Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

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

Scheme of Teaching and Examinations – 20B
Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
(Effective from 2024-25) 2023 Scheme

1st SEMESTER: CHEMISTRTY CYCLE (Computer Science Stream) – Information Science & Engineering (ISE)

Sl. No	Course Code	Course Title	Course Category	BOS	TD	Teaching Hours/Week					Credits	Examination			
						Lecture L	Tutorial T	Practical P	Project S	Total		SEE Duration (Hrs)	CIE Marks	SEE Marks	Total Marks
1	BMATS101	Engineering Mathematics for CSE Stream	ASC	MAT	MAT	3	2	0	0	5	4	3	50	50	100
2	BCHES102	Applied Chemistry for Computer Science Stream	ASC	CHE	CHE	2	2	2	0	6	4	3	50	50	100
3	BCECE105	Introduction to Electronics Engineering	CEC-1	ECE	ECE	3	0	0	0	3	3	3	50	50	100
4	BESCS101	Principles of Programming using C	ESC	ISE	ISE	2	0	2	0	4	3	3	50	50	100
5	BESCM102	Computer Aided Engineering Drawing	ESC	MED	MED	2	0	2	0	4	3	3	50	50	100
6	BCENC106	Communicative English	HSSC	HSS	HSS	1	0	0	0	1	1	2	50	50	100
7	BSBKC107	Samskruthika Kannada/Balake Kannada	HSSC	HSS	HSS	1	0	0	0	1	1	2	50	50	100
8	BIDTC108	Innovation Design and Thinking	AEC/SDC	ALD	ALD	1	0	0	0	1	1	2	50	50	100
					Total	**15**	**4**	**6**	**0**	**25**	**20**	**21**	**400**	**400**	**800**

2nd SEMESTER: PHYSICS CYCLE (Computer Science Stream) – Information Science & Engineering (ISE)

Sl. No	Course Code	Course Title	Course Category	BOS	TD	Teaching Hours/Week					Credits	Examination			
						Lecture L	Tutorial T	Practical P	Project S	Total		SEE Duration (Hrs)	CIE Marks	SEE Marks	Total Marks
1	BMATC201	Engineering Mathematics-2	ASC	MAT	MAT	3	2	0	0	5	4	3	50	50	100
2	BPHYS202	Applied Physics for Computer Science Stream	ASC	PHY	PHY	2	2	2	0	6	4	3	50	50	100
4	BCECV201	Introduction to Civil Engineering	CEC-2	CED	CED	3	0	0	0	3	3	3	50	50	100
3	BETCS203	Introduction to IOT	ETC	CSE(AI)	ISE	2	0	0	2	4	3	3	50	50	100
5	BPLCS201	Introduction to Python Programming	PLC	ISE	ISE	2	0	2	0	4	3	3	50	50	100
6	BCENC206	Professional writing skills in English	HSSC	HSS	HSS	1	0	0	0	1	1	2	50	50	100
7	BICNC207	Indian Constitution	HSSC	MED	MED	1	0	0	0	1	1	2	50	50	100
8	BEEXC208	Engineering Exploration	AEC/SDC	ALD	ALD	0	0	0	2	2	1	2	50	50	100
					Total	**13**	**6**	**4**	**4**	**27**	**20**	**21**	**400**	**400**	**800**

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

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

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Understand the basics of computers and C programming.
2	Learn the concepts of functions, and strings using C programming.
3	Study different searching, sorting techniques, and file handling in C.
4	Explore user-defined data structures such as arrays, pointers, and structures in implementing solutions to problems.
5	Design and develop solutions to problems using a structured programming approach.

