
| SEE Marks | 50 |
| Total Marks | 100 |
| Exam Hours | 3 |
| Examination nature (SEE) | Theory |

- 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.

Integrated Professional Core Course (IPCC) - 4 Credit Course

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) for the Theory component of the IPCC (Maximum marks 50)

Internal Assessment Test (IAT):

- 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 50 Marks with 01-hour 30 minutes' duration, are to be conducted and average of two tests to be reduced to 15 marks) and 10 marks for Two Continuous Comprehensive Assessment(CCA) methods.

- The first Internal test at the end of 40-50% coverage of the syllabus
- The second Internal 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.

The IA test questions are to be framed to map the Course Outcomes (COs), Program Outcomes (POs) and the Revised Blooms Taxonomy (RBT) Levels. Emphasis to be given for Higher order Thinking Skills(HOTS).

Continuous Internal Evaluation (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 CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report, **05 Marks** are for conducting the experiment, **05 Marks** for preparation of the laboratory record, **5 Marks** for conducting Open Ended Experiments Each experiment. Marks of all experiments' write-ups are added to 15 marks.
- The Practical laboratory test (**duration 03 hours**) at the end of the 15th week of the semester/after completion of all the experiments (whichever is early) shall be conducted for **50 Marks** and scaled down to **5 Marks**.
- The open-ended experiment after completion of all the experiments shall be conducted for 20 marks with a split-up for 5 Marks for writeup, 10 Marks for Execution, and 5 Marks for Viva-Voce. Marks for writeup, Execution and Viva-Voce is added and scaled down to 05 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.

Semester End Examination (SEE) for IPCC Theory

SEE will be conducted as per the scheduled timetable, with common question papers for the course (duration 03 hours)

- The question paper will have ten questions. Each question is set for 20 marks.

- 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.**
- 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.
- The students have to answer 5 full questions, selecting one full question from each module.
- 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.

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 $(CCA1+CCA2)/2$ and scaled down to **10 Marks**.

- CCA1 after 4th week and CCA2 after 9th week. The Assessment will be through 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 6th weeks of semester and review 2 after 12th 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**

Possible Continuous and Comprehensive Assessment (CCA):

- 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,
- The assessment of these techniques shall be in rubrics.
- The faculty can adopt any other CCA method of implementation and its assessment with prior approval of Program Assessment Committee (PAC).

4 Credits Courses – Integrated Professional Core Course (IPCC)

| Assessment Method | Component | Type of Assessments | Syllabus Coverage | Maximum Marks | Average | Reduced Marks | Minimum Passing Marks | Evaluation Details |
|-------------------------------------|--|--|-----------------------------|---------------|---------------|---------------|-----------------------|--|
| Total CIE Theory + Practical | | | | 50 | ---- | ---- | 20 | |
| CIE | Theory | Internal Assessment Test (IAT) - I | Module – 1 to 2.5 | 50 | $(50+50) / 2$ | 15 | 6 | Average of Two Internal test each of 50 Marks scale down the marks to 15 Marks |
| | | Internal Assessment Test (IAT) - II | Module – 2.5 to 5 | 50 | | | | |
| | Continuous Comprehensive Assessment (CCA) | CCA-1- Pedagogical Initiatives / Activity based learning | Considering all the Modules | 50 | $(50+50) / 2$ | 10 | 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/ Activity based learning | | 50 | | | | |
| | Total CIE Theory | | | | | | 25 | 10 |

| | | | | | | | | | |
|-----|-----------|----------------------------|--|----|----|----------------------------|----|---|--|
| CIE | Practical | Conduction of Experiments | Performance-Continuous Evaluation of each experiment | 05 | 15 | Average of all Experiments | 15 | 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 | | | | | |
| | | | Observation book | 05 | | | | | |
| | | Practical Test | Write up | 15 | 50 | ---- | 05 | 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 | ---- | 05 | 2 | One experiment for 20 marks. 20 marks reduced to 05 marks |
| | | | Execution | 10 | | | | | |
| | | | Viva-voce | 05 | | | | | |
| | | Total CIE Practical | | | | | | | 25 |

| | | | | | | | | |
|------------------|--|-------------|---|-----|------|------|----|---|
| SEE | | 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 |
| CIE + SEE | | | | 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



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

| | | | | | |
|--|---|--|-----------------|---|---------|
| Semester | : | III | | | |
| Course Title | : | Data Structures and Applications | | | |
| Course Code | : | BIS302 | | | |
| Course Type (Theory/ Practical/ Integrated) | : | Integrated | | | |
| Category | : | IPCC-1 | | | |
| Stream | : | Information Science and Engineering | CIE | : | 50 |
| Teaching hours/ week (L:T:P:S) | : | 3:0:2:0 | SEE | : | 50 |
| Total Hours | : | 40 Theory Hours + 20 Practical Hours = 60 Hours | SEE Duration | : | 3 Hours |
| Credits | : | 04 | | | |

Course Learning Objectives: Students will be able to:

| Sl. No | Course Objectives |
|--------|--|
| 1 | Understand the fundamentals of data structures and their applications. |
| 2 | Apply different data structures to solve given problems. |
| 3 | Analyze the given problem and identify the appropriate data structures to be used. |
| 4 | Evaluate the trade-offs of different data structures in different application scenarios. |
| 5 | Design solutions for the real-world applications using suitable data structure. |

Teaching-Learning Process

Pedagogical Initiatives:

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

- Adopt different teaching methods to attain the course outcomes.
- Include videos to demonstrate various concepts in C.
- Encourage collaborative (Group) Learning to encourage team building.
- Ask at least three **HOTS (Higher-order Thinking Skills)** module-wise questions to promote critical thinking.
- 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.
- Show different ways to solve a problem and encourage the students to come up with creative and optimal solutions.
- Discuss various case studies to map with real-world scenarios and improve the understanding.



Scheme of Teaching and Examinations for BE Programme -2024-25
Outcome Based Education and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2024-25)

COURSE CURRICULUM

| Module No. | Topics | Hours |
|--|---|---------|
| 1 | Basic Concepts: Introduction to Data Structures, Types of Data Structures, Applications of Data Structures, Pointers, Dynamic Memory Allocation. Arrays and Structures: Arrays, Dynamic Allocated Arrays, Structures and Unions, Polynomials, Sparse Matrices, Representation of multidimensional arrays. Textbook 1: Chapter 1:1.2 ; Chapter 2: 2.1 - 2.6 | 8 Hours |
| Pedagogy | Blended Learning | |
| 2 | Stacks: Stacks, Stacks Using Dynamic Arrays, Evaluation of Expressions. Queues: Queues, Circular Queues using Dynamic Arrays, Priority Queues, Double-Ended Queues. Textbook 1: Chapter 3: 3.1 - 3.6(excluding 3.5) | 8 Hours |
| Pedagogy | Game-Based Learning | |
| 3 | Linked Lists: Singly Linked Lists and Chains, Representing Chains in C, Linked Stacks and Queues, Polynomials, Additional List Operations, Sparse Matrices, Doubly Linked Lists. Textbook 1: Chapter 4: 4.1 - 4.8 (excluding 4.6) | 8 Hours |
| Pedagogy | Role play | |
| 4 | Trees: Introduction, Binary Trees, Binary Tree Traversals, Heaps, Binary Search Trees, Red-Black Trees, Splay Trees. Textbook 1: Chapter 5: 5.1 - 5.3, 5.6 - 5.7 ; Chapter 10: 10.3 - 10.4 | 8 Hours |
| Pedagogy | Problem-Solving | |
| 5 | Graphs: The Graph Abstract Data Type, Elementary Graph Operations. Hashing: Introduction, Static Hashing, Dynamic Hashing. Textbook 1: Chapter 6: 6.1 - 6.2, 8.1 - 8.3 | 8 Hours |
| Pedagogy | Peer Learning | |
| Pedagogical Initiatives (Not limited to): <ul style="list-style-type: none">• 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 to understand the topics easily visually.• Case studies: maps different domains in real-time applications• Demonstration: exhibits the implementation process | | |

List of Programs:

| Sl. No. | Experiments/Programs | COs |
|---------|---|-----|
| 1 | Develop a C Program to store movie Data with the fields: Title, Genre, Actor, Actress, and rating in an appropriate data structure. | CO5 |
| 2 | Given a mathematical expression <i>exp</i> , write a program to examine whether the parentheses in the expression are balanced. | CO5 |
| 3 | Implement a program in C to convert an Infix Expression to a Postfix Expression. The program should support both parenthesized and free parenthesized expressions with the operators: +, -, *, /, % (Remainder), ^ (Power), and alphanumeric operands. | CO5 |
| 4 | Implement a program in C for the following Stack applications: a. Evaluation of Suffix/Postfix expression with single digit operands and operators: +, -, *, /, %, ^. b. Assume we have three rods (A, B, and C) and N disks of different diameters. Initially, all the disks are on rod A, so the smaller disk is always on top of the larger disk. The objective of the puzzle is to move all the disks to another rod (here considered C), obeying the following simple rules: i. Only one disk can be moved at a time. ii. Each move consists of taking the topmost disk from one of the rods and placing it on top of another rod. iii. No disk may be placed on top of a smaller disk. | CO5 |
| 5 | Develop a C program to simulate the working of a multi-player game. i. Each player gets n turns. ii. Each player rolls a die during his turn. iii. The number rolled by the die is added for each player. iv. At the end of n turns, the player with the maximum total wins. | CO5 |
| 6 | Develop a program in C to read a polynomial of the form $a_nx^n + a_{n-1}x^{n-1} + a_{n-2}x^{n-2} + \dots + a_1x + a_0$ (Ex: $6x^4+3x^3+3x^2+2x+1$) using a Singly Linked List (SLL). Implement functions to display and evaluate the polynomial by taking the value of 'x' from the user. | CO5 |
| 7 | Develop a program in C to create a Doubly Linked List (DLL) of Student data with the fields: Name, USN, Sem, and CGPA supporting different operations and display the status after each operation. | CO5 |
| 8 | Implement a program in C to store 'n' integers in a Binary Search Tree (BST). Search the BST for a given element (KEY) and display the number of accesses required to find the key. Display the elements of the BST using inorder, preorder, and postorder traversal. | CO5 |
| 9 | Develop a C program to implement a road map for N Cities. Display the Depth-First Search(DFS) and Breadth-First Search(BFS) traversals for the graph. | CO5 |
| 10 | Develop a C program to store employee details (Employee ID: eid and Employee Name: ename) into a hash table using a hash function $H: K \rightarrow L$ as $H(K)=K \text{ mod } m$ (remainder method) where K is the Key(eid) and m is the Hash Table size. Implement linear probing to resolve any collisions. | CO5 |

Open-ended Programs

| | | | | | | | | | | | | | | | | | | | | |
|----------|---|------------|----|----|----|---|---|----------|---|---|---|---|---|--------|-----|----|----|----|----|------------|
| 1 | <p>Consider two players - A and B. 'N' Pots of gold are arranged in a line, each containing some gold coins. The players can see how many coins are in each gold pot, and each player gets turns in which the player can pick the coins from a pot from either end of the line. The winner is the player who has a higher number of coins at the end. Develop a program to solve the pots of gold game problem.</p> | CO5 | | | | | | | | | | | | | | | | | | |
| 2 | <p>You are given a set of n jobs where each has a deadline and profit associated with it. Each job takes one unit of time to complete, and only one job can be scheduled at a time. We earn the profit associated with the job if and only if the job is completed by its deadline. Find the job scheduling of the given jobs that ensure maximum profit.</p> <p>Input</p> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <td style="background-color: #FFA500;">Job id</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> </tr> <tr> <td style="background-color: #FFA500;">deadline</td> <td>2</td> <td>1</td> <td>2</td> <td>1</td> <td>3</td> </tr> <tr> <td style="background-color: #FFA500;">profit</td> <td>100</td> <td>19</td> <td>27</td> <td>25</td> <td>15</td> </tr> </table> | Job id | 1 | 2 | 3 | 4 | 5 | deadline | 2 | 1 | 2 | 1 | 3 | profit | 100 | 19 | 27 | 25 | 15 | CO5 |
| Job id | 1 | 2 | 3 | 4 | 5 | | | | | | | | | | | | | | | |
| deadline | 2 | 1 | 2 | 1 | 3 | | | | | | | | | | | | | | | |
| profit | 100 | 19 | 27 | 25 | 15 | | | | | | | | | | | | | | | |
| 3 | <p>Develop a program to implement password encryption using a suitable data structure.</p> <ol style="list-style-type: none"> i. Store n username and encrypted passwords in a suitable data structure. ii. Display the username and the encrypted password. iii. Provide a login option to the user. iv. Display login success/ failure message based on the validity of the password. | CO5 | | | | | | | | | | | | | | | | | | |
| 4 | <p>Create a directed graph with n nodes. Print the distance to all reachable nodes from the given source. Check if the graph is connected or not.</p> | CO5 | | | | | | | | | | | | | | | | | | |
| 5 | <p>Assume you are using a web browser.</p> <p>Store the URLs(links) you visited in a data structure of your choice.</p> <p>Implement Back/Forward Navigation such that choosing back should take the user to the previous page and forward should take to the next page visited in the web browser.</p> | CO5 | | | | | | | | | | | | | | | | | | |

| Textbooks | |
|-----------------|---|
| Sl. No. | Title of the Book/Name of the author/Name of the publisher/Edition and Year |
| 1 | Fundamentals of Data Structures in C, Ellis Horowitz, Sartaj Sahni and Susan Anderson-Freed, Universities Press, 2nd Edition, 2018. |
| Reference Books | |
| 1 | Data structures and algorithm analysis in C, Mark, Allen Weiss, Pearson Education, 2nd Edition, 2020. |
| 2 | Data Structures & Algorithms, Alfred V. Aho, Jeffrey D. Ullman, John E. Hopcroft, Pearson Education India, 1st Edition, 2002. |
| 3 | Data Structures Using C and C++, Yedidyah Langsam , Moshe J Augenstein , Aaron M Tenenbaum, Pearson Education, 2nd edition, 2015. |

