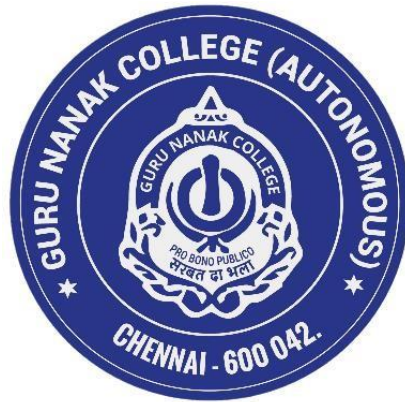


GURU NANAK COLLEGE (AUTONOMOUS)

(Affiliated to University of Madras and Accredited at 'A++' Grade by NAAC)

Guru Nanak Salai, Velachery, Chennai - 600042



SCHOOL OF INFORMATION TECHNOLOGY

B.Sc. COMPUTER SCIENCE

LEARNING OUTCOME BASED CURRICULUM FRAMEWORK

(For the UG batch of 2024-27 and thereafter)

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LEARNING OUTCOME BASED CURRICULUM FRAMEWORK

(For the UG batch of 2024-27 and thereafter)

Preamble

BSc. Computer Science refers to the study of algorithmic processes, computational devices, and computing itself. The course covers everything from the theoretical and practical study of algorithms and information to the real-world challenges of implementing computational systems in hardware and software. Through the review and modification of an extensive array of frameworks pertaining to agree upon/expected graduate attributes, qualification descriptors, and learning objectives for programming, the curriculum is intended to support the maintenance of national standards used in Hardware and Software Technologies. These are subjects that all computer science students need to study. The curriculum planning strategy that is based on practical experience aims to impart information and concepts in a range of areas, such as programming techniques, operating systems, software and firmware, and networking. Among the most important skill sets that employers have recognized are the core courses. Any exposure to the IT sector requires a deep understanding of these subjects. Given that advancement from this point may lead to jobs in IT, R&D, or as an entrepreneur, each course is essential to the students' chances of success in the industry. With the use of sophisticated tools and latest technology, such as graphical representations and online resources for implementing the written code, students should be able to learn the curriculum in the best way possible. The curriculum's design exposes students to contemporary tools. This curriculum places more of an emphasis on needy areas like entrepreneurship, skill development, and sustainability. In the future, Students will be able to apply the abilities they have learned through a variety of teaching-learning methodologies. In order to keep up with industry demands, requests for information, and technological changes, students are required to be knowledgeable in every area. According to BLOOM's Taxonomy, the curriculum, instructional strategies, and evaluation techniques are matched with suitable cognitive levels. The assessment of students' cognitive abilities and the evaluation of the attainment of expected course outcomes will be made possible by the OBE-based evaluation methodologies.

Vision

To empower students with the knowledge, skills, and values needed to thrive in a rapidly evolving technological landscape, while also making positive contributions to society with a distinct environment that provides quality higher education in Computer Science both to the Indian Society and on the global scale which bring forth excellent subject and practical knowledge to all students.

Mission

To offer student-centric education in Computer Science with a focus on research and innovation. Diversity, inclusion and social responsibility are imparted to students to prepare them for lucrative professions in technology. The programme aims to lead Computer Science education to make a beneficial impact on society by means of community participation and continued enhancement.

Program Educational Outcomes

PEO1: Values of Life, Ethics & Social Concern

The graduates exhibit truth, loyalty, and love as integral moral principles, thereby contributing to a society characterized by enhanced well-being and fundamental goodness in behavior.

PEO2: Employability & Entrepreneurship

The graduates apply analytical, logical, and critical problem-solving skills in professional contexts, elevating employability and cultivating entrepreneurial capabilities through upskilling.

PEO3: Regional/National/Global Relevance & Competency

The graduates foster advanced analytical skills and a heightened appreciation for current Regional/National/Global perspectives, enabling informed and sustainable decision-making in a dynamic environment.

PEO4: Skill Enhancement, Self-Directed & Lifelong Learning

The graduates independently engage in skill-based learning, utilizing infrastructure and opportunities for continuous upskilling, enabling self-evaluation and lifelong excellence attainment.

PEO5: Research Skills & Innovation

The graduates proficiently apply scientific reasoning, fostering creativity, strategic thinking, and effective problem-solving skills. They demonstrate a core competency in generating innovative ideas for advancements and inventions.

Program Outcomes

PO 1: Having the ability to develop software that aids society to minimize the effort.

PO 2: Having the ability to employ techniques, skills, and modern hardware and software tools necessary to meet the current demand of the IT Industry.

PO 3: Having Regional/National/Global Competency and being employable.

PO 4: Have the ability to independently engage in Self-directed learning and an inclination to life-long learning and upskilling.

PO 5: Demonstrate competency in generating innovative ideas for advancements and inventions.

Program Specific Outcomes

PSO 1: Exhibit expertise in concepts of Computer Science with an advanced understanding in programming languages and algorithms which enables to design optimized solution using cutting edge technologies.

PSO 2: Empowered to apply software development methods to analyse, design and build practical solutions to real-world problems.

PSO 3: Impart language proficiency and entrepreneurial skills to utilize technology in Computer Science to meet industrial needs and to communicate effectively among peers.

PSO 4: Develop effective skills in technology to ensure diverse career opportunities in the fields of IT, research, academia and entrepreneurship.

PSO5: Implement individual and original projects using emerging technologies in trend with the industries to provide an experiential learning.

PEO – PO mapping

	PEO1	PEO2	PEO3	PEO4	PEO5
PO1	1	3	3	3	3
PO2	1	3	3	3	2
PO3	1	3	3	3	2
PO4	2	3	3	3	3
PO5	3	3	3	3	3

PO – PSO mapping

	PO1	PO2	PO3	PO4	PO5
PSO1	3	3	3	3	3
PSO2	3	3	3	3	3
PSO3	1	3	3	3	2
PSO4	2	3	3	3	3
PSO5	2	3	3	3	3

CHOICE BASED CREDIT SYSTEM (CBCS)

The College follows the CBCS with Grades under the Semester pattern. Each course is provided with a credit point based on the quantum of subject matter, complexity of the content and the hours of teaching allotted. This is done after a thorough analysis of the content of each subject paper by the members of the Board of Studies and with the approval of the Academic Council. Students are also offered a variety of Job oriented Elective, Multidisciplinary skill-based courses as part of the curriculum. Students can earn extra credits by opting for Massive Open Online Courses (MOOCs) and Certificate Courses.

The evaluation method under CBCS involves a more acceptable grading system that reflects the personality of the student. This is represented as Cumulative Grade Point Average (CGPA) and Grade Point Average (GPA) which are indicators of the Academic Performance of the student. It

provides students with a scope for horizontal mobility and empowers them with the flexibility of learning at their convenience.

ELIGIBILITY FOR ADMISSION

Candidates admitted to the first year of the UG programme should have passed the higher Secondary Examinations (Academic or Vocational Stream) conducted by the Government of Tamil Nadu or an examination accepted as equivalent thereof by the Syndicate of the University of Madras. Students applying for the PG programme should have taken the UG degree in the relevant subject from a recognized university as per the norms of the University of Madras.

For B.Com. (Hons): Candidates admitted to the first year of the B.Com. (Hons.) programme should have passed the higher secondary examinations conducted by the Government of Tamil Nadu or an examination accepted as equivalent thereof by the Syndicate of the University of Madras with 75 % cut-off in Commerce/Business studies, Accountancy, Economics and Business Mathematics/ Mathematics.

For MBA: The basic requirement for admission to the MBA programme is a Bachelor's degree in any discipline with a minimum of 50% marks in aggregate and satisfactory test score in MAT Entrance Test conducted by AIMA, New Delhi / TANCET for MBA conducted by Government of Tamil Nadu / CAT / XAT or any other approved MBA Entrance Tests.

For MCA: Only those candidates who have passed B.C.A/B.Sc. in Computer Science or any other equivalent degree OR passed B.Sc./B.Com/BA with Mathematics at 10 + 2 level or at graduation level (with Optional bridge course in Mathematics), provided they have undergone the course under 10+2+3 pattern and obtained at least 50% of marks (45 % marks in case of candidates belonging to reserved category) in the qualifying examination shall be eligible for admission to the M.C.A. Programme.

DURATION OF THE COURSE

The UG programme is of three years duration with six semesters and the PG programme is of two years duration with four semesters. The period from June to November is termed as the odd semester and the period from December to April is referred to as the even semester. Each semester must compulsorily have 90 working days before the students appear for the final End Semester Exam.

COURSE OF STUDY

The main course of study for the Bachelor's Degree shall consist of the following:

FOUNDATION COURSES

PART - I: Tamil/ Hindi /Sanskrit/French

PART - II: English

CORE COURSES

PART - III: Consisting of (a) Main subject (b) Allied Subjects (c) Elective subjects related to the main subject of study and project work.

PART – IV: Those who have not studied Tamil up to XII standard and have taken a non- Tamil language under Part – I, shall opt for Basic Tamil in the first two semesters.

Those who have studied Tamil up to XII standard, and taken a non -Tamil language under Part – I, shall opt for Advanced Tamil in the first two semesters.

Others, who do not come under either of the clauses mentioned above, can choose a Non-Major Elective (NME) in the first two semesters.

Soft Skills (I, II, III & IV Semesters)

Self-Study (Compulsory) Course (III Semester)

Environmental Studies (IV Semester)

Value Education (V Semester)

Summer Internship (After IV Semester)

PART - V: Compulsory Extension Services

A Student shall be awarded one credit for compulsory extension service. A student must enroll in NSS / NCC /Sports & Games/ Citizen Consumer Club / Enviro Club or any other service organization in the College and should put in compulsory minimum attendance of 40 hours, which shall be duly certified by the Principal of the College. If a student lacks 40 hours

compulsory minimum attendance in the extension services in any Semester, s/he shall have to compensate the same, during the subsequent Semesters.

COURSE STRUCTURE

The UG programme consists of 15-19 Core courses with 3-4 credits for each paper, 3 Elective courses and 4 Allied courses with 4-5 credits for each paper in addition to 4 Soft Skill courses with two credits each. Internship as a compulsory component carries 2 credits. The B.Com. (Hons) course has 31 core courses of 4 credits each and project with 8 credits.

The MBA programme has 15 core courses including project work with 4 credits, 6 elective courses with 3 credits, 2 extra disciplinary courses with 3 credits, Four Soft Skill courses with two credits each.

The MCA programme has 15 core courses of 2-4 credits, 5 Elective courses of 3 credits, 2 Extra-disciplinary courses of 3 credits and a project work of 17 credits.

Internship training is a compulsory component for all the UG & PG programmes.