Teaching-Learning Process

Pedagogical Initiatives:

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

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

DSATM

Scheme of Teaching and Examinations for BE Programme -2023-24

Outcome Based Education and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2023-24)

COURSE CURRICULUM

Module No.	Topics	Hours
1	**Introduction to C:** Fundamentals of computing, flowcharts, pseudocodes, algorithm, data types, variables, constants, preprocessors, introduction to C, structure of C program, files used in a C program, compilers, compiling and executing C programs, types of Errors, applications of C language.	5
Pedagogy	**Peer Group Learning** provides an opportunity for the students to learn from one-another.	
2	**Operators and expressions in C:** Operators in C: arithmetic, relational, equality, logical, assignment, unary, conditional, bitwise operator, Increment and decrement operator, Conditional Operator, operator precedence, keywords and identifiers, type conversion and typecasting. **Decision control and Looping statements:** Introduction to decision control, Conditional branching statements, iterative statements, nested loops, break and continue statements, goto statement.	5
Pedagogy	**Mind Mapping** encourages innovative thinking to solve problems.	
3	**Functions:** Basics of functions, function call, return statement, passing parameters to functions, scope of variables, storage classes, recursive and non-recursive functions. **Arrays:** Declaration of arrays, accessing the elements of an array, storing values in arrays, operations on arrays, one-dimensional array, multidimensional arrays, passing arrays to functions, applications of arrays	6
Pedagogy	**Think Pair and Share** provides an opportunity for the students to learn from one-another.	
4	**Strings:** Introduction, string taxonomy, operations on strings, miscellaneous string and character functions, arrays of strings: **Pointers:** Introduction to pointers, declaring pointer variables, pointer to pointer, passing arguments to functions using pointers, Array of pointers, Dynamic memory allocation functions malloc/realloc/free. **Structure and Union:** Introduction, structures and functions, Unions, unions inside structures, Self-referential structures.	6
Pedagogy	**Brain Storming** encourages cognitive thinking and enables creative problem solving.	
5	**Searching algorithm:** Linear search, Binary search. **Sorting algorithm:** Selection sort, Insertion sort, Bubble sort. **File Handling:** Introduction, Using files, Read and Write Operations on files	6
Pedagogy	**Demonstration** exhibits the implementation process.	

List of Experiments or Programs

Sl.No	Experiments/Programs	COs
1	Write a C program to implement a Simple Calculator.	CO1
2	Compute the roots of a quadratic equation by accepting the coefficients. Print appropriate messages.	CO1
3	Write a C program for the following condition, Assume a Car servicing Center. Every service request by the Car Service Center the given charges are levied along with taxes. a. Car water wash - Rs. 500 + 10% tax b. Oil in the Engine must be at least 300 ml. If it goes below 300 ml (Ask the user to input the current level of oil in the engine), top up is done by the agency (the value of top up is given by the user so that level is at least 300 ml). Cost of 1 ml is Rs. 5 + 12.5% tax. 1. Define suitable variables to capture the above 2 parameters and corresponding taxes 2. Compute the total amount to be paid. 3. Display the total with 17 places which includes 7 places for fraction. The integer part of the total must be prefixed with 0's and a sign, if required.	CO2
4	Implement a C program to read the values from the user today's date and your Date of birth in the format dd-mm-yyyy. Consider your sleeping time 8 hours a day, read 12 hours and spend 1.5 hours a day for eating. Calculate how many minutes have you spent as of this date for Sleeping and Eating. The number of years you have spent for reading as of this date (amount of time spent for reading in years).	CO2
5	Implement Matrix multiplication and validate the rules of multiplication using C Program.	CO2
6	Write a C Program to input even & odd elements of an array in two separate arrays. The program first finds the odd and even elements of the array. Then the odd elements of an array are stored in one array and even elements of an array is stored in another array	CO3
7	Write functions to implement string operations such as compare, concatenate, and find string length. Use the parameter passing techniques.	CO3
8	Write a C program to define a structure to represent a cricketer's information (name, runs, average). Read the data corresponding to N Cricketer's in a structure array. The space for the array of structures should be determined at run-time by user input.	CO3
9	Write a C Program to Implement linear search and binary search.	CO4
10	Write a C Program to Implement Bubble Sort.	CO4
11	Write a C program to read employee information (Name, Designation, Salary) from the user and write it to a file.	CO4
	Open ended Programs	
1	Demonstrate the use of an array of pointers.	CO3
2	Develop a 'C' program to calculate the gravitational pull between two objects.	CO3
3	Demonstrate a simple units convertor for distance, temperature, and liquid volume.	CO3
4	Calculate the displacement for an automobile.	CO4

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

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

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

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

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

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

The theory part of the IPCC shall be evaluated both by CIE and SEE. The practical part shall be evaluated by only CIE (no SEE). However, questions from the practical part of IPCC shall be included in the SEE question paper. This course is common to all branches of first year B.E/B.Tech. 2023-24 regulation.