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

| CO | Course Outcomes | RBT Level | RBT Level Indicator |
|-----|---|-------------------|---------------------|
| CO1 | Understand , and explain the concepts of Data Structures and Applications. | Understand | L1/L2 |
| CO2 | Apply the concepts of linear and non-linear Data Structures to solve a given problem. | Apply | L3 |
| CO3 | Analyze the given problem and use appropriate Data Structures like the stack, queue, linked lists, trees, graphs, and hash tables. | Analyze | L4 |
| CO4 | Assess the efficiency and appropriateness of various data structures in solving complex, real-world problems. | Evaluate | L5 |
| CO5 | Design solutions for real-world problems using appropriate Data Structures. | 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 | PSO3 |
|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|
| CO1 | | | | | | | | | | | | | | | |
| CO2 | 3 | | | | | | | | | | | | 3 | 3 | |
| CO3 | | 3 | | | | | | | | | | | 2 | 3 | |
| CO4 | | | | 3 | | | | | 3 | 2 | | | 2 | 3 | |
| CO5 | | | 3 | | | | | | 3 | | | | 2 | 3 | |

Weblinks and Video Lectures (e-Resources)

| | |
|----|---|
| 1 | https://ds1-iiith.vlabs.ac.in/List%20of%20experiments.html (Virtual Lab) |
| 2 | https://nptel.ac.in/courses/106102064 |
| 3 | https://archive.nptel.ac.in/courses/106/106/106106130/ |
| 4 | https://academicearth.org/computer-science/ |
| 5 | https://online.vtu.ac.in/course-details/Skill-enhancement-with-Data-structure-algorithm-C-language-822203 |
| 6 | https://online.vtu.ac.in/course-details/Data-Structures-and-Applications |
| 7 | https://www.geeksforgeeks.org/data-structures/?ref=lbp |
| 8 | https://www.w3schools.com/dsa/dsa_intro.php |
| 9 | https://www.youtube.com/watch?v=BBpAmxU_NQo |
| 10 | https://www.youtube.com/watch?v=8hly31xKli0 |
| 11 | https://www.youtube.com/watch?v=MtVZAXepMPM |
| 12 | https://www.classcentral.com/course/udemy-data-structures-stack-queue-linkedlist-55316 |
| 13 | https://onlinecourses.swayam2.ac.in/cec19_cs04/preview |
| 14 | https://www.udemy.com/course/datastructurescncpp/?couponCode=LETSLEARNNOWPP |
| 15 | https://www.geeksforgeeks.org/courses/dsa-self-paced?itm_source=geeksforgeeks&itm_medium=main_header&itm_campaign=courses |

CIE- Continuous Internal Evaluation (50 Marks)

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

CIE Course Assessment Plan

| CO's | Marks Distribution | | | | | | Total Marks | Weightage |
|--------------|--------------------|----------|-----------------|-----------------|----------|----------|-------------|-----------|
| | Test-1 | | | Test-2 | | | | |
| | Module-1 | Module-2 | Module 2 to 2.5 | Module-2.5 to 3 | Module-4 | Module-5 | | |
| CO1 | 5 | 5 | | | | 5 | 15 | 15% |
| CO2 | 5 | 10 | 5 | 10 | 10 | 5 | 45 | 45% |
| CO3 | 5 | 5 | | | 5 | 5 | 20 | 20% |
| CO4 | | 5 | 5 | 5 | 5 | | 20 | 20% |
| CO5 | | | | | | | | |
| Total | | | | | | | 100 | 100% |

SEE- Semester End Examination (50 Marks)

| Bloom's Category | SEE Marks (90% Theory+10% Practical Questions) |
|------------------|---|
| Remember | 10% |
| Understand | 10% |
| Apply | 40% |
| Analyse | 10% |
| Evaluate | 20% |
| Create | 10% |

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 | 10 | 10% |
| CO2 | 5 | 10 | 10 | 10 | 5 | 40 | 10% |
| CO3 | | 5 | | 5 | | 10 | 40% |
| CO4 | | 10 | 5 | 5 | | 20 | 10% |
| CO5 | 2 | 2 | 2 | 2 | 2 | 10 | 20% |
| Total | 12 | 32 | 17 | 27 | 12 | 100 | 10% |



Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

| | | | | | |
|--|---|---|--------------|---|---------|
| Semester | : | III | | | |
| Course Title | : | Digital Design and Computer Organization | | | |
| Course Code | : | BIS303 | | | |
| Course Type (Theory/ Practical/ Integrated) | : | Integrated | | | |
| Category | : | IPCC-2 | | | |
| Stream | : | Information Science and Engineering | CIE | : | 50 |
| Teaching hours/ week (L:T:P:S) | : | 3:0:2:0 | SEE | : | 50 |
| Total Hours | : | 40 Theory Hours + 20 Practical Hours = 60 Hours | SEE Duration | : | 3 Hours |
| Credits | : | 04 | | | |

Course Learning Objectives: Students will be able to:

| Sl. No | Course Objectives |
|--------|--|
| 1 | Understand the requirement of digital system and the basic structure of computer. |
| 2 | Apply combinational and sequential circuits in the design of digital systems. |
| 3 | Analyze digital circuits, encompassing storage elements and different computer architectures, to gauge their operational effectiveness. |
| 4 | Demonstrate different data types on simple arithmetic and logical unit and the functions of basic processing unit, Parallel processing. |
| 5 | Design digital circuits and create corresponding HDL codes. |

Teaching-Learning Process

Pedagogical Initiatives:

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

- Adopt different teaching methods to attain the course outcomes.
- Include videos to demonstrate various concepts in C.
- Encourage collaborative (Group) Learning to encourage team building.
- Ask at least three **HOTS (Higher-order Thinking Skills)** module-wise questions to promote critical thinking.
- 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.
- Show different ways to solve a problem and encourage the students to come up with creative and optimal solutions.
- Discuss various case studies to map with real-world scenarios and improve the understanding.
- Devise innovative pedagogy to improve **Teaching-Learning Process (TLP)**.



DSATM

Scheme of Teaching and Examinations for BE Programme -2024-25
Outcome Based Education and Choice Based Credit System (CBCS)
(Effective from the Academic Year 2024-25)

COURSE CURRICULUM

| Module No. | Topics | Hours |
|-----------------|---|-------|
| 1 | BASIC CONCEPTS OF DIGITAL SYSTEMS: Sum-of-Products simplifications, Karnaugh Map, Pairs Quads, and Octets, Karnaugh Simplifications, Don't-care Conditions, Product-of-sums simplifications, NAND and NOR Implementation, Simplification by Quine-McClusky Method. Introduction to HDL: HDL Implementation Models. Textbook 1: Chapter 3: 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.9 | 8 |
| Pedagogy | Problem Solving | |
| 2 | DESIGN OF COMBINATIONAL LOGIC CIRCUITS: Introduction, Combinational Circuits, Decimal Adder; Decoders, Encoders; Multiplexers, De-multiplexers; Magnitude Comparator; HDL Models of Combinational Circuits. SEQUENTIAL CIRCUITS-I: Introduction, Sequential Circuits, Storage Elements: Latches, Flip-Flops: SR, JK, D, T and Master-Slave Flip-Flop – Characteristic table and equation. Textbook 1: Chapter 4: 4.1, 4.2, 4.6, 4.8, 4.9, 4.10, 4.11, 4.12 ; Chapter 5: 5.1, 5.2, 5.3, 5.4 | 8 |
| Pedagogy | Virtual Lab, Think Pair and Share | |
| 3 | SEQUENTIAL CIRCUITS-II: Registers-Types of Registers, Asynchronous-Ripple Counter and Synchronous Counters. HDL MODELS OF SEQUENTIAL CIRCUITS: Flip-flop, Register and Counters. Textbook 1: Chapter 5: 5.6 ; Chapter 6: 6.1, 6.2, 6.3, 6.4, 6.6 | 8 |
| Pedagogy | Problem Solving, Virtual Lab | |
| 4 | BASIC STRUCTURE OF COMPUTERS: Functional Units, Basic Operational Concepts, Bus structure, Performance – Processor Clock, Basic Performance Equation, Clock Rate, Performance Measurement. MACHINE INSTRUCTIONS AND PROGRAMS: Memory Location and Addresses, Memory Operations, Instruction and Instruction sequencing, Addressing Modes. Textbook 2: Chapter 1: 1.2, 1.3, 1.4, 1.6 ; Chapter 2: 2.2, 2.3, 2.4, 2.5 | 8 |
| Pedagogy | Poster Presentation | |

| | | |
|-----------------|---|---|
| 5 | <p>INPUT/OUTPUT ORGANIZATION: 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.</p> <p>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.</p> <p>Textbook 2: Chapter 4: 4.1, 4.2.1, 4.2.2, 4.2.3, 4.4 ;Chapter 5: 5.4, 5.5.1 ;Chapter 7: 7.1, 7.2</p> | 8 |
| Pedagogy | Poster Presentation | |
| | <p>Pedagogical Initiatives (Not limited to):</p> <ul style="list-style-type: none"> • 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 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 |
|---------|--|-----|
| | Simulation packages preferred: Multisim, Modelsim, PSpice or any other relevant | |
| 1 | a. Given a 4-variable logic expression, simplify it using appropriate technique using basic gates. b. Design and develop the HDL code for a 4-variable logic expression. Simulate and verify it's working. | CO5 |
| 2 | a. Given a 4-variable logic expression, simplify it using Entered Variable Map and realize the simplified logic expression using 8:1 multiplexer IC. b. Design and develop the HDL code for an 8:1 multiplexer. Simulate and verify it's working. | CO5 |
| 3 | a. Design and verify the Truth Table of 3×8 decoder using basic logic gates. b. Design and develop the HDL code for a 3×8 decoder. Simulate and verify it's working. | CO5 |
| 4 | a. Design and verify the Truth Table of 3×8 encoder using basic logic gates. b. Design and develop the HDL code for a 3×8 encoder. Simulate and verify it's working. | CO5 |
| 5 | a. Design and verify the Truth Table of 3-bit Parity Generator and 4-bit Parity Checker using basic Logic Gates with an even parity bit. b. Design and develop the HDL code 3-bit Parity Generator. Simulate and verify it's working. | CO5 |
| 6 | a. Realize a J-K Master / Slave Flip-Flop using NAND gates and verify its truth-table. b. Design and develop the HDL code for D Flip-Flop with positive-edge triggering. Simulate and verify it's working. | CO5 |

| | | |
|--|---|-----|
| 7 | a. Design and implement a mod-n ($n < 8$) synchronous up counter using J-K Flip-Flop ICs and demonstrate its working. b. Design and develop the HDL code for mod-8 up counter. Simulate and verify it's working. | CO5 |
| 8 | Design and implement an asynchronous counter using decade counter IC to count-up from 0 to n ($n \leq 9$) and demonstrate on 7-segment display (using IC- 7447). | CO5 |
| Open ended Programs | | |
| Design a 4/8-bit CPU using the LOGISIM simulator, for the following specifications. | | |
| 1 | Implement the following instructions namely: MOV, ADD, SUB, LOAD, STORE, AND, XOR, NOT, BRANCH, BRANCH ON CONDITION. | CO4 |
| 2 | Result to be displayed on 7-segment displays / reg tab of LOGISIM | CO4 |
| 3 | ALU (to support 4-bit integer arithmetic operations & 4-bit logical operations) | CO4 |
| 4 | Instruction Register (Assume instruction size as 16 bit) | CO4 |
| NOTE: Students can utilize this link to enhance their understanding | | |
| https://cse11-iiith.vlabs.ac.in/ | | |

Text Books

| Sl. No. | Title of the Book/Name of the author/Name of the publisher/Edition and Year |
|---------|--|
| 1 | "Digital Design with an Introduction to Verilog Design", M. Morris Mano & Michael D. Ciletti, 5e, Pearson Education. |
| 2 | "Computer Organization", Carl Hamacher, Zvonko Vranesic, SafwatZaky, 5th Edition, Tata McGraw-Hill. |

Reference Books

| | |
|---|---|
| 1 | Digital Principles and Design, Donald D.Givone, Tata McGraw-Hill, 2003. |
| 2 | Digital Principles and Applications, Donald P Leach, Malvoni, GautamSaha Tata McGraw Hill, 7th Edition 2010 |
| 3 | Fundamentals of logic design, Charles H Roth, Larry N. Kinney, Cengage Learning, 7 th Ed., 2014. |
| 4 | Computer Organization and Design, David A. Patterson and John L. Hennessy, Elsevier, 5th Edition, 2014 |
| 5 | William Stallings "Computer Organization and Architecture", Seventh Edition, Pearson Education, 2006. |