The details of the course structure are given in the following table:

B.Sc. Computer Science
Credit distribution for each semester

Semester I		Subject	Hrs/Week	Credit	Marks		Total
Course Component					Internals	Externals	
Part I	Language	Language – I	6	3	50	50	100
Part II	English	English – I	4	3	50	50	100
Part III	Core – I	Programming in Python	6	4	50	50	100
	Core-II	Practical-I: Programming in Python	4	4	50	50	100
	Allied-I	Allied Mathematics	6	5	50	50	100
Part IV	Non Major Elective-I	Basic Tamil-I/ Advanced Tamil-I/ Fundamentals of Web Skills and MS – Access Practical	2	2	50	50	100
	Soft Skills-I	Communication skills and Personality Development skills	2	2	50	50	100
Total			30	23			
Semester II		Subject	Hrs/Week	Credit	Marks		Total
Course Component					Internals	Externals	
Part I	Language	Language – II	6	3	50	50	100
Part II	English	English – II	4	3	50	50	100
Part III	Core –III	Programming in Java	6	4	50	50	100
	Core-IV	Practical-II: Programming in Java	4	4	50	50	100
	Allied-II	Statistics	6	5	50	50	100
Part IV	Non Major Elective-II	Basic Tamil-II/ Advanced Tamil-II/ Digital Literacy: Navigating Digital World	2	2	50	50	100
	Soft Skills-II	Interview skills and Resume Writing	2	2	50	50	100
Total			30	23			

Semester III		Subject	Hrs/Week	Credit	Marks		Total
Course Component					Internals	Externals	
Part I	Language				Language – III	6	
Part II	English	English – III	4	3	50	50	100
Part III	Core – V	Data structures and Algorithms	6	4	50	50	100
	Core-VI	Practical-III: Data structures and Algorithms using Java	5	4	50	50	100
	Allied-III	Advanced statistics with R programming	5	3	50	50	100
		Advanced statistics with R programming Practical	2	2	50	50	100
Part IV	Soft Skills-III	Adobe UX Foundation	2	2	50	50	100
	Self-Study (Compulsory) Course	Indian Heritage and Knowledge System/ Contemporary World and Sustainable Development	-	2	-	100	100
Total			30	23			
Semester IV		Subject	Hrs/Week	Credit	Marks		Total
Course Component					Internals	Externals	
Part I	Language				Language – IV	6	
Part II	English	English – IV	4	3	50	50	100
Part III	Core –VII	Software engineering with UML	6	4	50	50	100
	Core-VIII	Practical-IV: CASE tools and testing tools	4	4	50	50	100
	Allied-IV	Operations Research	6	5	50	50	100
Part IV	Soft Skills-IV	Foundations of Quantitative Aptitude	2	2	50	50	100
	EVS	Environmental Studies	2	2	50	50	100
Total			30	23			

Semester V		Subject	Hrs/Week	Credit	Marks		Total
Course Component					Internals	Externals	
					Part III	Core –IX	
Core –X	Advanced Web Programming	6	4	50		50	100
Core-XI	Practical-V: Advanced Web Programming	6	4	50		50	100
Elective-I (Interdisciplinary Elective)	Practical: Web Designing with Open Source Technology	5	5	50		50	100
Elective-II	Big Data Analytics/ Internet of Things and its Applications/ Artificial Intelligence	6	5	50		50	100
Part IV	Value Education	Value Education	1	2	50	50	100
	Internship	Internship	-	2	-	-	-
Total			30	26			
Semester VI		Subject	Hrs/Week	Credit	Marks		Total
Course Component					Internals	Externals	
					Part III	Core –XII	
Core-XIII	Operating systems with Linux	5	4	50		50	100
Core-XIV	Full Stack Development Technologies	5	4	50		50	100
Core –XV	Practical-VI: Full Stack Development Technologies with RDBMS	6	4	50		50	100
Core -XVI	Mini Project	3	3	50		50	100
Elective-III	Practical-VII: Machine Learning / Practical - VIII: Data Science / Practical-IX: Mobile Applications Development	6	5	50		50	100
Part V	Extension Activity	Participation in NSS/NCC/ROTRACT etc.	-	1	-	-	-
Total			30	25			
Total Credits			143				

Total credit distribution for all the 3 years

		No. of Paper	Credits
Part I	Language	4	12
Part II	English	4	12
Part III	Core	16	63
	Allied	4	20
	Elective	3	15
Part IV	NME	2	4
	Soft Skills	4	8
	Self-Study (Compulsory) Course	1	2
	EVS	1	2
	Value Education	1	2
	Internship	1	2
	Part V	Extension Activity	1
Total			143

EXAMINATION

Continuous Internal Assessment (CIA) will be for 50 percent and End Semester Examination (ESE) will be for 50 percent.

CONTINUOUS INTERNAL ASSESSMENT (CIA)

Every semester will have a mid-semester examination which will be conducted on completion of 45 working days in each semester. A Model exam for three hours duration will be conducted on completion of 80 working days in each semester. For the courses coming under Part IV, ESE will be conducted in MCQ pattern. Internship credits will be given in semester V after verification of documents by the respective Heads.

The schedule for these tests is as follows:

CIA	Schedule	Syllabus Coverage
Mid Semester Examination	After 45 working days of the Semester	60%
Model Examination	After 80 working days of the Semester	95%

The components for the CIA (Theory & Practicals) are as follows:

Internal Components			
Assessment Type	Nature	Maximum Marks	% of Weightage
CIA	Mid Semester Examination	50	10
Model	Model Examination	100	10
	Assignment		10
	Class activities		15
	Attendance		5
Total			50

The class activity relates to a programme of accepted innovative techniques such as Seminar, Quiz, Portfolio creation, PowerPoint presentation, Objective tests, Role play, Group discussion, Case Study etc. The mode of evaluation of the class activity will be fixed before the commencement of the semester and an approval will be obtained from the Head of the programme/wing. The students will be informed of the various methods of evaluation once the semester begins.

A record of all such assessment procedures will be maintained by the department and is open for clarification. Students will have the right to appeal to the Principal in case of glaring disparities in marking. CIA marks for practical subjects will be awarded by the respective faculty based on the performance of the student in the model practical examination, observation notebook, submission of record books, regularity and attendance for the practical classes. The attendance particulars for practical classes will be maintained by the concerned faculty. The marks for attendance will be awarded as per the following:

% of General Attendance	Marks Awarded
90-100	5
75-89	4
60-74	3
<60	0

END SEMESTER EXAMINATIONS (ESE)

After the completion of a minimum of 90 working days each semester, the End Semester Examinations will be conducted. Examinations for all UG and PG programmes will be held for all courses in November/December and April/May. Practical examinations will be conducted only during the end of the odd / even semester before, during or after the commencement of the theory exam. The schedule for ESE Practicals will be notified by the Controller of Examinations in consultation with the Dean (Academics)

Mode of Evaluation

METHODS OF EVALUATION		
Internal Evaluation	Mid Sem Exam (10)	50 Marks
	Model Exam (10)	
	Assignment (10)	
	Class activity (15)	
	Attendance (5)	
External Evaluation	End Semester Examination	50 Marks
Total		100 Marks

Method of assessment

Remembering (K1)	<ul style="list-style-type: none"> The lowest level of questions requires students to recall information from the course content Knowledge questions usually require students to identify information in the textbook. Suggested Keywords: Choose , Define, Find, How, Label, List, Match, Name, Omit, Recall, Relate, Select, Show, Spell, Tell, What, When, Where, Which, Who, Why
Understanding (K2)	<ul style="list-style-type: none"> Understanding off acts and ideas by comprehending organizing, comparing, translating, interpolating and interpreting in their own words. The questions go beyond simple recall and require students to combined at altogether Suggested Keywords: Classify, Compare, Contrast, Demonstrate, Explain, Extend, Illustrate, Infer, Interpret, Outline, Relate, Rephrase, Show, Summarize, Translate

Application (K3)	<ul style="list-style-type: none"> • Students have to solve problems by using / applying a concept learned in the classroom. • Students must use their knowledge to determine a exact response. • Suggested Keywords: Apply, Build, Choose, Construct, Develop, Experiment with, Identify, Interview, Make use of, Model, Organize, Plan, Select, Solve, Utilize
Analyze (K4)	<ul style="list-style-type: none"> • Analyzing the question is one that asks the students to breakdown something into its component parts. • Analyzing requires students to identify reasons causes or motives and reach conclusions or generalizations. • Suggested Keywords: Analyze, Assume, Categorize, Classify, Compare, Conclusion, Contrast, Discover, Dissect, Distinguish, Divide, Examine, Function, Inference, Inspect, List, Motive, Relationships, Simplify, Survey, Take part in, Test for, Theme
Evaluate (K5)	<ul style="list-style-type: none"> • Evaluation requires an individual to make judgment on something. • Questions to be asked to judge the value of an idea, a character, a work of art, or a solution to a problem. • Students are engaged in decision-making and problem–solving. • Evaluation questions do not have single right answers. • Suggested Keywords: Agree, Appraise, Assess, Award, Choose, compare, Conclude, Criteria, Criticize, Decide, Deduct, Defend, Determine, Disprove, Estimate, Evaluate, Explain, Importance, Influence, Interpret, Judge, Justify, Mark, Measure, Opinion, Perceive, Prioritize, Prove, Rate, Recommend, Rule on, Select, Support, Value
Create (K6)	<ul style="list-style-type: none"> • The questions of this category challenge students to get engaged in creative and original thinking. • Developing original ideas and problem solving skills • Suggested Keywords: Adapt, Build, Change, Choose, Combine, Compile, Compose, Construct, Create, Delete, Design, Develop, Discuss, Elaborate, Estimate, Formulate, Happen, Imagine, Improve, Invent, Make up, Maximize, Minimize, Modify, Original, Originate, Plan, Predict, Propose, Solution, Solve, Suppose, Test, Theory

SEMESTER I

PROGRAMME: B.Sc., COMPUTER SCIENCE	BATCH: 2024 -2027
PART: III	COURSE COMPONENT: CORE – I
COURSE NAME: PROGRAMMING IN PYTHON	COURSE CODE:
SEMESTER: I	MARKS:100
CREDITS: 4	TOTAL HOURS:90
THEORY	

COURSE OBJECTIVE:

To develop proficiency in Python programming through comprehensive coverage of fundamental concepts, data structures, algorithms, and practical application development.

COURSE OUTCOMES:

1. Develop simple Python programs utilizing conditional and looping statements for solving problems.
2. Effectively apply various types of Python functions for diverse programming tasks.
3. Represent compound data using lists, tuples, and dictionaries
4. Acquire Knowledge to Design Graphical User Interfaces.
5. Utilize control structures on datasets, employ NumPy for data manipulation, and perform data visualization predominantly with matplotlib and seaborn libraries.