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

Reference Books

Sl. No.	Title of the Book/Name of the author/Name of the publisher/Edition and Year
1	Computer fundaentals and programming in c, “Reema Thareja”, Oxford University, Second edition, 2017.
2	C: How to program, H. M. Deitel, P. J. Deitel, 7th edition, Pearson Education, 2010.
3	Programming in ANSI C, E.Balaguruswamy, 7th Edition, Tata McGraw-Hill,2019.
4	C Programming for Dummies, Dan Hookin, 2nd Edition, John Wiley & Sons, 2021.
5	C, The Complete Reference is a book on computer programming, Herbert Schildt, McGraw Hill Education , 4th Edition, 2017.

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

CO	Course Outcomes	RBT Level	Level Indicator
CO1	**Understand** the basics of programming in C	U	L2
CO2	**Apply** the knowledge of Functions, Strings using C Programming	A	L3
CO3	**Analyse** the user-defined data structures such as Arrays, Pointers and Structures in implementing solutions to problems.	An	L4
CO4	**Implement** different searching, sorting techniques, and file handling operations.	C	L5
CO5	**Develop** solutions to problems using structured programming approach	C	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	--	--	--	--	--	--	--	--	--	--	--	--
CO5	--	--	--	3	--	--	--	--	3	--	--	3	--	--	--

List of AI Tools to be Used (Not limited to)
Claude Code, Workik : AI- Coding and execution platform. C Code generating tool for any given problem statement

Weblinks and Video Lectures (e-Resources)	
1	https://archive.nptel.ac.in/courses/106/105/106105171/ (12 Weeks NPTEL Course Videos)
2	https://researchcomputing.princeton.edu/education/external-online-resources/cplusplus
3	https://www.w3schools.com/c/
4	https://ocw.mit.edu/courses/6-087-practical-programming-in-c-january-iap-2010/
5	https://sanfoundry.com/c-programming-examples-linked-list/
6	https://onlinecourses.swayam2.ac.in/cec20_cs02/preview
7	https://www.youtube.com/watch?v=_MF8L7ZxwRE
8	https://www.youtube.com/watch?v=0Sg6QHmlFJE
9	https://www.newtondesk.com/c-programming-handwritten-study-notes-pdf/
10	https://www.eskimo.com/~scs/cclass/notes/top.html

Assessment Pattern (both CIE and SEE)

4 Credit Course – IPCC								
Assessment Method	**Component**	**Type of Assessment**	**Assessment Type used**	**Max. Marks**	**Evaluation Details**	**Reduced Marks**	**Min. Marks**	**Total**
CIE	Theory	AAT	Pedagogical Initiatives	10	Continuous Comprehensive Assessment (CCA) – Following assessment can be used Assignments/ quizzes/ seminars/ Certification/Pedagogical Initiatives	10	4	10
		Test-1	Theory	25	Average of two Internal Assessment Tests each of 25 Marks, scale down the Marks to 15 Marks	15	6	15
		Test-2	Theory	25				
	Total CIE Theory						**10**	**25**
	Lab	Conduction of Experiments	Performance with Record & Observation Book	15	Conduction of Experiments and Preparation of Laboratory Records	15	6	25
		CIE Practical test	Evaluation & Viva-Voce	50	One test after conduction of all Experiments	10	4	
	Total CIE Practical						**10**	**25**
CIE (Theory + Practical)							**20**	**50**
SEE				**100**	SEE Exam is Theory Exam, conducted for 100 Marks, scored marks are scaled down to 50 marks	**50**	**18**	**50**
CIE+SEE							**40**	**100**
	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.							