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

| CO | Course Outcomes | RBT Level | RBT Level Indicator |
|-----|--|-----------|---------------------|
| CO1 | Understand the functionalities of binary logic system and the computer organization. | U | L2 |
| CO2 | Apply principles of digital systems to design and optimize circuits, and manage input/output operations in computer systems | A | L3 |
| CO3 | Analyze digital circuits, including storage elements and system process, to assess their functionality and efficiency. | An | L4 |
| CO4 | Evaluate different data types on a simple arithmetic and logical unit, and assess the functions of a basic processing unit. | E | L5 |
| CO5 | Design digital circuits and develop corresponding HDL codes. | C | L6 |

Mapping of Course Outcomes to Program Outcomes:

| CO/PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|
| CO1 | | | | | | | | | | | | | | | |
| CO2 | 3 | | | | | | | | | | | | | | |
| CO3 | | 3 | | | | | | | | | | | | | |
| CO4 | | | | 3 | | | | | 3 | | | | | | |
| CO5 | | | 3 | | 3 | | | | | | | 3 | 2 | | |

Weblinks and Video Lectures (e-Resources)

| | |
|---|---|
| 1 | https://www.youtube.com/watch?v=wk6O1OuAZn0&list=PLwdnzIV3ogoVIY7iVqr-FhWUQEX7JDdiP&index=4 (nptel) |
| 2 | https://www.youtube.com/watch?v=QXOVwloPGsM&list=PLwdnzIV3ogoVIY7iVqr-FhWUQEX7JDdiP&index=9 |
| 3 | https://www.youtube.com/watch?v=PqhTjBdiMk4&list=PLwdnzIV3ogoVIY7iVqr-FhWUQEX7JDdiP&index=10 |
| 4 | https://www.youtube.com/watch?v=mv-3hPgkNzM&list=PLwdnzIV3ogoVIY7iVqr-FhWUQEX7JDdiP&index=12 |
| 5 | https://www.youtube.com/watch?v=YXzgX8gyMFs&list=PLwdnzIV3ogoVIY7iVqr-FhWUQEX7JDdiP&index=23 |

| | |
|----|---|
| 6 | https://www.youtube.com/watch?v=9KzOApr5gKw&list=PLwdnzIV3ogoVIY7iVqr-FhWUQEX7JDdiP&index=24 |
| 7 | https://www.youtube.com/watch?v=qaTUzzysVew&list=PLwdnzIV3ogoVIY7iVqr-FhWUQEX7JDdiP&index=27 |
| 8 | https://www.youtube.com/watch?v=Ubp_L-7lucw&list=PLwdnzIV3ogoVIY7iVqr-FhWUQEX7JDdiP&index=28 |
| 9 | https://www.youtube.com/watch?v=3Jppx70tVp0&list=PLwdnzIV3ogoVIY7iVqr-FhWUQEX7JDdiP&index=30 |
| 10 | https://www.youtube.com/watch?v=POKtkWJI6KU&list=PLwdnzIV3ogoVIY7iVqr-FhWUQEX7JDdiP&index=34 |
| 11 | https://www.youtube.com/watch?v=Y17TLZCSe4M&list=RDQMbn7C5WgGghA&index=24 |
| 12 | https://www.youtube.com/watch?v=4goj-ajnpOQ&list=RDQMbn7C5WgGghA&index=1 |
| 13 | https://www.youtube.com/watch?v=p9wxyIx-j-c&list=PL1A5A6AE8AFC187B7&index=12 |
| 14 | https://cse11-iiith.vlabs.ac.in/ |
| 15 | https://nptel.ac.in/courses/108105113 |

CIE- Continuous Internal Evaluation (50 Marks)

| Bloom's Category | Theory | | | | Practical |
|------------------|-----------------------------------|----------|---|----------|-----------|
| | Continuous Assessment Tests (IAT) | | Continuous Comprehensive Assessment (CCA) | | |
| | IAT-1 | IAT-2 | CCA-1 | CCA-2 | |
| | 50 Marks | 50 Marks | 50 Marks | 50 Marks | |
| Remember | 05 | 0 | 0 | 0 | 0 |
| Understand | 15 | 10 | 0 | 0 | 0 |
| Apply | 25 | 25 | 0 | 0 | 20 |
| Analyse | 05 | 15 | 0 | 0 | 15 |
| Evaluate | 0 | 0 | 25 | 25 | 0 |
| Create | 0 | 0 | 25 | 25 | 15 |

CIE Course Assessment Plan

| CO's | Marks Distribution | | | | | | Total Marks | Weightage |
|--------------|--------------------|-----------|-----------------|-----------------|-----------|-----------|-------------|-------------|
| | Test-1 | | | Test-2 | | | | |
| | Module-1 | Module-2 | Module 2 to 2.5 | Module-2.5 to 3 | Module-4 | Module-5 | | |
| CO1 | 0 | 0 | 0 | 0 | 10 | 10 | 20 | 20% |
| CO2 | 10 | 20 | 10 | 0 | 5 | 5 | 50 | 50% |
| CO3 | 0 | 10 | 10 | 10 | 0 | 0 | 30 | 30% |
| CO4 | - | - | - | - | - | - | - | - |
| CO5 | - | - | - | - | - | - | - | - |
| Total | 10 | 30 | 20 | 10 | 15 | 15 | 100 | 100% |

SEE- Semester End Examination (50 Marks)

| Bloom's Category | SEE Marks (90% Theory+10% Practical Questions) |
|------------------|---|
| Remember | 10+5% |
| Understand | 20+5% |
| Apply | 25+5% |
| Analyse | 25+5% |
| Evaluate | - |
| Create | - |

SEE Course Plan

| CO's | Marks Distribution | | | | | | Total Marks | Weightage |
|--------------|--------------------|-----------|-----------------|-----------------|-----------|-----------|-------------|-------------|
| | Module-1 | Module-2 | Module 2 to 2.5 | Module-2.5 to 3 | Module-4 | Module-5 | | |
| CO1 | 0 | 0 | 0 | 0 | 10 | 10 | 20 | 20% |
| CO2 | 10 | 20 | 10 | 0 | 5 | 5 | 50 | 50% |
| CO3 | 0 | 10 | 10 | 10 | 0 | 0 | 30 | 30% |
| CO4 | - | - | - | - | - | - | - | - |
| CO5 | - | - | - | - | - | - | - | - |
| Total | 10 | 30 | 20 | 10 | 15 | 15 | 100 | 100% |

**PROFESSIONAL CORE
COURSE (PCC)**

PCC Course - Professional Core Course

| | |
|---------------------------------|----------|
| Teaching Hours/Week (L: T:P: S) | 3:0:0:0 |
| Total Hours of Pedagogy | 40 hours |
| Credits: | 03 |
| Each Module | 8 Hrs |
| CIE Marks | 50 |
| SEE Marks | 50 |
| Total Marks | 100 |
| Exam Hours | 3 |
| Examination nature (SEE) | Theory |

3 Credit Course – Professional Core Course (PCC)

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:

Internal Assessment Test (IAT):

- For the Internal Assessment Test component of CIE, there are 25 marks and for Assignment component of the CIE, there are 25 marks. Two Tests, each of 50 Marks with 01-hour 30 minutes' duration, are to be conducted and average of two tests to be reduced to 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, 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.

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

Semester-End Examination:

Theory SEE will be conducted as per the scheduled timetable (duration 03 hours).

- The question paper will have ten questions. Each question is set for 20 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 students have to answer 5 full questions, selecting one full question from each module.
- Marks scored shall be proportionally reduced to 50 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 4th week and CCA2 after 9th 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 6th weeks of semester and review 2 after 12th 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**

Possible Continuous and Comprehensive Assessment (CCA):

- 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,
- The assessment of these techniques shall be in rubrics.
- The faculty can adopt any other CCA method of implementation and its assessment with prior approval of Program Assessment Committee (PAC).

Professional Core Course (PCC) – 3 Credit course – Theory

| Assessment Method | Component | Type of Assessments | Syllabus Coverage | Maximum Marks | Average | Reduced Marks | Minimum Passing Marks | Evaluation Details |
|-------------------------------------|--|--|-----------------------------|---------------|---------------|---------------|-----------------------|--|
| Total CIE Theory + Practical | | | | 50 | ---- | ---- | 20 | |
| | Theory | Internal Assessment Test (IAT) - II | Module – 1 to 2.5 | 50 | $(50+50) / 2$ | 25 | 10 | Average of Two Internal test each of 50 Marks scale down the marks to 25 |
| | | Internal Assessment Test (IAT) - II | Module – 2.5 to 5 | 50 | | | | |
| | Continuous Comprehensive Assessment (CCA) | CCA-1- Pedagogical Initiatives / Activity Based learning | Considering all the Modules | 50 | $(50+50) / 2$ | 25 | 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 / Activity Based learning | | 50 | | | | |
| | Total CIE Theory | | | | | | 50 | 20 |

| | | | | | | | | |
|------------------|--|-------------|---|-----|-----|-----|----|---|
| SEE | | 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 |
| CIE + SEE | | | | 100 | --- | --- | 40 | |



Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

| | | |
|--|---|-------------------------------------|
| Semester | : | III |
| Course Title | : | Software Engineering |
| Course Code | : | BIS304 |
| Course Type (Theory/ Practical/ Integrated) | : | Theory |
| Category | : | PCC-1 |
| Stream | : | Information Science and Engineering |
| Teaching hours/ week (L: T:P:S) | : | 3:0:0:0 |
| Total Hours | : | 40 Hours |
| Credits | : | 03 |

Course Learning Objectives: Students will be able to:

| Sl. No | Course Objectives |
|--------|--|
| 1 | Illustrate the different process models and Software development lifecycle. |
| 2 | Apply concepts of Software Planning and Software Design techniques. |
| 3 | Analyse capabilities of various tools to assist in the software development activities. |
| 4 | Develop robust software design and software project plan from requirement gathering to implementation. |

Teaching-Learning Process

Pedagogical Initiatives:

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

- Adopt different teaching methods to attain the course outcomes.
- Include videos to demonstrate various concepts in C.
- Encourage collaborative (Group) Learning to encourage team building.
- Ask at least three **HOTS (Higher-order Thinking Skills)** module-wise questions to promote critical thinking.
- 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.
- Show different ways to solve a problem and encourage the students to come up with creative and optimal solutions.
- Discuss various case studies to map with real-world scenarios and improve the understanding.
- Devise innovative pedagogy to improve **Teaching-Learning Process (TLP)**.



DSATM

Scheme of Teaching and Examinations for BE Programme -2024-25
Outcome Based Education and Choice Based Credit System (CBCS)
(Effective from the Academic Year 2024-25)

COURSE CURRICULUM

| Module No. | Topics | Hours |
|-------------------|--|--------------|
| 1 | <p>Introduction to Software Engineering: The nature of Software, The unique nature of WebApps, Software Engineering, The Software Process, The Software Engineering practice, The Software myths.</p> <p>Process Models: A generic process model, Process assessment and improvement, Prescriptive process models, Waterfall model, Incremental process models, Evolutionary process models, Concurrent models, Specialized process models.</p> <p>Textbook 1: Chapter 1: 1.1 - 1.7 ; Chapter 2: 2.1 -2.4</p> | 8 Hours |
| Pedagogy | Role Play | |
| 2 | <p>Software Requirement Analysis and Specifications: Functional and Non-Functional, User, System – Requirement, Software Requirement Documents.</p> <p>Requirement Engineering Process: Feasibility Studies, Requirements Elicitation and Analysis, Requirement Validation and Requirement Management.</p> <p>System Model: Context Model, Behavioural model, Data Model, Object Model, Structured Model.</p> <p>Textbook 2: Chapter 4:4.1 -4.7 ; Chapter 5:5.1-5.5</p> | 8 Hours |
| Pedagogy | Think Pair and Share | |
| 3 | <p>Software Design: Architectural Design: Design decisions, Architectural views, Architectural patterns and architectures.</p> <p>Object Oriented Design: Object oriented design using UML, Design patterns, Implementation issues, Open-source development.</p> <p>Textbook 2: Chapter 6:6.1-6.4 ; Chapter 7: 7.1-7.4</p> | 8 Hours |
| Pedagogy | Problem Solving using various Design Techniques | |

| | | |
|-----------------|--|----------------|
| 4 | <p>Software Development and Testing: Rapid Software Development-Agile Methods, Extreme Programming, Rapid Application Development.</p> <p>Verification and Validation: Planning Verification and Validation, Software Inspections, Automated Static Analysis, Verification and Formal methods.</p> <p>Software Testing: Development testing, Test-driven development, Release testing, User testing.</p> <p>Textbook 2: Chapter 3: 3.1-3. 4 ; Chapter 15: 15.1 ; Chapter 8: 8.1-8.4</p> | 8 Hours |
| Pedagogy | Demonstration of Different Testing Tools | |
| 5 | <p>Software Cost Estimation and Project Management: Software cost estimation - COCOMO model – Estimation Techniques, Project Duration and Staffing,</p> <p>Quality Management: Quality concepts, software quality assurance, software reviews, formal technical reviews, statistical software quality assurance, software reliability, the ISO 9000 quality standards.</p> <p>Configuration Management: Configuration Management Planning, Change Management, Version and Release Management.</p> <p>Textbook 2: Chapter 23: 23.5 ; Chapter 24: 24.1-24.4 ; Chapter 25.1-25.4</p> | 8 Hours |
| Pedagogy | Case study | |
| | <p>Pedagogical Initiatives (Not limited to):</p> <ul style="list-style-type: none"> • 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 | |

| Text Books | |
|-------------------|---|
| Sl. No. | Title of the Book/Name of the author/Name of the publisher/Edition and Year |
| 1 | Software Engineering-A Practitioners Approach, Roger S. Pressman, Tata McGraw Hill,7 th Edition, 2010. |
| 2 | Software Engineering, Ian Somerville, Pearson Education,9 th Edition ,2011. |