UNIT I

(15 HOURS)

Introduction to Python- Features of Python-Programming in Python: Interactive Programming, Invoking Python IDLE, Script mode Programming-Input & Output Functions: input () function, print() function-Comments in Python-Indentation-Tokens: Identifiers, keywords, Variables, Operators (Arithmetic, Relational, Logical, Assignment), Delimiters, Literals (Numeric, String, Boolean, Escape)-Python Data Types: Number Data type, Boolean Data Type, String Data Type.

UNIT II

(15 HOURS)

Control Structures: Sequential Statements, Branching Statements, Looping Constructs, Nested Loop Statements, Jump Statements: break, continue, pass-Functions: Types of functions: User-defined functions, Built-in Functions, Lambda Functions, Recursion Functions-Invoking/Calling functions-Passing Parameters in function-User-defined functions: Required Arguments, Keyword Arguments, Default Arguments-Return Statement-Functions using Libraries-Recursive functions-Variable Scope(Local, Global)- Modules

UNIT III

(20 HOURS)

String & String Manipulation: Basic Operations, Slicing, Functions and Methods- List & List Manipulation: Basic Operations, Slicing, Functions and Methods-Tuple & Tuple Manipulation: Basic Operations, Slicing, Functions and Methods-Set & Set Manipulation: Basic Operations, Slicing, Functions and Methods-Dictionaries & Dictionaries Manipulation: Basic Operations, Slicing, Functions and Methods.

UNIT IV

(20 HOURS)

Writing GUI in Python using Tkinter: Introduction-Components and Events-An example-GUI-The root Component-Adding a Button-Entry Widgets-Text Widgets-Check Buttons-Accessing API Essentials: Introduction- Facebook Messenger- openweather.

UNIT V

(20 HOURS)

Python for Data Science: Introduction to Spyder-Creating and saving a script file-Removing Variables from Environment-Arithmetic and logical operators-Sequence data types and associated operations-Pandas and data frame operations-Control structures using dataset-NumPy-Data visualization on dataset: matplotlib, seaborn libraries.

PRESCRIBED BOOKS:

1. Python Crash Course: A Hands-On, Project-Based Introduction to Programming (2nd Edition) by Eric Matthes.
2. Python Data Science Handbook: Tools and Techniques for Developers by Jake VanderPlas
Released November 2016.

REFERENCE BOOKS:

1. Fluent Python: Clear, Concise, and Effective Programming, 2nd Edition by Luciano Ramalho
2. Python Tricks: A Buffet of Awesome Python Features by Dan Bader
3. Introduction to Machine Learning with Python: A Guide for Data Scientists by Andreas Müller and Sarah Guido
4. Python for Data Analysis: Data Wrangling with Pandas, NumPy, and Jupyter, 3rd Edition by Wes McKinney
5. Automate the Boring Stuff with Python (Practical Programming for Total Beginners)

E-LEARNING RESOURCES:

1. <http://interactivepython.org/courselib/static/pythonds>
2. <http://www.ibiblio.org/g2swap/byteofpython/read/>
3. <http://www.diveintopython3.net/>
4. NPTEL & MOOC courses titled Python programming
5. <http://docs.python.org/3/tutorial/index.html>

GUIDELINES TO THE QUESTION PAPER SETTERS

QUESTION PAPER PATTERN

SECTION	QUESTION COMPONENT	NUMBERS	MARKS	TOTAL
A	<i>Answer any 10 out of 12 questions(each in 50 words)</i>	1-12	3	30
B	<i>Answer any 5 out of 7 questions(each in 300 words)</i>	13-19	6	30
C	<i>Answer any 4 out of 6 questions(each in 1200 words)</i>	20-25	10	40
TOTAL MARKS				100

BREAK UP OF QUESTIONS

UNITS	SECTION A	SECTION B	SECTION C
I	2	1	1
II	2	2	1
III	3	1	2
IV	3	1	1
V	2	2	1
TOTAL	12	7	6
SECTION A – 12		SECTION B – 7	SECTION C – 6

PSO – CO Mapping

	PSO 1	PSO 2	PSO 3	PSO 4	PSO5
CO 1	3	3	2	3	2
CO 2	2	3	2	2	2
CO 3	3	3	3	2	3
CO 4	2	2	3	3	3
CO 5	3	3	3	3	3
Ave.	2.6	2.8	2.6	2.6	2.6

PSO-CO-question paper mapping

CO No:	COURSE OUTCOME	PSOs ADDRESSED	COGNITIVE LEVEL (K1 to K6)
CO1	Develop simple Python programs utilizing conditional and looping statements for solving problems.	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4, K5
CO2	Effectively apply various types of Python functions for diverse programming tasks.	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4, K5
CO3	Represent compound data using lists, tuples, and dictionaries	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4, K5
CO4	Acquire Knowledge to Design Graphical User Interfaces.	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4, K5
CO5	Utilize control structures on datasets, employ NumPy for data manipulation, and perform data visualization predominantly with matplotlib and seaborn libraries.	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4, K5

K1= Remember, K2= Understand, K3= Apply, K4=Analyse, K5= Evaluate, K6= Create

PROGRAMME: B.Sc., COMPUTER SCIENCE	BATCH: 2024 -2027
PART: III	COURSE COMPONENT: CORE – II
COURSE NAME: PRACTICAL-I: PROGRAMMING IN PYTHON	COURSE CODE:
SEMESTER: I	MARKS:100
CREDITS: 4	TOTAL HOURS:60
PRACTICAL	

COURSE OBJECTIVE:

To master practical Python programming skills through hands-on exercises.

COURSE OUTCOMES:

1. Apply basic programming constructs in Python.
2. Practice various computing strategies for Python-based solutions to real world problems.
3. Use Python data structures - lists, tuples, dictionaries.
4. Build applications using Python GUI.
5. Visualize data using various charts, NumPy.

PROGRAMS:

(8 HOURS)

1. a) Program to convert the given temperature from Fahrenheit to Celsius and vice versa depending upon the user's choice.

b) Write a Python program to construct the following pattern, using a nested loop

```

*
* * *
* * * * *
* * * * * *

```

(10 HOURS)

2. Write a Python script that prints prime numbers less than 20.
3. Program to find factorial of the given number using a recursive function.
4. Write a Python program to count the number of even and odd numbers from an array of N numbers.

(10 HOURS)

5. Write a Python class to reverse a string word by word.
6. Given a tuple and a list as input, write a program to count the occurrences of all items of the list in the tuple. (Input: tuple = ('a', 'a', 'c', 'b', 'd'), list = ['a', 'b'], Output: 3)

(10 HOURS)

7. Write a Python program for Towers of Hanoi using recursion
8. Design and implement a simple Python program for a "Guess the Number" game.
9. Create a menu driven Python program with a dictionary for words and their meanings.

(10 HOURS)

10. Design a simple Tkinter GUI that includes a button and displays a message when the button is clicked.
11. Develop a program that accesses the Facebook Messenger API and retrieves message data.
12. Create a Python script that utilizes the Openweather API to get current weather information.

(12 HOURS)

13. Write a program that uses to analyze a dataset using Pandas, including operations like filtering and grouping.
14. Develop a program that utilizes NumPy for numerical operations on arrays.
15. Design a data visualization program using matplotlib and seaborn to create meaningful plots from a dataset.

PSO – CO mapping

	PSO 1	PSO 2	PSO 3	PSO 4	PSO5
CO 1	3	3	2	3	2
CO 2	2	3	2	2	2
CO 3	3	3	3	2	3
CO 4	2	2	3	3	3
CO 5	3	3	3	3	3
Ave.	2.6	2.8	2.6	2.6	2.6

PSO-CO-question paper mapping

CO No:	COURSE OUTCOME	PSOs ADDRESSED	COGNITIVE LEVEL (K1 to K6)
CO1	Apply basic programming constructs in Python.	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4, K5
CO2	Practice various computing strategies for Python-based solutions to real world problems.	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4, K5
CO3	Use Python data structures - lists, tuples, dictionaries.	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4, K5
CO4	Build applications using Python GUI.	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4, K5, K6
CO5	Visualize data using various charts, NumPy.	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4, K5

K1= Remember, K2= Understand, K3= Apply, K4=Analyse, K5= Evaluate, K6= Create

PROGRAMME: B.Sc. (CS), BCA, B.Sc. (IT)	BATCH: 2024 – 2027
PART: III	COURSE COMPONENT: ALLIED-I
COURSE NAME: ALLIED MATHEMATICS	COURSE CODE:
SEMESTER: I	MARKS: 100
CREDITS: 5	TOTAL HOURS: 90
THEORY AND PROBLEMS	

COURSE OBJECTIVE:

To improve basics in mathematical and analytical skills.

COURSE OUTCOMES:

1. Recall the basic concepts of matrices, finite difference, trigonometry, differentiation and differential equations.
2. Understand the types of Matrices, interpolation of unknown values, expansion of trigonometric functions, higher order derivatives, solving differential equations.
3. Apply operations of matrix to find eigen value, interpolation formula, expansion of sine series, Jacobian function and complimentary functions.
4. Analyze the verification of Cayley -Hamilton, interpolation for equal intervals, hyperbolic functions, particular solutions.
5. Evaluate inverse using Cayley-Hamilton, interpolation for unequal intervals, inverse hyperbolic, maximum and minimum of a function, general solution for differential equations.

UNIT I

(18 Hours)

Matrices: Symmetric matrix, skew symmetric matrix, Hermitian matrix, skew Hermitian matrix, orthogonal matrix, unitary matrix, Cayley-Hamilton theorem (statement), eigen values and eigen vectors.

Chapter 4, Section 4.1-4.1.6,4.5,4.5.2

UNIT II

(18 Hours)

Finite Differences: Interpolation, Operators Δ , ∇ and E , difference tables, Interpolation formulae: Newton’s forward and backward interpolation formulae for equal intervals, Lagrange’s interpolation formula.

Chapter 5

UNIT III

(18 Hours)

Trigonometry: Expansion of $\sin^n \theta, \cos^n \theta, \sin^m \theta \cos^n \theta$, expansion of $\sin n\theta$ and $\cos n\theta$, expansions of $\sin \theta, \cos \theta$ and $\tan \theta$ in a series of powers of “ θ ”, hyperbolic and inverse hyperbolic functions.

Chapter 6, section 6.1,6.2,6.3

UNIT IV**(18 Hours)**

Differentiation: Basic differentiation, Successive Differentiation, Jacobian, Maxima and Minima of functions of two variables.

Chapter 1, Section 1.1,1.2, 1.3,1.3.1

UNIT V**(18 Hours)**

Differential Equations: Second order differential equation with constant coefficients, differential equation of the form $(aD^2+bD+c) y = e^{ax} \phi(x)$ where a, b, c are constants, $\phi(x) = \sin mx$ (or) $\cos mx$ (or) x^m .

Chapter 5, Section 5.2, 5.2.1

PRESCRIBED BOOK:

1. Treatment and content as in “Allied mathematics” – P. Durai Pandian, Dr.S.Udayabaskaran, Volume I & II S.Chand and company limited, Reprint 2018.