3 & 2 Credit Course

Assessment Method	Component	Type of Assessment	Assessment Type used	Max. Marks	Evaluation Details	Reduced Marks	Min. Marks	Total
CIE	Theory	AAT	Pedagogical Initiatives	10	Continuous Comprehensive Assessment (CCA) – Following assessment can be used Assignments/ quizzes/ seminars/ Certification/Pedagogical Initiatives	10	4	10
		Test-1	Theory	25	Average of two Internal Assessment Tests each of 25 Marks, scale down the Marks to 15 Marks	15	6	15
		Test-2	Theory	25				
	Total CIE Theory						**10**	**25**
	Practical	Conduction of Experiments	Performance with Record & Observation Book	15	Conduction of Experiments and Preparation of Laboratory Records	15	6	**15**
		CIE Practical test	Evaluation & Viva-Voce	50	One test after conduction of all Experiments	10	4	**10**
	Total CIE Practical						**10**	**25**
Total CIE (CIE Theory + CIE Practical)							**20**	**50**
SEE				**100**	SEE Exam is Theory Exam, conducted for 100 Marks, scored marks are scaled down to 50 marks	**50**	**18**	**50**
CIE+SEE							**40**	**100**
	Note: This course refers to professional theory core course integrated with practical of the same course and credit for this course is 3.							

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Theory			Practical
	Continuous Assessment Tests		Alternative Assessment Tool (AAT)	Test
	Test-1	Test-2		
	25 Marks	25 Marks	10 Marks	25 Marks
Remember	5	--	--	--
Understand	10	5	--	--
Apply	10	10	10	5
Analyse	--	10	--	--
Evaluate	--	--	--	--
Create	--	--	--	20

CIE Course Assessment Plan

CO's	Marks Distribution					Total Marks	Weightage
	Test-1			Test-2			
	Module-1	Module-2	Module-3	Module-4	Module-5		
CO1	10	10	--	--	--	20	20%
CO2	10	10	10	--	--	30	30%
CO3	--	--	10	20	--	30	30%
CO4	--	--	--	--	20	20	20%
CO5	5	5	5	5	5	25	25% (Lab)
Total	20	20	20	20	20	100	100%

SEE- Semester End Examination (50 Marks)

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

SEE Course Plan

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

Dayananda Sagar Academy of Technology & Management

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Semester	:	**2nd**				
Course Title	:	**Introduction to Python Programming**				
Course Code	:	**BPLCS201**				
Course Type (Theory/ Practical/ Integrated)	:	**Integrated**				
Category	:	**PLC**				
Stream	:	**Common to all branches**		**CIE**	:	**50 Marks**
Teaching hours/ week (L:T:P:S)	:	**2:0:2:0**		**SEE**	:	**50 Marks**
Total Hours	:	**28+12=40 Hrs**		**SEE Duration**	:	**3 Hours**
Credits	:	**03**				

Course Learning Objectives: Students will be able to:

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

Teaching-Learning Process

Pedagogical Initiatives:

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

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

DSATM

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

COURSE CURRICULUM

Module No.	Contents of the Module	Hours
1	**Python Basics**: Entering Expressions into the Interactive Shell, The Integer, Floating-Point, and String Data Types, String Concatenation and Replication, Storing Values in Variables, Your First Program, Dissecting Your Program. **Flow control:** Boolean Values, Comparison Operators, Boolean Operators, Mixing Boolean and Comparison Operators, Elements of Flow Control, Program Execution, Flow Control Statements, Importing Modules.	6
Pedagogy	**Think Pair and Share (Blended Learning):** provides an opportunity for students to learn from one another	
2	**Functions:** def Statements with Parameters, Return Values and return Statements, The None Value, Keyword Arguments and print (), Local and Global Scope, The global Statement, Exception Handling, Recursion. **Lists:** The List Data Type, Working with Lists, Methods, List Memory management List-like Types. Tuples- Working with Tuples	6
Pedagogy	**Problem Solving**: encourages cognitive thinking and enables creative problem solving	
3	**Dictionaries:** The Dictionary Data Type, Method, Working with dictionaries, types, data set handling with dictionaries, Pretty Printing. **Strings:** Working with Strings, Useful String Methods, Pattern matching with Regular Expressions, Patten matching without Regular Expressions	5
Pedagogy	**Poster Presentation:** allows students to represent the concepts visually in order to understand the topics easily	
4	**Files operations:** Files and File Paths, The os. path Module, File Operations , Compressing Files with the zip file, exception handling. **Classes and Objects:** Defining a Class, Defining a Method, Instantiating an Object.	5
Pedagogy	**Case studies:** maps different domains in real time applications	
5	Invoking a Method, Using Constructor, Using Class Attributes and Static Methods. **Object Oriented Programming:** Encapsulation, Polymorphism, Abstraction, Inheritance.	6
Pedagogy	**Demonstration:** exhibits the implementation process	