Weblinks and Video Lectures (e-Resources)

| | |
|----|---|
| 1 | https://www.pearson.com/us/higher-education/product/Sommerville-Software-Engineering-%209th-Edition/9780137035151.html |
| 2 | https://onlinecourses.nptel.ac.in/noc20_cs68/preview |
| 3 | https://swayam.gov.in/nd1_noc19_cs69/preview |
| 4 | https://nptel.ac.in/courses/128/106/128106012/ |
| 5 | http://elearning.vtu.ac.in/econtent/courses/video/CSE/15CS42.html |
| 6 | http://elearning.vtu.ac.in/econtent/courses/video/CSE/15CS42.html |
| 7 | https://www.abebooks.com/9788120332720/Software-Engineering-Kelkar-S-A-8120332725/plp |
| 8 | https://www.wileyindia.com/pankaj-jalote-s-software-engineering-a-precise-approach.html |
| 9 | https://www.coursera.org/learn/software-processes |
| 10 | https://www.youtube.com/redirect?v=4b1D1QFE |
| 11 | http://elearning.vtu.ac.in/econtent/courses/video/CSE/15CS42.html |
| 12 | https://nptel.ac.in/courses/128/106/128106012/ |
| 13 | https://www.youtube.com/watch?v=WxkP5KR_Emk&list=PLrjKTql3jnm9b5nr-ggx7Pt1G4UAHeFIJ |
| 14 | https://www.udemy.com/courses/development/software-engineering/ |

CIE- Continuous Internal Evaluation (50 Marks)

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

CIE Course Assessment Plan

| CO's | Marks Distribution | | | | | | Total Marks | Weightage |
|-------|--------------------|----------|-----------------|-----------------|----------|----------|-------------|-----------|
| | Test-1 | | | Test-2 | | | | |
| | Module-1 | Module-2 | Module 2 to 2.5 | Module-2.5 to 3 | Module-4 | Module-5 | | |
| CO1 | 5 | 5 | - | - | - | 5 | 15 | 15% |
| CO2 | 5 | 10 | 5 | 10 | 10 | 5 | 45 | 45% |
| CO3 | 5 | 5 | | | 5 | 5 | 20 | 20% |
| CO4 | - | 5 | 5 | 5 | 5 | | 20 | 20% |
| CO5 | - | - | - | - | - | - | | |
| Total | | | | | | | 100 | 100% |

SEE- Semester End Examination (50 Marks)

| Bloom's Category | SEE Marks (90% Theory+10% Practical Questions) |
|------------------|---|
| Remember | 10% |
| Understand | 10% |
| Apply | 40% |
| Analyse | 10% |
| Evaluate | 20% |
| Create | 10% |

SEE Course Plan

| CO's | Marks Distribution | | | | | | Total Marks | Weightage |
|--------------|--------------------|-----------|-----------------|-----------------|-----------|-----------|-------------|------------|
| | Module-1 | Module-2 | Module 2 to 2.5 | Module-2.5 to 3 | Module-4 | Module-5 | | |
| CO1 | 5 | 2 | - | - | 5 | 5 | 10 | 10% |
| CO2 | 5 | 5 | 5 | 10 | 10 | 5 | 40 | 40% |
| CO3 | - | 5 | 3 | - | 5 | - | 10 | 10% |
| CO4 | - | 4 | 6 | 5 | 5 | - | 20 | 20% |
| CO5 | 2 | - | 2 | 2 | 2 | 2 | 10 | 10% |
| Total | 12 | 16 | 16 | 17 | 27 | 12 | 100 | 10% |



Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

| | | | | |
|--|---|--|----------|-----------|
| Semester | : | III | | |
| Course Title | : | Operating Systems | | |
| Course Code | : | BIS305 | | |
| Course Type (Theory/ Practical/ Integrated) | : | Theory | | |
| Category | : | PCC-2 | | |
| Stream | : | Information Science and Engineering | CIE | : 50 |
| Teaching hours/ week (L:T:P:S) | : | 3:0:0:0 | SEE | : 50 |
| Total Hours | : | 40 Hours | SEE | : 3 Hours |
| Credits | : | 03 | Duration | |

Course Learning Objectives: Students will be able to:

| Sl. No | Course Objectives |
|--------|--|
| 1 | Understand the structure and services of the operating system that provides to users and system. |
| 2 | Learn the various CPU scheduling algorithms, storage management and disk management concepts. |
| 3 | Examine multithreading concepts, methods for handling deadlocks and recognize the classic synchronization problems. |
| 4 | Estimate Real-Time knowledge on how programming languages, operating systems, and architectures interact and how to use each effectively |

Teaching-Learning Process

Pedagogical Initiatives:

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

- Adopt different teaching methods to attain the course outcomes.
- Include videos to demonstrate various concepts in C.
- Encourage collaborative (Group) Learning to encourage team building.
- Ask at least three **HOTS (Higher-order Thinking Skills)** module-wise questions to promote critical thinking.
- 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.
- Show different ways to solve a problem and encourage the students to come up with creative and optimal solutions.
- Discuss various case studies to map with real-world scenarios and improve the understanding.
- Devise innovative pedagogy to improve **Teaching-Learning Process (TLP)**.



DSATM

Scheme of Teaching and Examinations for BE Programme -2024-25
Outcome Based Education and Choice Based Credit System (CBCS)
(Effective from the Academic Year 2024-25)

COURSE CURRICULUM

| Module No. | Topics | Hours |
|------------|--|-------|
| 1 | Introduction to Operating Systems: What Operating systems do? Computer System Architecture, Operating System Operations. Operating System Structure: Operating System Services, User Operating System Interface, System Calls, Operating-System Design and Implementation, Operating System Structure, Distributed System, Virtualization, Allocating Kernel Memory. Textbook 1: Chapter 1: 1.1-1.12, 1.3-1.3.3, 1.5-1.5.2 ; Chapter 2: 2.1-2.2.3, 2.3, 2.6-2.6.3, 2.7-2.7.5 ; Chapter 16: 16.1 | 8 |
| Pedagogy | Collaborative Learning | |
| 2 | Processes: Process Concept, Process Scheduling - FCFS, SJF, Priority, RR, Interprocess Communication, Multithreading Models. Process Synchronization: The Critical Section Problem, Peterson's Solution, Mutex Locks, Semaphores, Classical Problems of Synchronization, Failures and Recovery. Textbook 1: Chapter 3: 3.1-3.2, 3.4 ; Chapter 4: 4.1, 4.3 ; Chapter 5: 5.1 -5.3, 5.5-5.7 | 8 |
| Pedagogy | Program Solving | |
| 3 | CPU Scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms. Deadlocks: System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection and Recovery from Deadlock. Textbook 1: Chapter 6: 6.1-6.3.4 ; Chapter 7:7.1-7.7 | 8 |
| Pedagogy | Problem Solving | |
| 4 | Memory Management: Background, Swapping, Contiguous Memory Allocation, Segmentation, Paging, Structure of Page Table. Virtual Memory: Background, Demand Paging, Copy on Write, Page Replacement Algorithms, Thrashing. Textbook 1: Chapter 8: 8.1-8.6 ; Chapter 9: 9.1-9.4, 9.6 | 8 |
| Pedagogy | Poster Presentation | |
| 5 | Secondary Storage Structure: Mass Storage Structures; Disk Structure; Disk Attachment; Disk Scheduling - FCFS, SCAN, CSCAN, LOOK, SSTF, CLOOK, Disk Management File system Interface: File Concept, Access Methods, Directory Structure. Textbook 1: Chapter 10: 10.1-10.5 ; Chapter 11:11.1-11.3 | 8 |
| Pedagogy | Case Study | |

| | |
|--|--|
| | <p>Pedagogical Initiatives (Not limited to):</p> <ul style="list-style-type: none"> • 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 |
|--|--|

| Text Books | |
|-----------------|---|
| Sl. No. | Title of the Book/Name of the author/Name of the publisher/Edition and Year |
| 1 | Operating System Concepts, Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, Wiley India, 9 th Edition, 2018. |
| Reference Books | |
| 1 | Operating Systems, A Concept-Based Approach, DM Dhamdhere, Tata McGraw-Hill, 3 rd Edition, 2012, |
| 2 | An Introduction to Operating Systems: Concepts and Practice, P.C.P. Bhatt, PHI(EEE), 4 th Edition, 2014. |
| 3 | Operating System: Internals and Design Principles, William Stallings, Prentice Hall, 8 th Edition, 2014 |

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

| CO | Course Outcomes | RBT Level | RBT Level Indicator |
|-----|---|-----------|---------------------|
| CO1 | Understand the Basic concepts of operating system structures, services and its operations. | U | L2 |
| CO2 | Apply various concepts to solve problems related to synchronization, deadlocks, memory management, in Operating Systems. | A | L3 |
| CO3 | Analyze different algorithms of CPU scheduling, Page replacement, storage management and disk scheduling | An | L4 |
| CO4 | Evaluate real - time knowledge on how programming languages, operating systems, and architectures interact and how to use each effectively | E | L5 |

Mapping of Course Outcomes to Program Outcomes:

| CO/PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|
| CO1 | | | | | | | | | | | | | | | |
| CO2 | 3 | | | | | | | | | | | | | | |
| CO3 | | 3 | | | | | | | | | | | | | |
| CO4 | | | 3 | 3 | 2 | | | | 3 | | | 3 | 2 | | |

Weblinks and Video Lectures (e-Resources)

| | |
|----|---|
| 1 | https://www.youtube.com/watch?v=783KABtuE4&list=PLIemF3uozcAKTgsClj82voMK3TMR0YE_f (nptel and mooc link) |
| 2 | https://www.youtube.com/watch?v=3-ITLMMeeXY&list=PL3pGy4HtqwD0n7bQfHjPnsWzkeRn6mkO |
| 3 | Operating System Full Course Operating System Tutorials for Beginners (youtube.com) |
| 4 | Introduction to Operating Systems (youtube.com) |
| 5 | https://archive.nptel.ac.in/noc/courses/noc20/SEM1/noc20-cs04/ |
| 6 | https://archive.nptel.ac.in/noc/courses/noc21/SEM1/noc21-cs44/ |
| 7 | https://archive.nptel.ac.in/noc/courses/106/ |
| 8 | https://archive.nptel.ac.in/noc/courses/noc21/SEM2/noc21-cs88/ |
| 9 | https://www.youtube.com/watch?v=vBURt97EkA&list=PLBlnK6fEygRiVhbXDGLXDk_OQAeuVcp2O |
| 10 | https://www.youtube.com/watch?v=RozoeWzT7IM&list=PLdo5W4Nhv31a5ucW_S1K3-x6ztBRD-PNa |
| 11 | https://www.youtube.com/watch?v=9NpifXy16o |

| | |
|----|---|
| 12 | https://www.youtube.com/watch?v=PYPIEgSB_Ho |
| 13 | https://www.youtube.com/watch?v=fkGCLIQx1MI |
| 14 | https://www.youtube.com/watch?v=ACsLvXuaKxw |

CIE- Continuous Internal Evaluation (50 Marks)

| Bloom's Category | Theory | | | |
|------------------|-----------------------------------|----------|---|----------|
| | Continuous Assessment Tests (IAT) | | Continuous Comprehensive Assessment (CCA) | |
| | IAT-1 | IAT-2 | CCA-1 | CCA-2 |
| | 50 Marks | 50 Marks | 50 Marks | 50 Marks |
| Remember | 05 | 0 | 0 | 0 |
| Understand | 15 | 10 | 0 | 0 |
| Apply | 25 | 25 | 0 | 0 |
| Analyze | 05 | 15 | 0 | 0 |
| Evaluate | 0 | 0 | 50 | 50 |

CIE Course Assessment Plan

| CO's | Marks Distribution | | | | | | Total Marks | Weightage |
|--------------|--------------------|-----------|-----------------|-----------------|-----------|-----------|-------------|-------------|
| | Test-1 | | | Test-2 | | | | |
| | Module-1 | Module-2 | Module 2 to 2.5 | Module-2.5 to 3 | Module-4 | Module-5 | | |
| CO1 | 5 | 5 | 0 | 0 | 0 | 0 | 10 | 10% |
| CO2 | 9 | 20 | 5 | 5 | 10 | 5 | 36 | 54% |
| CO3 | 0 | 3 | 3 | 5 | 10 | 15 | 34 | 36% |
| CO4 | - | - | - | - | - | - | - | - |
| Total | 14 | 28 | 8 | 10 | 20 | 20 | 100 | 100% |