REFERENCE BOOKS:

1. Allied Mathematics, S.G.Venkatachalapathy.
2. P. Kandasamy and K. Thilagavathi, Allied Mathematics Volume I and Volume II -- 2004, S.Chand and Co, New Delhi.
3. Ancillary Mathematics Volume 1 and 2 by Balasubramanian & K.G.Subramanian..

E - LEARNING RESOURCES:

1. https://ia801306.us.archive.org/5/items/MIT18.01JF07/ocw-18.01-f07-lec11_300k.mp4
2. <https://nptel.ac.in/courses/111107107>
3. <https://nptel.ac.in/courses/111106146>

GUIDELINES TO THE QUESTION PAPER SETTERS**QUESTION PAPER PATTERN**

SECTION	QUESTION COMPONENT	NUMBERS	MARKS	TOTAL
A	Answer any 10 out of 12 questions	1 - 12	3	30
B	Answer any 5 out of 7 questions	13 - 19	6	30
C	Answer any 4 out of 6 questions	20 – 25	10	40
TOTAL MARKS				100

BREAK UP OF QUESTIONS FOR THEORY AND PROBLEMS

UNITS	SECTION A		SECTION B		SECTION C	
	THEORY	PROBLEM	THEORY	PROBLEM	THEORY	PROBLEM
I	1	1	-	1	-	1
II	1	1	-	1	-	1
III	-	2	-	1	-	1
IV	-	2	-	1	-	1
V	-	2	-	1	-	1
Any Unit	-	2	-	2	-	1
TOTAL	2	10	-	7	-	6
SECTION A - 12			SECTION B - 7		SECTION C - 6	

PSO – CO Mapping

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	2	3	2	2	3
CO 2	3	2	2	3	2
CO 3	3	2	3	3	2
CO 4	2	3	2	2	3
CO 5	2	3	3	3	2
Ave.	2.4	2.6	2.4	2.6	2.4

PSO-CO-question paper mapping

CO No:	COURSE OUTCOME	PSOs ADDRESSED	COGNITIVE LEVEL (K1 to K6)
CO1	Recall the basic concepts of matrices, finite difference, trigonometry, basic differentiation and differential equations.	1-5	K1
CO2	Understand the types of Matrices, interpolation of unknown values, expansion of trigonometric functions, higher order derivatives, solving differential equations	1-5	K1,K2
CO3	Apply operations of matrix to find eigen value, interpolation formula, expansion of sine series, Jacobian function and complimentary functions.	1-5	K3
CO4	Analyze the verification of Cayley-Hamilton, interpolation for equal intervals, hyperbolic functions, particular solutions.	1-5	K3,K4
CO5	Evaluate inverse using Cayley-Hamilton, interpolation for unequal intervals, inverse hyperbolic, maximum and minimum of a function, general solution for differential equations.	1-5	K4,K5

K1= Remember, K2= Understand, K3= Apply, K4=Analyze, K5= Evaluate, K6= Create

PROGRAMME: Open to all Programmes except BSc. COMPUTER SCIENCE	BATCH: 2024 -2027
PART: IV	COURSE COMPONENT: NON- MAJOR ELECTIVE-I
COURSE NAME: FUNDAMENTALS OF WEB SKILLS AND MS – ACCESS PRACTICAL	COURSE CODE:
SEMESTER: I	MARKS:100
CREDITS: 2	TOTAL HOURS:30
PRACTICAL	

COURSE OBJECTIVE:

To develop proficiency in web Application tools and practical skills in MS-Access for effective database management.

COURSE OUTCOMES:

1. Understand the fundamentals of Internet and the Web concepts.
2. Explain the usage of internet concepts and analyze its components.
3. Identify and apply the online information resources.
4. Inspect and utilize the appropriate Google Apps for education effectively.
5. Describe summarizing data and queries using MS-Access.

PROGRAMS:

(6 HOURS)

1. Assume that you are studying in final year of your graduation and are eagerly looking for a job. Visit any job portal and upload your resume.
2. Create a meeting using Google calendar and share meeting id to the attendees. Transfer the ownership to the Manager once the meeting id is generated.
3. Create a label and upload bulk contacts using import option in Google Contacts.

(6 HOURS)

4. Create your own Google classroom and invite all your friends through email id. Post study material in Google classroom using Google drive. Create a separate folder for every subject and upload all unit wise E-Content Materials.
5. Create and share a folder in Google Drive using ‘share a link’ option and set the permission to access that folder by your friends only.
6. Create one page story in your mother tongue by using voice recognition facility of Google docs.

(6 HOURS)

7. Create a registration form for your Department Seminar or Conference using Google Forms.
8. Create a question paper with multiple choice types of questions for a subject of your choice, using Google Forms.
9. Create a Google form with minimum 25 questions to conduct a quiz and generate a certificate after submission

(6 HOURS)

10. Create a meet using Google Calendar and record the meet using Google Meet.
11. Create a Google slides for a topic and share the same with your friends.

MS- Access

12. Create a table with appropriate table level constraints.

(6 HOURS)

13. Create a form to for data entry.
14. Sort the table data on a column. View selected records from a table by filter.
15. Create a Query manually and perform calculations using a query.

SEMESTER II

PROGRAMME: B.Sc., COMPUTER SCIENCE	BATCH: 2024 -2027
PART: III	COURSE COMPONENT: CORE – III
COURSE NAME: PROGRAMMING IN JAVA	COURSE CODE:
SEMESTER: II	MARKS:100
CREDITS: 4	TOTAL HOURS:90
THEORY	

COURSE OBJECTIVE:

To understand the Object Oriented Programming features and the core concepts of Java Programming language.

COURSE OUTCOMES:

1. Recognize the structure and model of the Java programming language.
2. Design programs using the basic constructs and object oriented concepts of Java.
3. Demonstrate the use of packages and interfaces.
4. Develop programs using exception handling, multithreading and file handling.
5. Understand the basic principles of creating GUI applications with Java.

UNIT I

(12 HOURS)

Introduction to OOPS: Paradigms of Programming Languages – Basic concepts of Object Oriented Programming–Procedure Oriented Programming vs. Object Oriented Programming – Benefits & Application of OOPs.

Introduction to Java: History – Java features –Java Environment – JDK API – Types of Java program – Creating and Executing a Java program – Java Tokens – Java Virtual Machine (JVM) – Command Line Arguments –Comments in Java program.

UNIT II

(18 HOURS)

Java Programming Elements: Constants – Variables – Data types – Scope of variables – Type casting –Operators: Special operators – Expressions – Evaluation of Expressions. Decision making and branching statements – Looping statements – break – labeled loop – continue Statement.

Arrays in Java: One Dimensional Array – Creating an array – Array processing – Multidimensional Arrays.

Class and objects: Defining a class – Methods – Creating objects – Accessing class members – Constructors – Method overloading – Static members –Nesting of Methods –this keyword.

UNIT III

(22 HOURS)

Inheritance: Definition –types of inheritance– Overriding methods – Final variables and methods – Final classes – Final methods – Abstract methods and classes – Visibility Control.

Packages: Java API Packages – System Packages – Naming Conventions –Creating & Accessing a Package – Adding Class to a Package – Hiding Classes.

Interfaces: Defining interface – Extending interface – Implementing Interface – Accessing interface variables. **Strings:** String Array – String Methods – String Buffer Class.

UNIT IV

(20 HOURS)

Exception Handling: Limitations of Error handling – Advantages of Exception Handling – Types of Errors – Basics of Exception Handling – try block – throwing an exception – catching an exception – finally statement.

Multithreading: Creating Threads – Life of a Thread –Defining & Running Thread – Thread Methods – Thread Priority – Synchronization –Implementing Runnable interface – Thread Scheduling.

I/O Streams: File – Streams – Advantages – The stream classes – Byte streams –Character streams.

UNIT V

(18 HOURS)

The AWT class hierarchy – Swing: Introduction to Swing – Hierarchy of swing components. Containers – Top level containers –JFrame–JWindow–JDialog–JPanel –JButton–JToggleButton–JCheckBox–JRadioButton–JLabel – JTextField– JTextArea–JList–JComboBox – JScrollPane– Event Handling: Events – Event sources – Event Listeners – Event Delegation Model (EDM) – Handling Mouse and Keyboard Events– Layout Managers – Menus.

Introduction to JApplet: Applet Life cycle – Creating & Executing a JApplet –Applet tag in HTML –Graphics Class: Drawing and filling lines – Rectangles – Polygon – Circles – Font and Color classes.

PRESCRIBED BOOKS:

1. Herbert Schildt, “Java: The Complete Reference”, TataMcGraw Hill, 12thEdition.

REFERENCE BOOKS:

1. E. Balagurusamy, “Programming with Java”, Tata McGraw Hill, 7th Edition.
2. Sagayaraj, Denis, Karthick and Gajalakshmi, “Java Programming for Core and Advanced Learners”, Universities Press (INDIA) Private Limited 2018.
3. Gary Cornell, “Core Java 2 Volume I – Fundamentals”, Addison Wesley.
4. Head First Java, O’Rielly Publications, Y. Daniel Liang, Introduction to Java Programming, 7th Edition, Pearson Education India.

E-LEARNING RESOURCES:

1. <https://NPTEL.ac.in/courses/106105191/>
2. <https://www.mooc-list.com/tags/java-programming>
3. <https://docs.oracle.com/javase/tutorial/>

4. <https://www.geeksforgeeks.org/java/>

5. <https://www.w3schools.com/java/>

GUIDELINES TO THE QUESTION PAPER SETTERS

QUESTION PAPER PATTERN

SECTION	QUESTION COMPONENT	NUMBERS	MARKS	TOTAL
A	<i>Answer any 10 out of 12 questions(each in 50 words)</i>	1-12	3	30
B	<i>Answer any 5 out of 7 questions(each in 300 words)</i>	13-19	6	30
C	<i>Answer any 4 out of 6 questions(each in 1200 words)</i>	20-25	10	40
TOTAL MARKS				100

BREAK UP OF QUESTIONS

UNITS	SECTION A	SECTION B	SECTION C
I	2	2	1
II	3	2	1
III	2	1	2
IV	3	1	1
V	2	1	1
TOTAL	12	7	6
SECTION A – 12		SECTION B - 7	SECTION C – 6

PSO – CO mapping

	PSO 1	PSO 2	PSO 3	PSO 4	PSO5
CO 1	3	3	2	3	3
CO 2	3	2	3	3	2
CO 3	3	3	3	2	2
CO 4	3	2	3	2	3
CO 5	3	3	2	2	3
Ave.	3	2.6	2.6	2.4	2.6

PSO-CO-question paper mapping

CO No:	COURSE OUTCOME	PSOs ADDRESSED	COGNITIVE LEVEL (K1 to K6)
CO1	Recognize the structure and model of the Java programming language.	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4, K5
CO2	Design programs using the basic constructs and object oriented concepts of Java.	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4, K5
CO3	Demonstrate the use of packages and interfaces.	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4, K5
CO4	Develop programs using exception handling, multithreading and file handling.	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4, K5
CO5	Understand the basic principles of creating GUI applications with Java.	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4, K5

K1= Remember, K2= Understand, K3= Apply, K4=Analyse, K5= Evaluate, K6= Create

PROGRAMME: B.Sc., COMPUTER SCIENCE	BATCH: 2024 -2027
PART: III	COURSE COMPONENT: CORE – IV
COURSE NAME: PRACTICAL-II: PROGRAMMING IN JAVA	COURSE CODE:
SEMESTER: II	MARKS:100
CREDITS: 4	TOTAL HOURS:60
PRACTICAL	

COURSE OBJECTIVE:

To acquire complete knowledge of the core concepts of Java through execution of programs.