List of Programs

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

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

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

8.	Define a function which takes TWO objects representing complex numbers and returns new complex number with a addition of two complex numbers. Define a suitable class 'Complex' to represent the complex number. Develop a program to read N (N >=2) complex numbers and to compute the addition of N complex numbers.	**CO3**
9.	Develop a program that uses class Student which prompts the user to enter marks in three subjects and calculates total marks, percentage and displays the score card details. [Hint: Use list to store the marks in three subjects and total marks. Use _init_() method to initialize name, USN and the lists to store marks and total, Use getMarks() method to read marks into the list, and display() method to display the score card details.].	**CO3**
10.	Develop a Python program to demonstrate single inheritance using the following scenario: Create a base class LibraryItem with: Attributes: title, category and year. A method: display_details() to print these details. Create a derived class Book that inherits from LibraryItem and adds: Attributes: author and ISBN. A method: to display all details (including base class attributes).	**CO5**
	Open Ended Questions: 1. Design a web page using Flask in python. 2. Demonstrate Web scraping using suitable example. 3. Demonstrate API Integration. 4. Demonstrate about Data Visualization. 5. Demonstrate GUI Applications. 6. Demonstrate E-mail Automation.	

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

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

CIE for Practical component of the PLC/PBL:

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

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

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

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

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

The theory part shall be evaluated both by CIE and SEE. The practical part shall be evaluated by only CIE (no SEE). However, questions from the practical part of PLC/PBL shall be included in the SEE question paper. This course is common to all branches of first year B.E 2023-24 regulation.

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

Reference Books	
Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year) change format	
1.	**Automate the Boring Stuff with Python,** Al Sweigart, No Starch Press, 1st Edition, 2015
2.	**Think Python: How to Think Like a Computer Scientist,** Allen B. Downey, , Green Tea Press 2nd Edition,2015.
3.	**Python for data analysis,** Wes Mckinney, O'Relly Publications,3rd edition ,2023
4.	**Scientific Computing with Python: High-performance scientific computing with NumPy, SciPy, and pandas** by Claus Fuhrer, Jan Erik Solem, Olivier Verdier, Pakt publications ,2nd Edition , 2021

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

CO	**Course Outcomes**	**RBT Level**	**Level Indicator**
CO1	**Understand** the syntax and schematics of Python programming.	**Understand**	**L2**
CO2	**Apply** data structures, functions for effective implementation of solution.	**Apply**	**L3**
CO3	**Analyse** object-oriented concepts and file operations.	**Analyse**	**L4**
CO4	**Evaluate** strings using pattern recognition techniques.	**Evaluate**	**L5**
CO5	**Implement** real world problems by using Data analysis and Scientific computation methods.	**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	--	1	--	--	--	--	--	--	--	1	1	--	--	--	--
CO3	--	2	2	--	1	--	--	--	--	--	--	--	--	--	--