SEE- Semester End Examination (50 Marks)

| Bloom's Category | SEE Marks (90% Theory+10% Practical Questions) |
|------------------|---|
| Remember | 05% |
| Understand | 05% |
| Apply | 54% |
| Analyse | 36% |
| Evaluate | - |

SEE Course Plan

| CO's | Marks Distribution | | | | | | Total Marks | Weightage |
|--------------|--------------------|-----------|-----------------|-----------------|-----------|-----------|-------------|-------------|
| | Module-1 | Module-2 | Module 2 to 2.5 | Module-2.5 to 3 | Module-4 | Module-5 | | |
| CO1 | 5 | 5 | 0 | 0 | 0 | 0 | 10 | 10% |
| CO2 | 9 | 20 | 5 | 5 | 10 | 5 | 36 | 54% |
| CO3 | 0 | 3 | 3 | 5 | 10 | 15 | 34 | 36% |
| CO4 | - | - | - | - | - | - | - | - |
| Total | 14 | 28 | 8 | 10 | 20 | 20 | 100 | 100% |

**PROJECT BASED
LEARNING (PBL)**

PBL- Project Based Learning

| | |
|---------------------------------|-----------------------------|
| Teaching Hours/Week (L: T:P: S) | 0:0:2:2 |
| Total Hours of Pedagogy | 25 hours – Theory + Project |
| Credits: | 02 |
| Modules | 3 |
| CIE Marks | 50 |
| SEE Marks | 50 |
| Total Marks | 100 |
| Exam Hours | 3 |
| Examination nature (SEE) | Project Evaluation |

| | CIE | | SEE | |
|----------------|------------------------------|-----------------|---|------------------|
| | Project Weekly Assessment | | Final Project Evaluation | |
| Project | Project Understanding | 05 Marks | Write up | 10 Marks |
| | Technical Competence | 10 Marks | Presentation & Demonstration | 50 Marks |
| | Innovation | 10 Marks | Project report | 25 Marks |
| | Problem Solving | 15 Marks | Viva-Voce | 15 Marks |
| | Project Demonstration | 10 Marks | Total | 100 Marks |
| Total | | 50 Marks | 100 Marks Reduced to 50 Marks | |

1. Introduction

Project Based Learning is a model for classroom activity that shifts away from the classroom practices of short, isolated, teacher-centered lessons and instead emphasizes learning activities that are long-term, interdisciplinary, and student-centered.

A systematic teaching method that engages students in learning essential knowledge and life-enhancing skills through an extended, student-influenced inquiry process structured around complex, authentic questions and carefully designed products and tasks.

Project learning, also known as project-based learning, is a dynamic approach to teaching, in which students explore real-world problems and challenges, simultaneously developing cross-curriculum skills while working in small collaborative groups.

2. Characteristics of Project-Based Learning:

- Students making decisions within a framework
- A problem or challenge to be solved;
- Students designing the process for reaching a solution
- Students gathering and managing information
- Continuous Evaluation
 - Students regularly reflecting on the process
- A final product to be evaluated for quality
- An atmosphere that tolerates error and change

3. Purpose

- Introducing project-based learning on the curriculum.
- To help students to gain in-depth knowledge of the subject via project.
- During this process, students will be able to learn and understand the various stages of project development.

4. Objectives

- Introducing mini project based on the curriculum.
- Develop in depth knowledge of the topic and technology.
- Use critical thinking skills and make real world connections
- Demonstrate and understand through products.
- Industry and concept-oriented learning.

5. Why Incorporate PBL?

- Promotes collaboration and interaction
- Learners communicate meaningfully and for authentic purposes
- Allows students with a variety of learning styles to demonstrate their acquired knowledge
- Students learn language, content, and skills simultaneously
- Increases learner autonomy
- Provides opportunities for students to pursue their own interests and questions and make decisions about how they will find answers and solve problems.
- Improves education for all students Facilitates student integration of the content of different subjects
- Teaches children to use their own minds well and applies what they learn in school to life-long endeavors.
- Helps students to become technologically literate
- Establishes connections to life outside the classroom, addressing real-world concerns, and developing real-world skills
- Skills learned through PBL are those desired by today's employers.

6. Benefits of PBL

- Offers multiple ways for students to participate and to demonstrate their knowledge.
- Accommodates different kinds of intelligences.
- Shifts students away from doing only what they typically do in a classroom Environment.
- Encourages the mastery of technological tools, thus preparing them for the workforce.

- Serves as a medium for students who don't usually participate.
- Prompts students to collaborate while at the same time support self-directed learning.
- Offers a learning experience that draws on the thinking and shared efforts of several individuals.
- Helps students develop a variety of social skills relating to group work and negotiation.
- Promotes the internalization of concepts, values, and modes of thought, especially those related to cooperation and conflict resolution.
- Establishes a supportive and non-competitive climate for students.
- Provides a means for transferring the responsibility for learning from teachers to students.
- Calls upon students to explain or defend their position to others in their project groups, so that learning is more apt to be personalized and valued.

7. Process

- Project batches will be formed after the commencement of 3rd semester.
- The Students Batch Comprising of 4 members in a batch should be formed by the Project Based Learning co-ordinator.
- Each Semester consists of 16 Weeks of Project based Learning.
- The Level of the Projects to be identified.
 - Level 1-** 2nd Year – 3rd Semester & 4th Semester
 - Level 2-** 3rd year – 5th Semester & 6th Semester
 - Level 3** – Final Year Project
- The Faculty handling the respective Theory Subject will be the PBL Coordinator and all the three Batches to be handled by the PBL Coordinator with additional faculty.
- The List of Project Batches to be identified by the faculty assigned in consultation with HOD.
- The batch can select any topic from the list circulated by the PBL Coordinator
- The details of students Interaction with the guide shall be maintained by the guide in the prescribed format.
- The Students Project should be continuously evaluated and PBL Coordinator should submit weekly report to the HOD.
- The Rubrics for the PBL should be followed.
- The Students batches shall give the presentation on understanding of the topic and plan for implementation.
- The Evaluation of the Projects is done in Two Phases

7.1 Two phases for Assessment

Phase 1:

1. Phase 1 is for 4 weeks
2. During this phase, the students shall discuss about the Objectives, Literature Survey and plan for project execution.

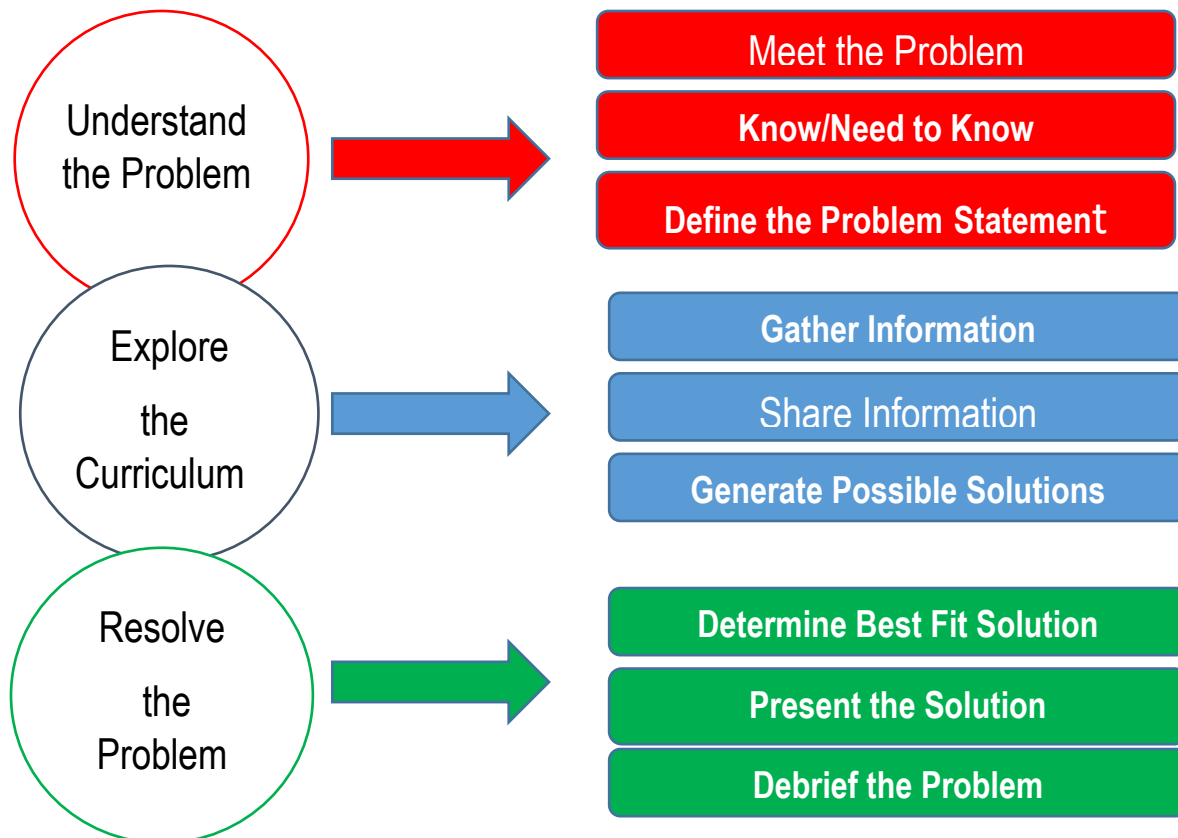
Phase 2:

1. Phase 2 is for 11 Weeks
2. During this phase, the students shall carry out the project under regular supervision of the guide/subject expert, Implementation and give final presentation/demonstration with project documents.

The marks distribution for PBL Work:

1. Phase 1 – 25 Marks
2. Phase 2 – 25 Marks

8. PBL Teaching and Learning Template



9. Practice

- Every week 3 hour is exclusively dedicated to Project Based Learning.
- Assess their progress until they resolve the problem and summarise their learning.
- Provide opportunities for in-depth investigations of worthy topics.
- Allow learners to become more autonomous as they construct personally-meaningful artefacts that are representations of their learning.
- Motivate students by engaging them in their own learning. PBL affords students opportunities for development.
- Building communication, technical and management skills.

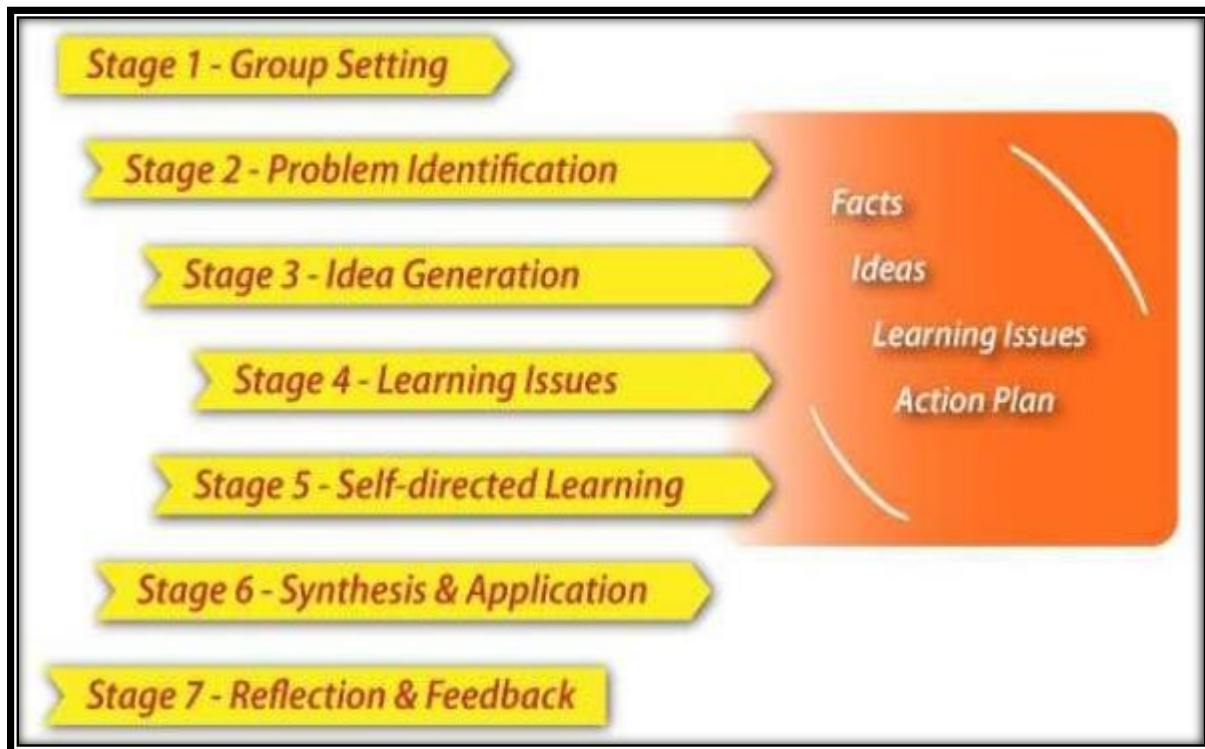
10. Obstacles/Gaps

- Lack of student's interest
- Lack of assessment
- Lack of Basic knowledge
- Lack of consistence attendance and monitoring.
- Lack of abundant time allotment and time management

11. How to Overcome?

- Periodic process – stage wise assessment has to be done.
- Basic Knowledge- A complete guidelines and videos will be provided by the faculty who is handling the respective subject and allotted guide.
- Regular evaluation and periodic monitoring is done by 2 stages.
- For Successful execution and demonstration of end-to-end system, exclusive 3hr/week project time is allotted.