COURSE OUTCOMES:

1. Write programs using the basic constructs in Java.
2. Practice Java-based programs for real world problems using classes and strings.
3. Create packages and handle exceptions.
4. Develop Java Applications for multithreading, file handling and displaying Applet.
5. Design simple GUI applications to demonstrate layout managers.

PROGRAMS:

(16 HOURS)

1. Write a Java program to calculate Simple Interest and Compound Interest.
2. Write a Java program to read the previous and current month reading and generate EB Bill.
3. Write a Java program to check whether the given number is a perfect number or not.
4. Write a Java program to perform matrix operations using two-dimensional arrays.

(16 HOURS)

5. Write a Java program to prepare student mark sheet using inheritance.
6. Write a Java program to print the area and perimeter of various two-dimensional objects using abstract class and interface.
7. Write a Java program to read a string and check whether it is a pangram.
8. Write a Java program to find a substring in the given string and replace it with another string using String Buffer class.

(8 HOURS)

9. Write a Java program to perform bank operations using packages.
10. Write a Java program to read two numbers and perform various arithmetic operations using Exception Handling.

(12 HOURS)

11. Write a Java program to scroll the text and display the current time in HH:MM:SS format using threads.
12. Write a Java program to copy the contents of one file to another file.
13. Write a Java program to display a JApplet with two-dimensional objects and text using different fonts and colors.

(8 HOURS)

14. Write a Java program to design a simple calculator using Swing components.
15. Write a Java program to create an array of buttons and display them using Grid Layout.

PSO – CO mapping

	PSO 1	PSO 2	PSO 3	PSO 4	PSO5
CO 1	3	3	2	3	2
CO 2	3	3	2	3	2
CO 3	3	3	3	2	3
CO 4	2	3	3	3	3
CO 5	3	2	3	3	3
Ave.	2.8	2.8	2.6	2.8	2.6

PSO-CO-question paper mapping

CO No:	COURSE OUTCOME	PSOs ADDRESSED	COGNITIVE LEVEL (K1 to K6)
CO1	Write programs using the basic constructs in Java.	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4, K5
CO2	Practice Java-based programs for real world problems using classes and strings.	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4, K5
CO3	Create packages and handle exceptions.	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4, K5, K6
CO4	Develop Java Applications for multithreading, file handling and displaying Applet.	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4, K5, K6
CO5	Design simple GUI applications to demonstrate layout managers.	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4, K5

K1= Remember, K2= Understand, K3= Apply, K4=Analyse, K5= Evaluate, K6= Create

PROGRAMME: B.Sc.(CS), BCA, B.Sc.(IT)	BATCH: 2024 – 2027
PART: III	COURSE COMPONENT: ALLIED-II
COURSE NAME: STATISTICS	COURSE CODE:
SEMESTER: II	MARKS:100
CREDITS: 5	TOTAL HOURS: 90
THEORY AND PROBLEMS	

COURSE OBJECTIVE:

Understand about data and use various statistical techniques to measure and compare the relation between data points.

COURSE OUTCOMES:

1. Recall the basics of statistical data, meaning of correlation and regression and probability.
2. Understand the concept of Statistical data representation in graph, location of measure, difference between correlation and regression and concept of probability.
3. Apply the concepts of data in various types of graphical representation, various types of averages and deviations, relation between correlation and regression, real world problems into probability models.
4. Analyze graphical representation, measures of central tendency and dispersion, correlation and regression, Addition and multiplication theorem in probability.
5. Evaluate different types of graphical methods, measures of central tendency and dispersion, correlation and regression and Baye's Theorem applications in problems.

UNIT I

(18 Hours)

Introduction to statistics: Definition, Characteristics, Graphical Representation of data: Bar charts, Pie Diagrams, Histograms, Frequency polygon, Ogives.

Volume I: Chapter 1, Chapter 6

UNIT II

(18 Hours)

Measures of Central Tendency: Mean, Median, Mode, graphical location of median, quartiles, deciles, percentiles, relation among arithmetic mean, geometric mean and harmonic mean.

Volume I: Chapter 7

UNIT III

(18 Hours)

Measures of Dispersion: Range, Mean deviation, Quartile deviation, Standard deviation, Coefficient of variation, Inter quartile deviation, Mean Absolute deviation.

Volume I: Chapter 8

UNIT IV

(18 Hours)

Correlation and Regression: Correlation: Meaning, Applications, types of degree of correlation, Scatter diagram, Karl Pearson's Coefficient of Correlation, Spearman's Rank Correlation. Regression: Meaning, uses, Difference between correlation and regression, linear regression equations.

Volume I : Chapter 10 and Chapter 11

UNIT V

(18 Hours)

Probability: Basic probability, axioms of probability, independent events, Addition and Multiplication theorem (Statement only), Baye's theorem

Volume II : Chapter 1

PRESCRIBED BOOK:

1. Treatment and content as in "Statistical Methods" – S.P. Gupta, Sultan Chand & Sons 45th Edition(2017)

REFERENCE BOOKS:

1. New Mathematical statistics - Sanjay Arora & Bansilal (2002), Meerat Publications, New Delhi
2. Fundamentals of Mathematical Statistics - Gupta, S.C. and Kapoor, V.K.(2000): 10/e, Sultan Chand & Sons
3. Basic Statistics - 3/Agarwal .B.L (1996): e ,New Age International(P) Ltd.,
4. Statistics for Business and Economics - Hooda.R.P.(2003): 3/e, MacMillan.

E - LEARNING RESOURCES:

1. <https://www.digimat.in/nptel/courses/video/110107114/L01.html>
2. <https://ocw.mit.edu/courses/14-30-introduction-to-statistical-method-in-economics-spring-2006/>
3. www.e-booksdirectory.com
4. www.bookboon.com/en/statistics-and-mathematics-ebooks

GUIDELINES TO THE QUESTION PAPER SETTERS

QUESTION PAPER PATTERN

SECTION	QUESTION COMPONENT	NUMBERS	MARKS	TOTAL
A	Answer any 10 out of 12 questions	1 - 12	3	30
B	Answer any 5 out of 7 questions	13 - 19	6	30
C	Answer any 4 out of 6 questions	20 - 25	10	40
TOTAL MARKS				100

BREAK UP OF QUESTIONS FOR THEORY AND PROBLEMS

UNITS	SECTION A		SECTION B		SECTION C	
	THEORY	PROBLEM	THEORY	PROBLEM	THEORY	PROBLEM
I	2	-	-	1	-	1
II	1	1	-	1	-	1
III	-	2	-	1	-	1
IV	1	1	-	1	-	1
V	1	1	-	1	-	1
Any Unit	-	2	-	2	-	1
TOTAL	5	7	-	7	-	6
SECTION A – 12			SECTION B - 7		SECTION C - 6	

PSO-CO mapping

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	2	3	2	2	3
CO 2	3	2	2	3	2
CO 3	3	2	3	3	2
CO 4	2	3	2	2	3
CO 5	2	3	3	3	2
Ave.	2.4	2.6	2.4	2.6	2.4

PSO-CO-question paper mapping

CO No:	COURSE OUTCOME	PSOs ADDRESSED	COGNITIVE LEVEL (K1 to K6)
CO1	Recall the basics of statistical data, meaning of correlation and regression and probability.	1-5	K1
CO2	Understand the concept of Statistical data representation in graph, location of measure, difference between correlation and regression and concept of probability.	1-5	K1, K2
CO3	Apply the concepts of data in various types of graphical representation, various types of averages and deviations, relation between correlation and regression, real world problems into probability models.	1-5	K3
CO4	Analyze graphical representation, measures of central tendency and dispersion, correlation and regression, Addition and multiplication theorem in probability.	1-5	K3, K4
CO5	Evaluate different types of graphical methods, measures of central tendency and dispersion, correlation and regression and Baye's Theorem applications in problems.	1-5	K4, K5

K1= Remember, K2= Understand, K3= Apply, K4=Analyse, K5= Evaluate, K6= Create

PROGRAMME: Open to all Programmes except BSc. COMPUTER SCIENCE	BATCH: 2024 -2027
PART: IV	COURSE COMPONENT: NON- MAJOR ELECTIVE -II
COURSE NAME: DIGITAL LITERACY: NAVIGATING DIGITAL WORLD	COURSE CODE:
SEMESTER: II	MARKS:100
CREDITS: 2	TOTAL HOURS: 30
THEORY	

COURSE OBJECTIVE:

To equip students with the knowledge and skills of digital society and to engage students with digital technologies in their personal and professional lives.

COURSE OUTCOMES:

1. Understand the functions of Computers, Computer hardware and file management.
2. Manage to store and share files in cloud.
3. Design graphics and presentations using Content creation tools.
4. Identify and Prevent cyber security threats and phishing attempts.
5. Acquire Physical and Mental health by practicing proper strategies.

UNIT I

(6 HOURS)

Basics of Computing: Hardware Vs Software – Operating System: Windows, MacOS, Linux - Introduction to File Management.

UNIT II

(6 HOURS)

Online File Storage and Sharing: Google Drive Uploading, Organizing and Sharing Files and Folders – Best Practices for file Organization and Share Permissions.

UNIT III

(6 HOURS)

Visual Content Creation Tools : Canva – Designing graphics, Presentations and Social media Posts- Design principles for creating Visually appealing Content.

UNIT IV

(6 HOURS)

Digital Security: Cyber security threats and Vulnerabilities – Password management and best Practices- Recognizing Phishing scams and malware.

UNIT V

(6 HOURS)

Digital Wellness: Managing Screen time and Digital distractions – Mental health Considerations in the digital age.

PRESCRIBED BOOKS:

1. Fundamentals of Information Technology – Alexis Leon, Mathews Leon.
2. Introduction to Cyber Security: Guide to the World of Cyber Security – Anand Shinde.