CO4	--	2	2	--	1	--	--	--		2	2	--	--	--	--
CO5	--	1	1	--	2	--	--	--	1	2	2	--	--	--	--

List of AI Tools to be Used (Not limited to)	
GitHub Copilot, Replit : These tools used for lab coding and practice	
Weblinks and Video Lectures (e-Resources)	
1	The Joy of Computing using Python: https://onlinecourses.nptel.ac.in/noc23_cs20/preview
2	Python for Data Science: https://onlinecourses.nptel.ac.in/noc22_cs32/preview
3	Infyspringboard-Scipy: https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_012825354493067264684 22_shared/overview
4	Python for everybody: Course era
5	Udemy: https://www.udemy.com/course/python-pandas/ -

Assessment Pattern (both CIE and SEE)

Engineering Science Course (ESC) / Emerging Technology Course (ETC) / Programming Language Course (PLC)								
3 Credits & 2 Credits Courses – Theory (if Integrated)								
Assessment Method	**Component**	**Type of Assessments**	**Syllabus Coverage**	**Maximum Marks**	**Average**	**Reduced Marks**	**Minimum Passing Marks**	**Evaluation Details**
Total CIE Theory + Practical				**50**	**----**	**----**	**20**	
CIE	**Theory**	Internal Assessment Test (IAT) - I	Module - 1 & 2	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 - 3 4,& 5	50				
	Continuous Comprehensive Assessment (CCA)	CCA-1- Pedagogical Initiatives	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		50				

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

SEE		Theory exam	Entire theory syllabus including questions from lab Component in respective Modules	100	----	**50**	18	SEE Exam is theory Exam conducted for 100 Marks, scored Marks are scaled down to 50 Marks
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

4 Credit Course – IPCC	
	The Minimum Marks to be secured in CIE to appear for SEE shall be 10marks (40% of Maximum Marks – 25) in the Theory Component and 10 (40% of Maximum Marks -25) in the Practical Component. The Laboratory Component of the IPCC shall be for CIE only. However, in SEE the questions from the Laboratory Component shall be included in the respective Modules only. **Assessment Details (both CIE and SEE)** The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum Marks (20 Marks out of 50). The minimum passing mark for the SEE is 35% of the maximum Marks (18 Marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 Marks out of 100) in the total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together. **Possible continuous and comprehensive assessment:** Project based, Problem Based, Building Models, Lab-to-Land, Mobile Studio, Design and Programming Contest, Certification, Concept Map (Collage presentation/poster presentation), Case studies, Think-Pair-Share, Flipped classroom, storytelling. The assessment of these techniques can be either based on Quiz or rubrics. The faculty can adopt any other CCA method of implementation and its assessment with prior approval of Program Assessment Committee (PAC). **Continuous Internal Evaluation (CIE):** The CIE Marks for the theory component of the IPCC shall be **25 Marks** and for the laboratory component **25 Marks**. **CIE for the theory component of the IPCC** **Internal Assessment Test (IAT):** **The IA test questions are to be framed to map the Course Outcomes(COs), Program Outcomes(POs) and the Blooms RBT Levels. Emphasis to be given for higher order RBT levels** Three Tests each of **50 Marks** • First test after 6th week of the semester (syllabus completion of 35 – 40%) • Second test after 10th week of semester (syllabus completion of 65 – 70%) • Third test after 14th week of semester (syllabus completion of 90 – 100%) The average score of three test is taken and scaled down to **15 Marks.** **Continuous and Comprehensive Assessment (CCA):** Two of continuous and comprehensive assessment (CCA) to be conducted to attain COs and POs, evaluated each for **50 Marks**. Total Marks scored will be CCA1+CCA2 and scaled down to **10 Marks**. • CCA1 after 4th week and CCA2 after 9th week. The evaluation includes either through quiz or rubrics • CCA as project-based learning, o 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. o 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 IPCC** • On completion of every experiment/program in the laboratory, the students shall be evaluated and Marks shall be awarded on the same day. The **10 Marks** are for conducting the experiment and preparation of the laboratory record, the other **10 Marks shall be for the test** conducted at the end of the semester and **5 Marks** for conducting Open Ended Experiments. • The CIE Marks awarded in the case of the practical component shall be based on the continuous evaluation of the laboratory report and the conduction. Each experiment report can be evaluated for 05 Marks conduction(Observation Book) and 5 Marks for Record Book. Marks of all experiments' write-ups and conduction are added and scaled to **10 Marks.** • The Practical laboratory test **(duration 03 hours)** at the end of the 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 • The question paper shall be set for 100 Marks. The medium of the question paper shall be English. **The duration of SEE is 03 hours.** • The question paper will have 10 questions. Two questions per module. Each question is set for 20 Marks. The student has to answer 5 full questions, selecting one full question from each module summing up to maximum score of 100 Marks. Marks **scored out of 100 shall proportionally be reduced to 50 Marks**. • There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module. The two questions shall be of same course outcome, program outcome and Blooms RBT level. Emphasis to be given for higher order RBT levels