12. Block diagram of PBL



13. Impact Analysis

- It encourages students to draw on their own creativity on problem solving and they learn the bridge gap between theory and practice.
- Final products resulting from project-based learning can be shared with the department at large, thus fostering ownership and technically strong with the subject scenario.

14. PBL – Guidelines

The guidelines are for successful completion of the project and to facilitate effective and uniform conduction of projects by the students. It is expected that these guidelines will help in overall improvement in the quality of the project.

14.1 Main phases of the project

| Sl. No. | Topics | Duration |
|----------------|---|-----------------|
| Phase-1 | | |
| 1. | Understanding of the project and preparing a project plan | 3 Weeks |
| 2. | Literature review | 1 Week |
| 3. | Planning | 1 Week |
| Phase-2 | | |
| 4. | Analysis and Design | 3 Weeks |
| 5. | Implementation | 6 Weeks |
| 6. | Testing | 1 Week |
| 7. | Writing the project report | 1 Week |
| Total | | 16 Weeks |

14.2 Final Presentation Structure

1. Title of the project & Batch Information
2. Agenda / Topics
3. Problem Statement / Project Definition
4. Background / Literature Review
5. Methodology
6. Analysis and Design
7. Implementation
8. Testing
9. Conclusion and Scope for Future Works

14.3 Project Based Learning Report Structure

1. Cover Page
2. Certificate
3. Declaration
4. Acknowledgement
5. Table of Contents
6. List of Tables
7. List of Figures
8. Introduction
9. Background / Literature Review
10. Methodology / Solution
11. Analysis and Design
12. Implementation
13. Results
14. Conclusion and Future Works
15. Bibliography / References
16. Appendices

15. Guidelines to prepare the Project report

- Project reports should be typed neatly only on one side of the paper with 1.5 or double line spacing on a A4 size bond paper (210 x 297 mm).
- The margins should be: Left – 1.25", Right – 1", Top and Bottom – 0.75".
- The total number of reports to be prepared are
 - One copy to the department.
 - One copy to the concerned guide
 - One copy to the candidate.
- Before taking the final printout, the approval of the concerned guide is mandatory and suggested corrections, if any, must be incorporated in the Final Report.
- For making copies dry tone Xerox is suggested.

- An abstract (synopsis) not exceeding 100 words, indicating salient features of the work.

16. Outcome of the project

- Students will gain the knowledge and understand
- To think creatively, work collaboratively.
- Solve complex problems using digital technology.
- Students learn and desire to engage continuous gain about knowledge such as design, analysis, development, implementation and testing.
- Strong written communication skills and the ability to write technical documents that include specification, design, and implementation of a mini project.

Project - Based Learning Rubric

| Score Levels | Content | Conventions | Organization | Presentation |
|--------------|--|--|---|--|
| 5 | <ul style="list-style-type: none"> ▪ Is well thought out and supports the solution to the challenge or question ▪ Reflects application of critical thinking ▪ Has clear goal that is related to the topic ▪ Is pulled from a variety of sources ▪ Is accurate | <ul style="list-style-type: none"> ▪ No spelling, grammatical, or punctuation errors ▪ High-level use of vocabulary and word choice | <ul style="list-style-type: none"> ▪ Information is clearly focused in an organized and thoughtful manner. ▪ Information is constructed in a logical pattern to support the solution. | <ul style="list-style-type: none"> ▪ Multimedia is used to clarify and illustrate the main points. ▪ Format enhances the content. ▪ Presentation captures audience attention. ▪ Presentation is organized and well laid out. |
| 4 | <ul style="list-style-type: none"> ▪ Is well thought out and supports the solution ▪ Has application of critical thinking that is apparent ▪ Has clear goal that is related to the topic ▪ Is pulled from several sources ▪ Is accurate | <ul style="list-style-type: none"> ▪ Few (1 to 3) spelling, grammatical, or punctuation errors ▪ Good use of vocabulary and word choice | <ul style="list-style-type: none"> ▪ Information supports the solution to the challenge or question. | <ul style="list-style-type: none"> ▪ Multimedia is used to illustrate the main points. ▪ Format is appropriate for the content. ▪ Presentation captures audience attention. ▪ Presentation is well organized. |
| 3 | <ul style="list-style-type: none"> ▪ Supports the solution ▪ Has application of critical thinking that is apparent ▪ Has no clear goal ▪ Is pulled from a limited number of sources | <ul style="list-style-type: none"> ▪ Minimal (3 to 5) spelling, grammatical, or punctuation errors ▪ Low-level use of vocabulary and word choice | <ul style="list-style-type: none"> ▪ Project has a focus but might stray from it at times. ▪ Information appears to have a pattern, but the pattern is not consistently | <ul style="list-style-type: none"> ▪ Multimedia loosely illustrates the main points. ▪ Format does not suit the content. ▪ Presentation does not capture audience attention. |

| | | | | |
|---|--|---|--|--|
| 2 | <ul style="list-style-type: none">▪ Provides inconsistent information for solution▪ Has no apparent application of critical thinking▪ Has no clear goal▪ Is pulled from few sources▪ Has significant factual errors, misconceptions, or misinterpretations | <ul style="list-style-type: none">▪ More than 5 spelling, grammatical, or punctuation errors▪ Poor use of vocabulary and word choice | <ul style="list-style-type: none">▪ Content is unfocused and haphazard.▪ Information does not support the solution to the challenge or question.▪ Information has no apparent pattern. | <ul style="list-style-type: none">▪ Presentation appears sloppy and/or unfinished.▪ Multimedia is overused or underused.▪ Format does not enhance content.▪ Presentation has no clear organization. |
|---|--|---|--|--|

Subject Identified for Project Based Learning

| | |
|---|---|
| Semester | III |
| Subject Identified for PBL | Advanced Python Programming |
| Prerequisite | Basic Python, Basics of Scientific computing using python, Object Oriented Concepts |
| Justification for the selected subject | It is required to analyze the data, building projects in different domains like machine learning, E-commerce, healthcare, social media etc. |
| List of possible projects | Educational Tools, Social Media Applications, Healthcare, Transport, E-Commerce, IoT Applications, Machine Learning and Artificial Intelligence, Desktop GUI Applications, Game Development, Web Scraping and Data Mining: Database Applications, Networking and Cybersecurity. (Not limited to) |

Signature of the Guide

Signature of HOD



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| | | | | |
|--|---|--|----------|-----------|
| Semester | : | III | | |
| Course Title | : | Advanced Python Programming | | |
| Course Code | : | BIS306 | | |
| Course Type (Theory/ Practical/ Integrated) | : | Practical | | |
| Category | : | PBL | | |
| Stream | : | Information Science and Engineering | CIE | : 50 |
| Teaching hours/ week (L:T:P:S) | : | 0:2:0:2 | SEE | : 50 |
| Total Hours | : | 30 Hours | SEE | : 2 Hours |
| Credits | : | 02 | Duration | |

Course Learning Objectives: Students will be able to:

| Sl. No | Course Objectives |
|--------|---|
| 1 | Understand the concepts of threading and multi-threading in Python. |
| 2 | Learn usage of Python libraries to implement Date and time, GUI and database interaction. |
| 3 | Illustrate the different aspects of datasets using different modules in Python. |
| 4 | Design and implement the programming concepts of Python to obtain a desired solution for a given problem. |

Teaching-Learning Process

Pedagogical Initiatives:5

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

- Adopt different teaching methods to attain the course outcomes.
- Include videos to demonstrate various concepts in C.
- Encourage collaborative (Group) Learning to encourage team building.
- Ask at least three **HOTS (Higher-order Thinking Skills)** module-wise questions to promote critical thinking.
- 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.
- Show different ways to solve a problem and encourage the students to come up with creative and optimal solutions.
- Discuss various case studies to map with real-world scenarios and improve the understanding.
- Devise innovative pedagogy to improve **Teaching-Learning Process (TLP)**.



Scheme of Teaching and Examinations for BE Programme -2024-25
Outcome Based Education and Choice Based Credit System (CBCS)
(Effective from the Academic Year 2024-25)

DSATM

COURSE CURRICULUM

| Module No. | Topics | Hours |
|-------------------|---|--------------|
| 1 | <p>Threads in Python: Difference between process and thread, Types of threads, Benefits of threads, Creating threads, Single tasking and multitasking, Thread synchronization, Deadlock in threads, Daemon threads.</p> <p>Date and time in Python: Date and time now, combining date and time, Formatting dates and times, Finding durations using “time delta”, Comparing two dates, sorting dates, Stopping execution temporarily, knowing the time taken by a program, Calendar module.</p> <p>Graphical User Interface: Creating a GUI in Python, Widget classes, Working with Fonts and Colours, working with Frames, Layout manager, Event handling.</p> <p>Textbook 1: Chapter 1: 1.1 to 1.8 ; Chapter 2,3</p> <p>Textbook 2: Chapter 3: 3.1, 3.2,3.3.</p> | 5 |
| Pedagogy | Problem Solving | |
| 2 | <p>Introduction to Pandas: NumPy, SciPy: Introduction to Pandas Data Frames, NumPy multidimensional arrays, and SciPy libraries to work with different datasets.</p> <p>Import and Export of Data: Installing, loading and using packages for importing and exporting data in Python.</p> <p>Textbook 3: Chapter 1: 1.4 - 1.7</p> | 5 |
| Pedagogy | Poster Presentation | |
| 3 | <p>Data Preprocessing and Transformation: Handling of missing data, Data cleaning and transformation.</p> <p>Data Visualization: Introduction to Matplotlib, Seaborn, Bokeh, Plotly Libraries with functions.</p> <p>Textbook 3: Chapter 2: 2.1 - 2.3 ; Chapter 3: 3.2 - 3.6</p> | 5 |
| Pedagogy | Demonstration | |

| | |
|--|--|
| | <p>Pedagogical Initiatives (Not limited to):</p> <ul style="list-style-type: none"> • 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 |
|--|--|

| Text Books | |
|-----------------|--|
| Sl. No. | Title of the Book/Name of the author/Name of the publisher/Edition and Year |
| 1 | Practical Programming: An Introduction to Computer Science Using Python 3, Paul Gries , Jennifer Campbell, Jason Montojo, Pragmatic Bookshelf, 3rd Edition, 2018. |
| 2 | Python for Data Analysis, Mckinney, W, O'reilly (SPD), Second edition, 2017. |
| 3 | Python Data Science Handbook, Jake VanderPlas, O'REILLY , 1st Edition,2016 |
| Reference Books | |
| 1 | Advanced Python Programming, Dr. Gabriele Lanaro, Quan Nguyen, SakisKasampalis, Packt Publishing, 2019. |
| 2 | Automate the Boring Stuff with Python, Al Sweigart, No Starch Press, 1 st Edition, 2015. (Available under CC-BY-NC-SA license at https://automatetheboringstuff.com/). |
| 3 | Python Programming Using Problem Solving Approach, Reema Thareja Oxford University Press. |
| 4 | Think Python: How to Think Like a Computer Scientist, Green Tea Press, Allen B. Downey, 2nd Edition, 2015. (Available under CC-BY-NC license http://greenteapress.com/thinkpython2/thinkpython2.pdf). |

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

| CO | Course Outcomes | RBT Level | RBT Level Indicator |
|-----|---|-----------|---------------------|
| CO1 | Understand the concepts of threading, multi-threading, data analysis and visualization in python. | U | L2 |
| CO2 | Apply application-oriented python programming modules to implement Date and time, GUI and database interaction. | A | L3 |
| CO3 | Analyze the different aspects of datasets using different modules in python. | AN | L4 |
| CO4 | Implement the programming concepts of python to obtain a desired solution for a given problem. | C | L6 |

Mapping of Course Outcomes to Program Outcomes:

| CO/PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|
| CO1 | | | | | | | | | | | | | | | |
| CO2 | 3 | | 3 | | | | | | | | | | | | |
| CO3 | | 3 | | | 3 | 3 | | | | | | | 3 | | |
| CO4 | | | | 3 | 3 | 3 | | 2 | 3 | 3 | 3 | 3 | | 3 | |

Weblinks and Video Lectures (e-Resources)

| | |
|----|---|
| 1 | https://onlinecourses.nptel.ac.in/noc22_cs31/preview |
| 2 | https://onlinecourses.swayam2.ac.in/cec22_cs20/preview |
| 3 | https://www.youtube.com/watch?v=7v_TVJHodil |
| 4 | https://www.coursera.org/courses?query=python&productDifficultyLevel=Advanced |
| 5 | https://warin.ca/ressources/books/2019_Book_AdvancedGuideToPython3Programm.pdf |
| 6 | https://www.youtube.com/watch?v=2660m0fVgn0&list=PLI4OVrCFuY57b_16D8xs7-hmABHncVD_w |
| 7 | https://www.geeksforgeeks.org/advanced-python-tutorials/ |
| 8 | https://github.com/methylDragon/coding-notes/blob/master/Python%203/04%20Python%203%20-%20Advanced%20Concepts.md |
| 9 | https://www.javatpoint.com/advance-concepts-of-python-for-python-developer |
| 10 | https://www.slideshare.net/slideshow/advance-python-programming/244945363 |



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6 Programs Accredited by **NBA**
(CSE, ISE, ECE, EEE, MECH, CV)

Project Based Learning - Batch

From,

Date:

Name: & USN:

Name: & USN:

Name: & USN:

Name: & USN:

Semester:

Respected Sir/Madam,

Sub: Regarding PBL Batch

With respect to the above subject, we are the students mentioned above would like to form the batch for carrying out the mini project on.....