REFERENCE BOOKS:

1. Fundamental of Computers – V. Rajaraman.
2. Cybersecurity Fundamentals: Best Security Practices - Bruce Brown.

E-LEARNING RESOURCES:

1. <https://www-mooc--list-com.webpkgcache.com/doc/-/s/www.mooc-list.com/tags/digital-literacy>
2. <https://www.mooc4dev.org/DigiLitMOOC>
3. <https://www.javatpoint.com/computer-fundamentals-tutorial>
4. <https://www.javatpoint.com/ict-tools>

QUESTION PAPER PATTERN: MULTIPLE CHOICE QUESTIONS

SEMESTER III

PROGRAMME: B.Sc., COMPUTER SCIENCE	BATCH: 2024 -2027
PART: III	COURSE COMPONENT: CORE – V
COURSE NAME: DATA STRUCTURES AND ALGORITHMS	COURSE CODE:
SEMESTER: III	MARKS:100
CREDITS: 4	TOTAL HOURS:90
THEORY	

COURSE OBJECTIVE:

To understand the fundamental data structures and algorithms.

COURSE OUTCOMES:

1. Understand static data structures like array implementation of stack and queue.
2. Relate static data structures with dynamic data structures.
3. Demonstrate tree and graph traversal algorithms.
4. Apply Divide and Conquer approach to recurrence problems.
5. Identify and solve algorithms using Greedy approach.

UNIT I

(18 HOURS)

Introduction to Data structure-Arrays: Single and Multi-dimensional Arrays, **Sparse Matrices -Stacks:** Implementing stack using array - Recursion - Prefix, Infix and Postfix expressions, Conversion from Infix to Postfix – Postfix evaluation.

UNIT II

(20 HOURS)

Queues: Array implementation of Queue, Circular Queue – Linked. **Lists:** Singly, Doubly-representation of Stack and Queue as Linked Lists.

UNIT III

(16 HOURS)

Trees: Introduction - Binary Trees - Binary Search Tree. **Creation and Traversal:** Inorder, Preorder and Postorder. **Graph:** Definition, Types of Graphs, Traversal – Breadth First Search and Depth First Search.

UNIT IV

(20 HOURS)

Algorithms: Introduction: What is an Algorithm? Algorithm Specification – Divide and Conquer: General method – Binary Search – Finding the maximum and minimum – Merge Sort – Quick Sort – Selection Sort.

UNIT V

(16 HOURS)

The Greedy Method: General Method – Knapsack problem – Job Sequencing with deadlines – Minimum cost spanning trees: Prim’s Algorithm – Kruskal Algorithm – Single Source Shortest Paths.

PRESCRIBED BOOKS:

1. Sahni, S. (2005). Data Structures, Algorithms, and Applications in Java (2nd ed.). Silicon Press.

REFERENCE BOOKS:

1. Hubbard, J. R., & Huray, A. (2004). Data Structures with Java. Prentice Hall.
2. Barbuddhe, V., Zanjat, S. N., & Karmore, B. S. (2020). Fundamentals of computer algorithms. LAP Lambert Academic Publishing.
3. Gilberg, R., & Forouzan, B. A. (2005). Data Structures: A Pseudocode Approach with C. Course Technology.
4. Puntambekar, A. A. (2020). Data Structures: Concepts and Implementation. Amazon Digital Services LLC - KDP Print.
5. Puntambekar, A. A. (2020a). Analysis and design of algorithms: Conceptual approach. Amazon Digital Services LLC - KDP Print.

E-LEARNING RESOURCES:

1. NPTEL, MOOC and coursera courses on Analysis of algorithms and data structures
2. <https://www.geeksforgeeks.org/data-structures/>
3. <https://visualgo.net/en/>
4. https://www.tutorialspoint.com/data_structures_algorithms/index.htm
5. <https://www.programiz.com/dsa>

GUIDELINES TO THE QUESTION PAPER SETTERS

QUESTION PAPER PATTERN

SECTION	QUESTION COMPONENT	NUMBERS	MARKS	TOTAL
A	<i>Answer any 10 out of 12 questions(each in 50 words)</i>	1-12	3	30
B	<i>Answer any 5 out of 7 questions(each in 300 words)</i>	13-19	6	30
C	<i>Answer any 4 out of 6 questions(each in 1200 words)</i>	20-25	10	40
TOTAL MARKS				100

BREAK UP OF QUESTIONS

UNITS	SECTION A	SECTION B	SECTION C
I	2	1	1
II	3	1	1
III	3	2	2
IV	2	2	1
V	2	1	1
TOTAL	12	7	6
SECTION A – 12		SECTION B - 7	SECTION C - 6

PSO – CO mapping

	PSO 1	PSO 2	PSO 3	PSO 4	PSO5
CO 1	3	3	3	2	3
CO 2	2	3	2	3	3
CO 3	3	3	3	2	3
CO 4	3	2	3	3	3
CO 5	3	3	3	3	3
Ave.	2.8	2.8	2.8	2.6	3

PSO-CO-question paper mapping

CO No:	COURSE OUTCOME	PSOs ADDRESSED	COGNITIVE LEVEL (K1 to K6)
CO1	Understand static data structures like array implementation of stack and queue.	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4, K5
CO2	Relate static data structures with dynamic data structures.	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4, K5
CO3	Demonstrate tree and graph traversal algorithms.	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4, K5
CO4	Apply Divide and Conquer approach to recurrence problems.	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4, K5
CO5	Identify and solve algorithms using Greedy approach.	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4, K5

K1= Remember, K2= Understand, K3= Apply, K4=Analyse, K5= Evaluate, K6= Create

PROGRAMME: B.Sc., COMPUTER SCIENCE	BATCH: 2024 -2027
PART: III	COURSE COMPONENT: CORE – VI
COURSE NAME: PRACTICAL-III: DATA STRUCTURES AND ALGORITHMS USING JAVA	COURSE CODE:
SEMESTER: III	MARKS:100
CREDITS: 4	TOTAL HOURS:75
PRACTICAL	

COURSE OBJECTIVE:

To familiarize algorithmic techniques and different data structures using Java.

COURSE OUTCOMES:

1. Apply iterative technique with sorting algorithms.
2. Demonstrate divide and conquer algorithm using quick and merge sort.
3. Use data structure stack to implement recursion and expression evaluation.
4. Implement linked list to create dynamic data structures.
5. Create trees and graph as well as apply various traversal techniques.

Programs from Data Structures:

(15 HOURS)

1. Array implementation of stack
2. Conversion of infix to postfix using stack operations
3. Postfix Expression Evaluation.

(15 HOURS)

4. Array implementation of Queue
5. Implementation of Stack using linked list
6. Implementation of queue using linked list

(15 HOURS)

7. Creation and traversal of Binary Search Tree. (Preorder, Inorder, Postorder)
8. Creation and traversal of Graph (DFS,BFS)

Programs from Algorithms

(15 HOURS)

9. Implement Linear Search
10. Implement Binary Search
11. Implement Bubble Sort
12. Implement Insertion Sort

(15 HOURS)

13. Implement Merge Sort
14. Implement Selection Sort
15. Implement Quick Sort

PSO – CO mapping

	PSO 1	PSO 2	PSO 3	PSO 4	PSO5
CO 1	3	3	3	3	3
CO 2	2	3	3	3	3
CO 3	3	3	3	3	3
CO 4	3	3	3	3	3
CO 5	2	3	3	2	3
Ave.	2.6	3	3	2.8	3

PSO-CO-question paper mapping

CO No:	COURSE OUTCOME	PSOs ADDRESSED	COGNITIVE LEVEL (K1 to K6)
CO1	Apply iterative technique with sorting algorithms.	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4, K5, K6
CO2	Demonstrate divide and conquer algorithm using quick and merge sort.	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4, K5, K6
CO3	Use data structure stack to implement recursion and expression evaluation.	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4, K5, K6
CO4	Implement linked list to create dynamic data structures.	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4, K5
CO5	Create trees and graph as well as apply various traversal techniques.	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4, K5, K6

K1= Remember, K2= Understand, K3= Apply, K4=Analyse, K5= Evaluate, K6= Create

PROGRAMME: B.Sc. (CS)	BATCH: 2024 – 2027
PART: III	COURSE COMPONENT: ALLIED-III
COURSE NAME: ADVANCED STATISTICS WITH R PROGRAMMING	COURSE CODE:
SEMESTER: III	MARKS:100
CREDITS: 3	TOTAL HOURS: 75
THEORY AND PROBLEMS	

COURSE OBJECTIVE

Understand about data and use various statistical techniques in R Programming concepts.

COURSE OUTCOMES:

1. Recall the concept of Curve fitting, Hypothesis testing, Probability distribution, Introduction to R - programming, Measure of central tendency and Testing the hypothesis using R- programming.
2. Understand the concept of Curve fitting, Hypothesis testing, Probability distribution, Introduction to R - programming, Measure of central tendency and Testing the hypothesis using R- programming.
3. Apply the concept of Curve fitting, Hypothesis testing, Probability distribution, Introduction to R - programming, Measure of central tendency and Testing the hypothesis using R- programming.
4. Analyze the concept of Curve fitting, Hypothesis testing, Probability distribution, Introduction to R - programming, Measure of central tendency and Testing the hypothesis using R- programming.
5. Evaluate the concept of Curve fitting, Hypothesis testing, Probability distribution, Introduction to R - programming, Measure of central tendency and Testing the hypothesis using R- programming.

UNIT I

(15 Hours)

Curve fitting: Principle of least squares, fitting of straight line, parabola, exponential and power curve'

Part 1- Chapter: 10

UNIT II

(15 Hours)

Hypothesis: Meaning, types, standard hypothesis, null and alternative hypothesis, simple and composite hypothesis, type I and type II error, testing of hypothesis: t- test, F-test, chi square.

Part 1 - Chapters: 25, 26, 27 & 29

UNIT III

(15 Hours)

Probability Distributions: Binomial Distribution, Poisson distribution, Normal Distribution
Part 1 - chapters: 12, 13 & 16

UNIT IV

(15 Hours)

Introduction to R programming: R Studio Overview, Working in the Console, Arithmetic Operators, Logical Operations, Using Functions, Data structures, variables, and data types in R: Creating Variables, Numeric, Character and Logical, Graphical Representation of data using R: Bar-charts, Pie-diagrams, Histogram, Frequency polygon.

Measures of central tendency in R: Mean, Median, Mode.

Correlation using R: Scatter diagram, Karl Pearson's coefficient of correlation rank.

UNIT V

(15 Hours)

Testing of Hypothesis using R: Test for specified mean, test for equality of two means, test for paired observations.

Probability theorem using R: Addition theorem, Multiplication theorem -Baye's theorem.

Test of significance using R: t-test, F-test, Chi square and ANOVA.

Measure of dispersion using R: Mean deviation, Quartile deviation and standard deviation.

PRESCRIBED BOOKS:

1. Mathematical Statistics - by P. R. Vittal Margham Publications, 1st edition 2002.
2. Roger D. Peng," R Programming for in", 2012.
3. Norman Matloff," The Art of R Programming- A Tour of Statistical Software Design", 2011.