3 Credit Course – Theory	
	Note: A few of the Courses of 3 Credit are Integrated Course Type, for such courses the method suggested for 4 Credit IPCC shall be followed. **Assessment Details (both CIE and SEE)** The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum Marks (20 Marks out of 50). The minimum passing mark for the SEE is 35% of the maximum Marks (18 Marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end

examination (SEE), and a minimum of 40% (40 Marks out of 100) in the total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

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

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

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

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

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

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

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

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

- CCA1 after 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**

Semester End Examination (SEE):

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

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

CIE- Continuous Internal Evaluation (50 Marks)

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

CIE Course Assessment Plan

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

SEE- Semester End Examination (50 Marks)

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

Analyse	**10**
Evaluate	**10**
Create	**10**

SEE Course Plan

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

Course Contents and Lecture Schedule:

Module No.	Topics	No. of Lectures
1	**Python Basics**: Entering Expressions into the Interactive Shell. The Integer, Floating-Point, and String Data Types, String Concatenation and Replication	1
1	Storing Values in Variables, First Program, Dissecting Your Program	1
1	**Flow control:** Boolean Values, Comparison Operators, Boolean Operators	1
1	Mixing Boolean and Comparison Operators,	1
1	Elements of Flow Control, Program Execution, Flow Control Statements	1
1	Importing Modules.	1
2	**Functions:** def Statements with Parameters, Return Values and return Statements.	1
2	The None Value, Keyword Arguments and print ().	1
2	Local and Global Scope, The global Statement	1
2	Exception Handling, Recursion.	1
2	**Lists:** The List Data Type, Working with Lists, Methods	1
2	List Memory management List-like Types. Tuples- Working with Tuples	1
3	**Dictionaries:** The Dictionary Data Type, Method, Working with dictionaries.	1
3	Types, data set handling with dictionaries, Pretty Printing.	1
3	**Strings:** Working with Strings, Useful String Methods,	1
3	Pattern matching with Regular Expressions	1

3	Patten matching without Regular Expressions	1
4	**Files operations:** Files and File Paths, The os. path Module,	1
4	File Operations , Compressing Files with the zip file, exception handling.	1
4	**Classes and objects:** Defining a Class, Defining a Method	1
4	Instantiating an Object	1
5	Invoking a Method	1
5	Using Constructor, Using Class Attributes	1
5	Static Methods	1
5	**Object-Oriented Programming:** Encapsulation	1
5	Polymorphism	1
5	Abstraction	1
5	Inheritance	1
1 - 5	**Laboratory Programs**	8
	Project periodic reviews	4
Total Number of Hours		40

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

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

Course Learning Objectives: Students will be taught

Sl.No	Course Objectives
1	• Understand about the fundamentals of Internet of Things and its building blocks along with their characteristics.
2	• Understand the recent application domains of IoT in everyday life.
3	• Gain insights about the current trends of Associated IOT technologies and IOT Analytics'.
4	• To come out with real time projects addressing the socio economic problems prevailing in the society