Thanking you,

Yours faithfully

| Sl. No. | Name of the student | Signature |
|---------|---------------------|-----------|
| 1. | | |
| 2. | | |
| 3. | | |
| 4. | | |

Signature of the Guide

Name of the Guide Designation

Department of Engineering



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(CSE, ISE, ECE, EEE, MECH, CV)

Project Based Learning – Student(s) – Guide – Interaction

| | | |
|--------------------------------------|--|--|
| Date | | |
| PBL Batch No. | | |
| Title of the project | | |
| Week No. | | |
| Content of the Discussion | | |
| Suggestion by the guide | | |
| Name of Signature of students | | |
| | | |
| | | |
| | | |

Signature of the Guide

Signature of PBL Coordinator

Signature of HOD



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Project Based Learning – Continuous Evaluation

| Batch No. | Name | USN | Marks assigned | Remarks by the guide on the progress of the project |
|-----------|------|-----|----------------|---|
| | | | | |
| | | | | |
| | | | | |
| | | | | |

Signature of the Guide

Signature of PBL Coordinator

Signature of HOD



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Project Based Learning – Review

CONTINUOUS INTERNAL ASSESSMENT

| Batch No. | Name of the Student | USN | Phase I (25 Marks) | | Phase II (25 Marks) | | Final CIE Marks (Phase I & Phase II) (50 Marks) |
|-----------|---------------------|-----|---|------------------------------|---------------------------|-------------------------|---|
| | | | Abstract / Understanding of the Project (5 Marks) | Analysis & Design (20 Marks) | Implementation (20 Marks) | Demonstration (5 Marks) | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

Signature of the Guide

Signature of PBL Coordinator

Signature of HOD



Dayananda Sagar Academy of Technology & Management
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ABILITY ENHANCEMENT COURSE

EXPERIENTIAL LEARNING

1. (a) Define Objectives

| | |
|--|--|
| Identify Goals: Determine what skills and knowledge you want students to acquire through Experiential Learning. | |
| Learning Goal (LG)-1 | Illustrate the Semantic Structure of XHTML and CSS. |
| Learning Goal (LG) -2 | Create forms and tables using HTML and CSS. |
| Learning Goal (LG) -3 | To get familiarity with the JavaScript language and Document Object Model handling of Java Script. |
| Learning Goal (LG)-4 | Design Client and Server-Side programming using JavaScript and PHP. |

(b) Course Outcomes

| | |
|--|---|
| Identify Goals: Determine what skills and knowledge you want students to acquire through Experiential Learning. | |
| Course Outcomes (CO)-1 | Apply XHTML and CSS syntax and semantics to build web pages. |
| Course Outcomes (CO)-2 | Analyze the forms with tables using HTML and CSS. |
| Course Outcomes (CO)-3 | Design Client-Side Scripts using JavaScript. |
| Course Outcomes (CO)-4 | Develop Server-Side Scripts using PHP to insert and retrieve the contents. |
| Course Outcomes (CO)-5 | Implement a web based mini projects using XHTML, JavaScript and PHP. |

(c) Alignment

| Align with Curriculum: Ensure these goals align with the overall educational objectives of the engineering program. | | | | | | |
|--|----------------|-----------------|-------------------------------|-------------------|------------------------|-----------|
| SI.No | Learning Goals | Course Outcomes | Assessment | In-Class Activity | Out-of- Class Activity | Weightage |
| 1. | LG-1 | CO-1 | Program Conduction | In –Lab Execution | | 10% |
| 2. | LG-2 | CO-2 | Program Conduction | In –Lab Execution | | 20% |
| 3. | LG-3 | CO-3 | Program Conduction | In –Lab Execution | | 30% |
| 4. | LG-4 | CO-4 | Program Conduction | In –Lab Execution | Open ended programs | 30% |
| 5. | LG-1 to LG-4 | CO-5 | Demonstration of Mini Project | | Mini Project | 10% |


2. Curriculum Design

(a) Course integration

| Course Integration: Identify which courses can incorporate experiential learning activities. This can include project-based courses, labs, internships, and workshops. | | | |
|---|----------------|-------------|--|
| SI.No | Course Name | Course Code | Justification for selecting the Course for Experiential Learning |
| 1. | OOPS with Java | | Course is thought with basic of object oriented programming with Java. Students are engaged in programming with real world problems. |

(b) Develop Modules

| Develop Modules: Create specific modules within these courses that focus on hands-on experiences. | | | | | | | | |
|--|-------------|---|------------|---------------------|------------------------|------------------|--------------|-------------|
| Module No | Lecture No. | Lab Programs | RBT Levels | Activities Planned | Course Outcome Mapping | Mode of Delivery | Planned Date | Actual Date |
| 1 | 2 | Introduction to XHTML: Basic syntax, Standard XHTML document structure, Basic text markup, Images, Hypertext Links, Lists, Tables. Forms, Frames in XHTML | L2 | Peer Group Learning | CO-1 | PPT | | |
| 1 | 2 | Introduction to CSS: Levels of style sheets, Style specification formats, Selector forms, Property value forms | L2 | Mind Mapping | CO-2 | Chalk and Talk | | |
| 2 | 2 | Java Script: General syntactic characteristics, Primitives, Operations, and expressions; Screen output and keyboard input. Control statements, Arrays, strings, Functions, Element access in JavaScript. | L2 | Brain Storming | CO-3 | PPT | | |
| 2 | 2 | PHP: Overview of PHP, General syntactic characteristic, Arrays, \$_GET and \$_POST Reading/Writing Files, Form handling, Files, Cookies, Session tracking, Database access with PHP and MySQL. | L2 | Problem Solving | CO-4 | Video Lectures | | |
| Experiment - 1 | 1 | Apply XHTML knowledge to accomplish the following using tags: i) A paragraph containing text "All that glitters are not gold". Bold face and italicize this text ii) Create equation: $x = 1/3(y_1^2 + z_1^2)$ iii) Put a background image to a page and demonstrate all attributes of background image iv) Create unordered list of 5 fruits and ordered list of 3 flowers | L3 | Lab Execution | CO-1 | PC | | |

| | | | | | | | | | | | | | | | | | | | | | |
|------------------------------|-------------|--|-------------------|-----------------------------|-----------------|-----------------|-----------------|-------------|-----------------|-----------------|-----------------|-------------|-----------------|-----------------|-----------------|-----------|-----------------------------|-------------|-----------|--|--|
| <p>Experiment - 2</p> | <p>2</p> | <p>Create following table using XHTML tags. Properly align cells, give suitable cell padding and cell spacing, and apply background color, bold and emphasis necessary.</p> <table border="1" data-bbox="443 344 1182 746"> <tr> <td rowspan="9" style="background-color: #ADD8E6; text-align: center; vertical-align: middle;">Department</td> <td rowspan="3" style="background-color: #9370DB; text-align: center; vertical-align: middle;">Sem1</td> <td><i>SubjectA</i></td> </tr> <tr> <td><i>SubjectB</i></td> </tr> <tr> <td><i>SubjectC</i></td> </tr> <tr> <td rowspan="3" style="background-color: #9370DB; text-align: center; vertical-align: middle;">Sem2</td> <td><i>SubjectE</i></td> </tr> <tr> <td><i>SubjectF</i></td> </tr> <tr> <td><i>SubjectG</i></td> </tr> <tr> <td rowspan="3" style="background-color: #9370DB; text-align: center; vertical-align: middle;">Sem3</td> <td><i>SubjectH</i></td> </tr> <tr> <td><i>SubjectI</i></td> </tr> <tr> <td><i>SubjectJ</i></td> </tr> </table> | Department | Sem1 | <i>SubjectA</i> | <i>SubjectB</i> | <i>SubjectC</i> | Sem2 | <i>SubjectE</i> | <i>SubjectF</i> | <i>SubjectG</i> | Sem3 | <i>SubjectH</i> | <i>SubjectI</i> | <i>SubjectJ</i> | <p>L6</p> | <p>Lab Execution</p> | <p>CO-2</p> | <p>PC</p> | | |
| Department | Sem1 | <i>SubjectA</i> | | | | | | | | | | | | | | | | | | | |
| | | <i>SubjectB</i> | | | | | | | | | | | | | | | | | | | |
| | | <i>SubjectC</i> | | | | | | | | | | | | | | | | | | | |
| | Sem2 | <i>SubjectE</i> | | | | | | | | | | | | | | | | | | | |
| | | <i>SubjectF</i> | | | | | | | | | | | | | | | | | | | |
| | | <i>SubjectG</i> | | | | | | | | | | | | | | | | | | | |
| | Sem3 | <i>SubjectH</i> | | | | | | | | | | | | | | | | | | | |
| | | <i>SubjectI</i> | | | | | | | | | | | | | | | | | | | |
| | | <i>SubjectJ</i> | | | | | | | | | | | | | | | | | | | |
| <p>Experiment - 3</p> | <p>3</p> | <p>Create following calculator interface with XHTML and CSS</p>  | <p>L6</p> | <p>Lab Execution</p> | <p>CO-2</p> | <p>PC</p> | | | | | | | | | | | | | | | |
| <p>Experiment - 4</p> | <p>4</p> | <p>Design a web page using JavaScript program to displays scrolling text which moves from left to right with a small delay, upon clicking a button.</p> | <p>L5</p> | <p>Lab Execution</p> | <p>CO-3</p> | <p>PC</p> | | | | | | | | | | | | | | | |

| | | | | | | | | |
|-------------------|---|---|----|---------------|------|----|--|--|
| Experiment - 5 | 5 | Develop and demonstrate a XHTML file that includes JavaScript script for the following problems: a) Input: A number n obtained using prompt. Output: The first n Fibonacci numbers. b) Input: A number n obtained using prompt. Output: A table of numbers from 1 to n and their squares using alert. | L6 | Lab Execution | CO-3 | PC | | |
| Experiment - 6 | 6 | Develop and demonstrate a XHTML file that includes JavaScript script that uses functions for the following problems: a) Parameter: A string Output: The position in the string of the left-most vowel. b) Parameter: A number Output: The number with its digits in the reverse order. | L6 | Lab Execution | CO-3 | PC | | |
| Experiment - 7 | 7 | Create a webpage containing 3 overlapping images using XHTML, CSS and JS. Further when the mouse is over any image, it should be on the top and fully displayed. | L6 | Lab Execution | CO-3 | PC | | |
| Experiment - 8 | 8 | Write a PHP program to store current date-time in a COOKIE and display the 'Last visited on' date-time on the web page upon reopening of the same page. | L4 | Lab Execution | CO-4 | PC | | |
| Experiment - 9 | 9 | Create a XHTML form with Name, Address Line 1, Address Line 2, and E-mail text fields. On submitting, store the values in MySQL table. Retrieve and display the data based on Name. | L6 | Lab Execution | CO-4 | PC | | |

| | | | | | | | | |
|-----------------|----|--|----|---------------|------|----|--|--|
| Experiment - 10 | 10 | Using PHP and MySQL, develop a program to accept book information viz. Accession number, title, authors, edition and publisher from a web page and store the information in a database and to search for a book with the title specified by the user and to display the search results with proper headings. | L6 | Lab Execution | CO-4 | PC | | |
|-----------------|----|--|----|---------------|------|----|--|--|

3. Mapping of Learning objectives with Learning Outcomes

| Course/Modules | Learning Objective | Learning Outcome | Assessment Method |
|--------------------|--------------------|------------------|-----------------------------------|
| Experiment 1 | LO-1 | CO-1 | Program Conduction in Lab |
| Experiment 2, 3 | LO-2 | CO-2 | Program Conduction in Lab |
| Experiment 4,5,6,7 | LO-3 | CO-3 | Program Conduction in Lab |
| Experiment 8,9,10 | LO-4 | CO-4 | Program Conduction in Lab |
| Mini Project | LO1-LO4 | CO-5 | Demonstration of the Mini Project |

4. Partnerships and Resources

| Industry Collaboration: Establish partnerships with local industries and organizations to provide real-world projects, internships, and site visits. | | | | |
|---|------------------------------------|--|--------------------------------------|--|
| Sl. No. | Name of the Industry Collaboration | Projects undertaken / Industrial Visit | Domain | Project Outcomes |
| 1. | ATAL Incubation Centre, DSU | Industrial Visit | Computer Science- Web Development | Web page/app for the Mini Project on real world problems |