REFERENCE BOOKS:

1. Statistical Methods - S.P.Gupta , Sultan Chand & Sons 45th Edition(2017).
2. Garrett Golemund, Hadley Wickham," Hands-On Programming with R: Write Your Own Functions and Simulations",1st Edition, 2014.
3. Maria Dolores Ugarte, Ana F. Militino, Alan T. Arnholt "Probability and Statistics with R" 2nd Edition on, CRC Press, 2016.
4. Statistical Analysis with R,fordummies, Joseph Schmuller,2017 by John Wiley & Sons

E - LEARNING RESOURCES:

1. <https://archive.nptel.ac.in/courses/103/106/103106120/>
2. <https://www.youtube.com/watch?v=ZfbWC4rqIiE>
3. https://ocw.mit.edu/courses/9-07-statistics-for-brain-and-cognitive-science-fall-2016/8fa39994fa6b066d23c68c78f0923531_MIT9_07F16_lec12.pdf
4. <https://mathisfunforum.com/viewtopic.php?id=28219>
5. <https://www.javatpoint.com/r-normal-distribution>
6. <https://www.javatpoint.com/r-vector>
7. <https://www.geeksforgeeks.org/central-tendency-in-r-programming/>
8. MOOC courses entitled R Programming using statistics.

GUIDELINES TO THE QUESTION PAPER SETTERS

QUESTION PAPER PATTERN

SECTION	QUESTION COMPONENT	NUMBERS	MARKS	TOTAL
A	Answer any 10 out of 12 questions	1 - 12	3	30
B	Answer any 5 out of 7 questions	13 - 19	6	30
C	Answer any 4 out of 6 questions	20 - 25	10	40
TOTAL MARKS				100

BREAK UP OF QUESTIONS FOR THEORY AND PROBLEMS

UNITS	SECTION A		SECTION B		SECTION C	
	THEORY	PROBLEM	THEORY	PROBLEM	THEORY	PROBLEM
I	-	2	-	1	-	1
II	1	1	-	1	-	1
III	1	1	-	1	-	1
IV	2	-	1	-	1	-
V	2	-	1	-	1	-
Any Unit	1	1	1	1	-	1
TOTAL	7	5	3	4	2	4
SECTION A – 12			SECTION B - 7		SECTION C - 6	

PSO-CO Mapping

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	2	3	2	2	3
CO 2	3	2	2	3	2
CO 3	3	2	3	3	2
CO 4	2	3	2	2	3
CO 5	2	3	3	3	2
Ave.	2.4	2.6	2.4	2.6	2.4

PSO-CO-question paper mapping

	COURSE OUTCOME	PSOs ADDRESSED	COGNITIVE LEVEL (K1 to K6)
CO1	Recall the concept of Curve fitting, Hypothesis testing, Probability distribution, Introduction to R - programming, Measure of central tendency and Testing the hypothesis using R- programming.	1-5	K1, K2
CO2	Understand the concept of Curve fitting, Hypothesis testing, Probability distribution, Introduction to R - programming, Measure of central tendency and Testing the hypothesis using R- programming.	1-5	K2
CO3	Apply the concept of Curve fitting, Hypothesis testing, Probability distribution, Introduction to R - programming, Measure of central tendency and Testing the hypothesis using R- programming.	1-5	K3
CO4	Analyze the concept of Curve fitting, Hypothesis testing, Probability distribution, Introduction to R - programming, Measure of central tendency and Testing the hypothesis using R- programming.	1-5	K3, K4
CO5	Evaluate the concept of Curve fitting, Hypothesis testing, Probability distribution, Introduction to R - programming, Measure of central tendency and Testing the hypothesis using R- programming.	1-5	K5, K6

K1= Remember, K2= Understand, K3= Apply, K4=Analyse, K5= Evaluate

PROGRAMME: B.Sc. (CS)	BATCH: 2024 – 2027
PART: III	COURSE COMPONENT: ALLIED-III
COURSE NAME: ADVANCED STATISTICS WITH R PROGRAMMING PRACTICAL	COURSE CODE:
SEMESTER: III	MARKS:100
CREDITS: 2	TOTAL HOURS: 30
PRACTICAL	

COURSE OBJECTIVE:

Understand about data and use various statistical techniques in R Programming concepts.

COURSE OUTCOMES:

1. Apply the basic concepts of operators and data types using R Programming.
2. Visualize statistical data in graphs using R Programming.
3. Analyse test of significance based on t, chi-square and F distributions with respect to mean and variance using R Programming.
4. Analyse and compare group means using ANOVA one-way classification.
5. Implement advanced statistical functions using R Programming.

PROGRAMS

(6 HOURS)

1. Perform basic arithmetic operations.
2. Create variables for numeric, character, and logical data types
3. Write an R program to create a bar chart and a pie chart representing the different products.

(6 HOURS)

4. Write a program to calculate the mean, median and mode.
5. Generate a scatter plot and calculate both Karl Pearson's coefficient of correlation and the rank correlation coefficient
6. Calculate the correlation between two variables.

(6 HOURS)

7. Perform a hypothesis test for paired observations.
8. Write an R program to implement Bayes' theorem for a medical test scenario, where the probability of having a disease and the accuracy of the test

(6 HOURS)

9. Perform a hypothesis test for a specified mean.

10. Write an R program to perform an F-test and t-test to compare the mean scores of two groups.

(6 HOURS)

11. Write a program to Calculate the mean deviation.

12. Write an R program to perform a one-way ANOVA to compare the means of multiple groups.

PSO – CO mapping

	PSO 1	PSO 2	PSO 3	PSO 4	PSO5
CO 1	3	3	3	3	3
CO 2	3	2	2	3	2
CO 3	2	3	3	3	3
CO 4	3	3	3	3	3
CO 5	3	2	3	3	3
Ave.	2.8	2.6	2.8	3	2.8

PSO-CO-question paper mapping

CO No:	COURSE OUTCOME	PSOs ADDRESSED	COGNITIVE LEVEL (K1 to K6)
CO1	Apply the basic concepts of operators and data types using R Programming.	PSO1, PSO2, PSO3, PSO4, PSO5	K1,K2, K3, K4
CO2	Visualize statistical data in graphs using R Programming.	PSO1, PSO2, PSO3, PSO4, PSO5	K1,K2, K3, K4
CO3	Analyse test of significance based on t, chi-square and F distributions with respect to mean and variance using R Programming.	PSO1, PSO2, PSO3, PSO4, PSO5	K3, K4, K5
CO4	Analyse and compare group means using ANOVA one-way classification.	PSO1, PSO2, PSO3, PSO4, PSO5	K3, K4, K5
CO5	Implement advanced statistical functions using R Programming.	PSO1, PSO2, PSO3, PSO4, PSO5	K3, K4, K5

SEMESTER IV

PROGRAMME: B.Sc., COMPUTER SCIENCE	BATCH: 2024 -2027
PART: III	COURSE COMPONENT: CORE – VII
COURSE NAME: SOFTWARE ENGINEERING WITH UML	COURSE CODE:
SEMESTER: IV	MARKS:100
CREDITS: 4	TOTAL HOURS:90
THEORY	

COURSE OBJECTIVE:

To understand software development life cycle and know how to draw various UML diagrams.

COURSE OUTCOMES:

1. Apply the Software Development Life Cycles phases to software projects.
2. Understand various methods of collecting software requirements.
3. Demonstrate different design techniques.
4. Attain proficiency in creating and interpreting various UML diagrams.
5. Recall to translate the design specifications into code and apply different software testing techniques.

UNIT I

(22 HOURS)

Introduction – Evolution – Software Development projects – Emergence of Software Engineering. Software Life cycle models – Waterfall model – Rapid Application Development – Agile Model– Spiral Model

UNIT II

(14 HOURS)

Requirement Analysis and Specification – Gathering and Analysis – SRS – Formal System Specification.

UNIT III

(18 HOURS)

Software Design – Overview – Characteristics – Cohesion & Coupling – Layered design – Approaches Function Oriented Design – Structured Analysis – DFD – Structured Design – Detailed design.

UNIT IV

(20 HOURS)

Object Modeling using UML – OO concepts – UML – Diagrams – Use case, Class, Interaction, Activity, State Chart – Post script.

UNIT V

(16 HOURS)

Coding & Testing – coding – Review – Documentation – Testing – Black-box, White - box, Integration, OO Testing, Smoke testing.

PRESCRIBED BOOKS:

1. Rajib Mall, “Fundamentals of Software Engineering”, PHI 2018,5th Edition.

REFERENCE BOOKS:

1. Roger S.Pressman, Software Engineering-A Practitioner’s Approach, McGrawHill2010, 7th Edition.
2. Pankaj Jalote, An Integrated Approach to Software Engineering, Narosa Publishing House 2011, 3rd Edition.
3. Tsui, F., Karam, O., & Bernal, B. (2022). Essentials of software engineering (5th ed.). Jones and Bartlett.
4. Foster, E., & Towle, B., Jr. (2021). Software engineering: A methodical approach, 2nd edition (2nd ed.). CRC Press.
5. Booch, G., Rumbaugh, J., & Jacobson, I. (2005). The unified modeling language user guide (2nd ed.). Addison-Wesley Educational.

E-LEARNING RESOURCES:

1. https://pdfrock.com/compress-pdf-free.html#google_vignette (Ebook)
2. NPTEL ,coursera and udemy courses on Software Engineering, Software Testing and UML diagrams
3. <https://www.javatpoint.com/software-engineering>
4. https://www.tutorialspoint.com/software_engineering/software_engineering_tutorial.pdf
5. [https://www.youtube.com/playlist?list=PL_pbwdIyffslgxMVyXhnHiSn_EWTvx1G-UML Diagrams for beginners.](https://www.youtube.com/playlist?list=PL_pbwdIyffslgxMVyXhnHiSn_EWTvx1G-UML%20Diagrams%20for%20beginners)

GUIDELINES TO THE QUESTION PAPER SETTERS
QUESTION PAPER PATTERN

SECTION	QUESTION COMPONENT	NUMBERS	MARKS	TOTAL
A	<i>Answer any 10 out of 12 questions(each in 50 words)</i>	<i>1-12</i>	<i>3</i>	<i>30</i>
B	<i>Answer any 5 out of 7 questions(each in 300 words)</i>	<i>13-19</i>	<i>6</i>	<i>30</i>
C	<i>Answer any 4 out of 6 questions(each in 1200 words)</i>	<i>20-25</i>	<i>10</i>	<i>40</i>
TOTAL MARKS				100

BREAK UP OF QUESTIONS

UNITS	SECTION A	SECTION B	SECTION C
I	2	2	2
II	2	1	1
III	2	2	1
IV	3	1	1
V	3	1	1
TOTAL	12	7	6
SECTION A – 12		SECTION B – 7	SECTION C – 6

PSO – CO mapping

	PSO 1	PSO 2	PSO 3	PSO 4	PSO5
CO 1	3	3	3	2	3
CO 2	3	3	2	3	3
CO 3	3	3	3	3	3
CO 4	3	3	3	3	3
CO 5	3	3	3	3	3
Ave.	3	3	2.8	2.8	3

PSO-CO-question paper mapping

CO No:	COURSE OUTCOME	PSOs ADDRESSED	COGNITIVE LEVEL (K1 to K6)
CO1	Apply the Software Development Life Cycles phases to software projects.	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4, K5
CO2	Understand various methods of collecting software requirements.	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4, K5
CO3	Demonstrate different design techniques.	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4, K5
CO4	Attain proficiency in creating and interpreting various UML diagrams.	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4, K5
CO5	Recall to translate the design specifications into code and apply different software testing techniques.	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4, K5

K1= Remember, K2= Understand, K3= Apply, K4=Analyse, K5= Evaluate, K6= Create

PROGRAMME: B.Sc., COMPUTER SCIENCE	BATCH: 2024 -2027
PART: III	COURSE COMPONENT: CORE – VIII
COURSE NAME: PRACTICAL-IV: CASE TOOLS AND TESTING TOOLS	COURSE CODE:
SEMESTER: IV	MARKS:100
CREDITS: 4	TOTAL HOURS:60
PRACTICAL	

COURSE OBJECTIVE:

To analyze and design the software models using unified modeling language (UML).