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	**Basics of Networking:** Introduction, Network Types, Layered network models, Addressing, TCP/IP Transport layer, Internetworking, ipv4, ipv6, Transition from ipv4 to ipv6. **Emergence of IoT:** Introduction, Evolution of IoT, Enabling IoT and the Complex Interdependence of Technologies, IoT Networking Components Textbook 1: Chapter 1- 1.1 to 1.5, Chapter 4 – 4.1 to 4.4 . Text Book 2:Chapter 20 – 20.1 to 20.4	**8 hrs**
Pedagogy	**ICT Based Learnings, Project**	
2	**IoT Sensing and Actuation:** Introduction, Sensors, Sensor Characteristics, Sensorial Deviations, Sensing Types, Sensing Considerations, Actuators, Actuator Types, Actuator Characteristics. Textbook 1: Chapter 5 – 5.1 to 5.9	**8 hrs**
Pedagogy	**ICT Based Learnings ,Project**	
3	IoT Processing Topologies and Types: Data Format, Importance of Processing in IoT, Processing Topologies, IoT Device Design and Selection Considerations, Processing Offloading. Textbook 1: Chapter 6 – 6.1 to 6.5	**8 hrs**
Pedagogy	**ICT Based Learnings ,Project**	
4	ASSOCIATED IOT TECHNOLOGIES Cloud Computing: Introduction, Virtualization, Cloud Models, Service-Level Agreement in Cloud Computing, Cloud Implementation, Sensor-Cloud: Sensors-as-a-Service. IOT CASE STUDIES Agricultural IoT – Introduction and Case Studies Textbook 1: Chapter 10– 10.1 to 10.6; Chapter 12- 12.1-12.2	**8 hrs**
Pedagogy	**Project, Collaborative Learning**	
5	IOT CASE STUDIES AND FUTURE TRENDS Vehicular IoT – Introduction Healthcare IoT – Introduction, Case Studies IoT Analytics – Introduction Introduction to Arduino, Arduino UNO Programming.	

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

List of Experiments or Programs using Arduino/Raspberry Pi

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

Reference Books

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

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

CO	Course Outcomes	RBT Level	Level Indicator
CO1	Describe the evolution of IoT, IoT networking components, Internet Protocols and addressing strategies in IoT.	Remember	L1
CO2	Classify various sensing devices and actuator types.	Understand	L2
CO3	Demonstrate the processing in IoT.	Apply	L3
CO4	Analysing different Associated IOT Technologies	Analyze	L4
CO5	Develop the IOT applications using Arduino/ Raspberry Pi	Create	L6

Mapping of Course Outcomes to Program Outcomes:

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

AI Tool used
Copilot, ChatGPT, CiscoPackcetTracer, AI assistants and agents in IoT applications

Weblinks and Video Lectures (e-Resources)	
1	https://nptel.ac.in/noc/courses/noc19/SEM1/noc19-cs31/

Assessment Pattern (both CIE and SEE)

Engineering Science Course (ESC) / Emerging Technology Course (ETC) / Programming Language Course (PLC)								
3 Credits & 2 Credits Courses – Theory (if Integrated)								
Assessment Method	**Component**	**Type of Assessments**	**Syllabus Coverage**	**Maximum Marks**	**Average**	**Reduced Marks**	**Minimum Passing Marks**	**Evaluation Details**
Total CIE Theory + Practical				**50**	**----**	**----**	**20**	
CIE	**Theory**	Internal Assessment Test (IAT) - I	Module - 1 & 2	50	(50+50+50) / 3	**15**	6	Average of Three Internal test each of 50 Marks scale down the marks to
		Internal Assessment Test (IAT) - II	Module - 3 & 4	50				
		Internal Assessment Test (IAT) - III	Module - 5	50				
	Continuous Comprehensive Assessment (CCA)	CCA-1- Pedagogical Initiatives	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		50				
	Total CIE Theory					**25**	10	Scale down Marks of IAT and CCA to 25

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

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

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

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

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

- CCA1 after 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 summing up to maximum score of 100 Marks. Marks **scored out of 100 shall proportionally be reduced to 50 Marks**. • There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module. The two questions should be of same course outcome, program outcome and Blooms RBT level. Emphasis to be given for higher order RBT levels

CIE- Continuous Internal Evaluation (50 Marks)

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

CIE Course Assessment Plan

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

SEE- Semester End Examination (50 Marks)

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

SEE Course Plan

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

Course Contents and Lecture Schedule

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

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