Implement Experiential Activities

| PBL Component | Details |
|----------------------------|--|
| Project Title | Mini Project on Web Application |
| Real-World Problem | The following projects can be considered as realworld problems. [Not Limited to] <ol style="list-style-type: none">1. TOURISM2. AGRICULTURE, FOODTECH & RURAL DEVELOPMENT3. SMART EDUCATION4. SMART AUTOMATION |
| Learning Objectives | Subject Areas: Web Programming (BIS307) Skills Developed: XHTML, JavaScript, PHP, MySQL |
| Timeline | Start Date: First day of the semester Milestones/Checkpoints: <ol style="list-style-type: none">1. Understand the SDLC process of the project: 1-3weeks2. Design and Implement the project: 4-8 weeks3. Evaluate the working of the project: 9-10 weeks4. Demonstrate and report submission: 11-12 weeks End Date: Last day of the semester |

| | |
|-------------------------------|---|
| Resources Needed | <p>Materials: computer systems</p> <p>Technology: MySQL, PHP and JavaScript</p> <p>Guest Speakers/Experts: ATAL DSU</p> |
| Team Formation | <p>Group Size: 4members</p> <p>Team Roles: Analysis, Design, Develop and Test</p> |
| Background Information | Basic programming skills |
| Research Methods | <p>Primary Sources: [List methods such as interviews, surveys]</p> <p>Secondary Sources: [List methods such as articles, books, videos]</p> |
| Team Meetings | <p>Frequency: Once in a Month</p> <p>Structure: Based on their SDLC stage the review for the progress and suggestions given</p> |
| Collaboration Tools | <p>Digital Platforms: Google sites, Apache webserver, MySQL database, PHP</p> <p>Communication Methods: In-Person meetings, presentations, demonstration.</p> |
| Project Deliverables | <ol style="list-style-type: none"> 1. Discovery. 2. Strategy. 3. Visual and User Experience Design. 4. Web Development. 5. Content Integration. 6. Quality Assurance. 7. Deployment. 8. Report on project |

| | |
|----------------------------|---|
| Presentation Format | Options: PowerPoint, Team Demonstration Audience: classmates Schedule: Presentation schedule: 11 th week |
| Project Exhibition | <ul style="list-style-type: none">• Defining the Purpose and Theme• Setting Goals• Form an Organizing Committee: Invite Participants• Choose a Venue• Set a Budget for the exhibition• Create a Timeline to host |

Experiential Learning - Batch

From,

Date:

Name: & USN:

Name: & USN:

Name: & USN:

Name: & USN:

Semester:

Respected Sir/Madam,

Sub: Regarding Experiential Learning Batch

With respect to the above subject, we are the students mentioned above would like to form the batch for carrying out the mini project on.....

Thanking you,

Yours faithfully

| Sl. No. | Name of the student | Signature |
|---------|---------------------|-----------|
| 1. | | |
| 2. | | |
| 3. | | |
| 4. | | |

Signature of the Guide

Name of the Guide Designation

Department of Engineering

Experiential Learning (EL) – Student(s) – Guide – Interaction

| | | |
|--------------------------------------|--|--|
| Date | | |
| EL Batch No. | | |
| Title of the project | | |
| Week No. | | |
| Content of the Discussion | | |
| Suggestion by the guide | | |
| Name of Signature of students | | |
| | | |
| | | |
| | | |

Signature of the Guide

Signature of HOD

Assessment

Rubrics for Project-Based Learning Assessment

| Sl. No | Name of the Student | USN | Criteria | Exemplary (4) | Proficient (3) | Developing (2) | Beginning (1) | Total |
|--------|---------------------|-----|------------------------------|--|--|---|---|-------|
| | | | Project Understanding | Demonstrates deep understanding of project goals and requirements; identifies key issues and objectives. | Shows good understanding of project goals and requirements; recognizes most key issues and objectives. | Displays basic understanding of project goals and requirements; some key issues and objectives are unclear. | Lacks clear understanding of project goals and requirements; key issues and objectives are misunderstood. | |
| | | | Technical Competence | Mastery of technical skills required for the project; applies skills effectively and efficiently. | Good technical skills; applies skills competently with few errors. | Basic technical skills; occasionally makes errors in application. | Limited technical skills; frequently makes errors in application. | |

| | | | | | | | | |
|--|--|--|---------------------------|---|--|--|--|--|
| | | | Innovation | Highly creative and original ideas; shows significant innovation and out-of-the-box thinking. | Somewhat creative and original ideas; demonstrates innovation in some aspects. | Limited creativity and originality; shows minimal innovation. | Lacks creativity and originality; no evidence of innovative thinking. | |
| | | | Problem Solving | Identifies problems accurately and develops effective, comprehensive solutions. | Identifies problems correctly and develops good solutions. | Identifies problems but solutions are somewhat effective or incomplete. | Struggles to identify problems and develop effective solutions. | |
| | | | Project Management | Manages project timelines, resources, and tasks exceptionally well; meets all deadlines. | Manages project timelines, resources, and tasks effectively; meets most deadlines. | Manages project timelines, resources, and tasks with some difficulty; misses some deadlines. | Poor management of project timelines, resources, and tasks; frequently misses deadlines. | |
| | | | Documentation | Thorough, clear, and well-organized documentation; all necessary details included. | Clear and organized documentation; most necessary details included. | Basic documentation; some necessary details are missing or unclear. | Poor documentation; lacks necessary | |

| | | | | | | | | |
|--|--|--|----------------------------|--|--|---|---|--|
| | | | | necessary details included. | | | details and organization. | |
| | | | Presentation Skills | Engaging and well-organized presentation; communicates ideas clearly and effectively. | Good presentation; communicates ideas clearly but lacks some engagement or organization. | Basic presentation; some ideas are unclear or poorly organized. | Ineffective presentation; ideas are unclear and poorly organized. | |
| | | | Collaboration | Works exceptionally well with team members; shows strong teamwork and leadership skills. | Works well with team members; demonstrates good teamwork. | Works with team members but has some difficulties in collaboration. | Struggles to work with team members; lacks teamwork and collaboration skills. | |
| | | | Faculty Assessment | Meets or exceeds faculty expectations in all areas; shows exceptional performance. | Meets faculty expectations in most areas; shows good performance. | Meets some faculty expectations; shows average performance. | Does not meet faculty expectations; shows poor performance. | |

| | | | | | | | | |
|--|--|--|---------------------------|---|--|---|---|--|
| | | | Reflection | Provides deep insights and critical analysis of own work; demonstrates significant learning and growth. | Provides good insights and analysis of own work; demonstrates learning and growth. | Provides basic insights and analysis of own work; shows some learning and growth. | Provides minimal or no insights and analysis of own work; shows little to no learning and growth. | |
| | | | Overall Assessment | Exceptional overall performance; exceeds expectations in most or all areas. | Good overall performance; meets expectations in most areas. | Average overall performance; meets expectations in some areas. | Poor overall performance; does not meet expectations in most areas. | |

| Text Books | |
|------------------------|---|
| Sl. No. | Title of the Book/Name of the author/Name of the publisher/Edition and Year |
| 1 | Programming the World Wide Web, Robert.W.Sebesta ,Fourth Edition, Pearson Education,2007 |
| 2 | Fundamentals of Web Development, Randy Connolly, Ricardo Hoar, Fourth Edition, Pearson Education India. (ISBN:978-9332575271), 2016 |
| Reference Books | |
| 1 | Internet & World Wide Web How to program, M.Deitel, P.J.Deitel, A.B.Goldberg 4th Edition, Pearson Education / PHI, ISBN-13: 978-8131725221, 2009. |
| 2 | Internet & World Wide Web How to Program, Deitel, Goldberg, Third Edition, PearsonEducation,2006 |
| 3 | The Web Warrior Guide to Web Design Technologies, Sklar 1st Edition, Cengage Learning India, ISBN-13: 978-8131514764, January 2011. |

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

| CO | Course Outcomes | RBT Level | RBT Level Indicator |
|-----|--|-----------|---------------------|
| CO1 | Apply XHTML and CSS syntax and semantics to build web pages. | Apply | L3 |
| CO2 | Analyze the forms with tables using HTML and CSS. | Analyze | L4 |
| CO3 | Design Client-Side Scripts using JavaScript. | Evaluate | L5 |
| CO4 | Develop Server-Side Scripts using PHP to insert and retrieve the contents. | Create | L6 |
| CO5 | Implement a web based mini projects using XHTML, JavaScript and PHP. | 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 | PSO3 |
|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|
| CO1 | 3 | | | | | | | | | | | | 3 | | |
| CO2 | | 3 | | | | | | | | | | | | | |
| CO3 | | | 3 | | | | | | | | | | | 3 | |
| CO4 | | | | 3 | | | | | | | | | | 3 | |
| CO5 | | | 3 | 2 | 2 | | | 2 | 2 | 2 | | 3 | | 3 | |

Weblinks and Video Lectures (e-Resources)

| | |
|-----------|---|
| 1 | Fundamentals of WEB Programming: https://www.youtube.com/watch?v=DR9dr6gxhDM |
| 2 | https://nptel.ac.in/courses/106/105/106105084/ |
| 3 | https://www.edx.org/learn/web-development |
| 4 | Coursera–Web Application Technologies and Django: https://www.coursera.org/learn/django-database-web-apps |
| 5 | Coursera-Web Design: Wire frames to Prototypes: https://www.coursera.org/learn/web-design-wireframes-prototypes |
| 6 | HTML and XHTML: https://www.youtube.com/watch?v=A1XIIDDXgwg |
| 7 | CSS: https://www.youtube.com/watch?v=J35jug1uHzE |
| 8 | Java Script and HTML Documents: https://www.youtube.com/watch?v=Gd0RBdFRvF0 |
| 9 | Dynamic Documents with JavaScript: https://www.youtube.com/watch?v=HTFSIJALNKc |
| 10 | Tutorial Links: http://www.tutorialspoint.com |
| 11 | Tutorial Links: http://www.w3schools.com |

**SOCIAL CONNECT
&
RESPONSIBILITY (SCR)**

1 Credit Course – Practical + Planning

Assessment Details (both CIE and SEE)

NO SEE – Semester End Exam – Completely Practical and activities based evaluation

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. | Case study-based Assessment, Individual performance |
| 6. | Sector/ Team wise study and its consolidation |
| 7. | Video based seminar for 10 minutes by each student at the end of semester with Report. |

- Each student should do activities according to the scheme and syllabus.
- At the end of semester student performance has to be evaluated by the faculty for the assigned activity progress and its completion.
- At last consolidated report of all activities from 1st to 5th, compiled report should be submitted as per the instructions and scheme.

Assessment Details for CIE (both CIE and SEE)

| Weightage | CIE – 100% | <ul style="list-style-type: none">● Implementation strategies of the project (NSS work).● The last report should be signed by NSS Officer, the HOD and principal.● At last report should be evaluated by the NSS officer of the institute. |
|--|-------------------|--|
| 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. Activities 1 to 5, 5*5 = 25 | 25 Marks | |
| Total marks for the course in each semester | 100 Marks | |

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.

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.

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 guidelines of scheme & syllabus.

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

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. | Plantation and adoption of a tree: | 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. | Heritage walk and crafts corner: | 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. | Waste management and Animal adoption | 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. | Water conservation: | 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. | Food walk: Practices in societ | May be individual or team | Villages/ City Areas / Grama panchayat/ public associations/ Governme nt 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 |



Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

| | | | | | |
|--|---|-------------------------------------|--------------|---|--------|
| Semester | : | III | | | |
| Course Title | : | Social Connect & Responsibility | | | |
| Course Code | : | BIS308 | | | |
| Course Type (Theory/ Practical/ Integrated) | : | Practical | | | |
| Category | : | SCR | | | |
| Stream | : | Information Science and Engineering | CIE | : | 100 |
| Teaching hours/ week (L:T:P:S) | : | 0:0:2:0 | SEE | : | NA |
| Total Hours | : | 15 Hours | CIE Duration | : | 1 Hour |
| Credits | : | 01 | | | |

Course Learning Objectives: Students will be able to:

| Sl. No. | Course Objectives |
|---------|---|
| 1 | Understand the environment to build and elevate nature to the society. |
| 2 | Explore the ancient monument with team, connecting to society with creative idea. |
| 3 | Demonstrate planning, organizational and management skills. |

Teaching-Learning Process

General Instructions - Pedagogy:

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

- 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.
- State the need for activities and its present relevance in the society and Provide real-life examples.
- Support and guide the students for self-planned activities.
- You will also be responsible for assigning homework, grading assignments and quizzes, and documenting students' progress in real activities in the field.
- Encourage the students for group work to improve their creative and analytical skills



DSATM

Scheme of Teaching and Examinations for BE Programme -2024-25

Outcome Based Education and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2024-25)

COURSE CURRICULUM

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.

| Module No. | Topics | Hours |
|------------|--|-------|
| 1 | Plantation and adoption of a tree: Plantation of a tree that will be adopted for four years by a group of BE students. They will also make an excerpt either as a documentary or a photoblog describing the plant's origin, its usage in daily life, and its appearance in folklore and literature. | 8 |
| 2 | 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. | 8 |
| 3 | Animal adoption and Waste Management: Community Clean-Up Events and Pet -Adopting animals for shelters- Objectives, Visit, case study, report, outcomes, documentary or photo blog presenting the current practices. | 8 |
| 4 | Water conservation: Water Conservation Workshops about water-saving techniques, Educational Campaigns in Schools on Protection of Local Water Resources , - Objectives, Visit, case study, report, outcomes, documentary or photo blog presenting the current practices | 8 |
| 5 | Food Walk: Cooking without fire recipes with Tasting and Learning Sessions, Food Waste Awareness Healthy on Eating, Charitable Initiatives – Objectives, Visit, case study, report, outcomes, implementation in the campus, documentary or photo blog presenting the current practices. | 8 |