COURSE OUTCOMES:

1. Plot state and behaviour of an object using class diagram.
2. Draw Use Case diagrams to summarize the details of actors and their interactions with the system.
3. Visualize interactive behavior of the system by drawing an interaction diagram.
4. Demonstrate workflow between users and the system with the help of activity diagrams.
5. Describe state dependent behavior of an object with a state diagram.

I. Using UML tools produce analysis and design models and draw

- a. Class diagram
- b. Use case diagram
- c. Interaction diagram
- d. Activity diagram
- e. State chart diagram

for the following projects.

(15 HOURS)

1. Student Information Management
2. Library Management System

(15 HOURS)

3. Hotel Management System
4. Stock Management System

(15 HOURS)

5. Hospital Management System
6. Automatic Teller Machine

(15 HOURS)

- 7. E-Ticketing
- 8. HR Management System.

PSO – CO mapping

	PSO 1	PSO 2	PSO 3	PSO 4	PSO5
CO 1	3	3	3	3	3
CO 2	2	3	3	3	3
CO 3	3	3	3	3	3
CO 4	3	3	3	3	3
CO 5	2	3	3	2	3
Ave.	2.6	3	3	2.8	3

PSO-CO-question paper mapping

CO No:	COURSE OUTCOME	PSOs ADDRESSED	COGNITIVE LEVEL (K1 to K6)
CO1	Plot state and behaviour of an object using class diagram.	PSO1, PSO2, PSO3, PSO4, PSO5	K3,K4,K5,K6
CO2	Draw Use Case diagrams to summarize the details of actors and their interactions with the system.	PSO1, PSO2, PSO3, PSO4, PSO5	K3,K4,K5,K6
CO3	Visualize interactive behavior of the system by drawing an interaction diagram.	PSO1, PSO2, PSO3, PSO4, PSO5	K3,K4,K5,K6
CO4	Demonstrate workflow between users and the system with the help of activity diagrams.	PSO1, PSO2, PSO3, PSO4, PSO5	K3,K4,K5,K6
CO5	Describe state dependent behavior of an object with a state diagram.	PSO1, PSO2, PSO3, PSO4, PSO5	K3,K4,K5,K6

K1= Remember, K2= Understand, K3= Apply, K4=Analyse, K5= Evaluate, K6= Create

PROGRAMME: B.Sc. (CS), BCA, B.Sc.(IT), B.Sc.(DA)	BATCH: 2024 – 2027
PART: III	COURSE COMPONENT: ALLIED-IV
COURSE NAME: OPERATIONS RESEARCH	COURSE CODE:
SEMESTER: IV	MARKS:100
CREDITS: 5	TOTAL HOURS: 90
THEORY AND PROBLEMS	

COURSE OBJECTIVE:

On completion of this course student will be able to use the mathematical knowledge in optimal use of resources.

COURSE OUTCOMES:

1. Recollect the fundamental ideas of Operations Research.
2. Understand Solution of LPP, Transportation, Assignment, Sequencing and Network Problems.
3. Apply the concepts of graphical representation and different models into practice.
4. Analyze minimization and maximization concepts of different models.
5. Evaluate different models of LPP, Transportation, Assignment, Sequencing and Network problems.

UNIT I

(18 Hours)

Linear Programming Problem: Introduction, Requirements for a Linear Programming Problem, Assumptions in Linear Programming Models, Applications of Linear Programming Method, Areas of Application of Linear Programming, Formulation of Linear Programming Problems. Graphical Method of Solutions, Some exceptional cases.
Chapter 1 & 2.

UNIT II

(18 Hours)

Transportation Problem: Definitions of the Transportation problem, Formulation and Solution of Transportation Models: Basic feasible solution by North West Corner Method, Least Cost Method, Vogel's Approximation Method. without degeneracy. Unbalanced Transportation Problem, Maximization Problem.
Chapter 7.

UNIT III

(18 Hours)

Assignment Problem: Definition of the Assignment problem, Formulation and Solution of the Assignment models, Unbalanced Assignment Problem, Maximization Problem.
Chapter 8.

UNIT IV

(18 Hours)

Sequencing Problem: n jobs through two machines, n jobs through three machines, two jobs through m machines, n jobs through m machines.

Chapter 14.

UNIT V

(18 Hours)

Network Analysis: Introduction, planning, scheduling, control, basic technologies, rules for constructing a project network, network construction, Program Evaluation Review Techniques (PERT), Critical Path Method (CPM). (no crashing).

Chapter 15

PRESCRIBED BOOK:

1. Resource Management Techniques- Sundaresan, K.S.Ganapathy Subramanian, K.Ganesan, A.R.Publications.

REFERENCE BOOKS:

1. Operations Research - Kandiswarup, P.K.Gupta, Man Mohan, S.Chand & Sons Education Publications, New Delhi, 12th Revised edition.
2. Operations Research Principles and Problems - S. Dharani Venkata Krishnan, Keerthi publishing house PVT Ltd
3. Operations Research - Prem Kumar Gupta & D. S. Hira, 7th Revised Edition, S. Chand & Company Ltd., 2014

E - LEARNING RESOURCES

1. <https://nptel.ac.in/courses/110106062>
2. <https://maa.org/press/maa-reviews/operations-research-problems>
3. https://ocw.mit.edu/courses/15-053-optimization-methods-in-management-science-spring-2013/resources/mit15_053s13_lec2/

GUIDELINES TO THE QUESTION PAPER SETTERS

QUESTION PAPER PATTERN

SECTION	QUESTION COMPONENT	NUMBERS	MARKS	TOTAL
A	Answer any 10 out of 12 questions	1 - 12	3	30
B	Answer any 5 out of 7 questions	13 - 19	6	30
C	Answer any 4 out of 6 questions	20 - 25	10	40
TOTAL MARKS				100

BREAK UP OF QUESTIONS FOR THEORY AND PROBLEMS

UNITS	SECTION A		SECTION B		SECTION C	
	THEORY	PROBLEM	THEORY	PROBLEM	THEORY	PROBLEM
I	1	1	-	1	-	1
II	1	1	-	1	-	1
III	1	1	-	1	-	1
IV	1	1	-	1	-	1
V	1	1	-	1	-	1
Any Unit	-	2	1	1	-	1
TOTAL	5	7	1	6	-	6
SECTION A – 12			SECTION B - 7		SECTION C - 6	

PSO-CO Mapping

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	2	3	2	2	3
CO 2	3	2	2	3	2
CO 3	3	2	3	3	2
CO 4	2	3	2	2	3
CO 5	2	3	3	3	2
Ave.	2.4	2.6	2.4	2.6	2.4

PSO-CO-question paper mapping

CO No:	COURSE OUTCOME	PSOs ADDRESSED	COGNITIVE LEVEL (K1 to K6)
CO1	Recollect the fundamental ideas of Operations Research.	1-5	K1
CO2	Understand Solution of LPP, Transportation, Assignment, Sequencing and Network Problems.	1-5	K1,K2
CO3	Apply the concepts of graphical representation and different models into practice.	1-5	K3
CO4	Analyze minimization and maximization concepts of different models	1-5	K3,K4
CO5	Evaluate different models of LPP, Transportation, Assignment, Sequencing and Network Problems.	1-5	K4,K5

PROGRAMME: ALL UG	BATCH: 2024 – 2027
PART: IV	COURSE COMPONENT: EVS
COURSE NAME: ENVIRONMENTAL STUDIES	COURSE CODE:
SEMESTER: IV	MARKS:100
CREDITS: 2	TOTAL HOURS: 30
THEORY	

COURSE OBJECTIVE:

To make students realize the importance of Environmental Studies.

COURSE OUTCOMES:

1. Understand the multidisciplinary nature, scope, and importance of environmental studies, emphasizing public awareness.
2. Recognize the challenges associated with natural resources and propose sustainable management solutions.
3. Comprehend the structure and function of ecosystems and identify different types of ecosystems.
4. Appreciate biodiversity, its value, threats, and conservation strategies, with a focus on India.
5. Gain insight into environmental pollution, its causes, effects, and mitigation measures, including disaster management.

UNIT I

(6 HOURS)

The Multidisciplinary nature of environmental studies Definition; Scope and importance, Need for public awareness.

UNIT II

(6 HOURS)

Natural Resources: Renewable and non-renewable resources: Natural resources and associated problems.

a) Forest resources: Use and Over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.

b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water dams benefits and problems.

c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, Case studies.

f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. - Role of an individual in conservation of natural resources. - Equitable use of resources for sustainable lifestyles.

UNIT III

(6 HOURS)

Ecosystems - Concept of an ecosystem - Structure and function of an ecosystem - Producers, consumers and decomposers - Energy flow in the ecosystem - Ecological succession - Food chains, food webs and ecological pyramids- Introduction, types, characteristic features, structure and function of the following ecosystem: -

- a. Forest ecosystem
- b. Grassland ecosystem
- c. Desert ecosystem
- d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

UNIT IV

(6 HOURS)

Biodiversity and its Conservation

- Introduction-Definition: genetic, species and ecosystem diversity.
- Biogeographical classification of India.
- Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values.
- Biodiversity at global, National and local levels.
- India as a mega-diversity nation.
- Hot-spots of biodiversity.
- Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts.
- Endangered and endemic species of India.
- Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT V

(6 HOURS)

Environmental Pollution: Definition - Causes, effects and control measures of: -

- a. Air pollution
- b. Water pollution
- c. Soil pollution

- d. Marine pollution
- e. Noise pollution
- f. Thermal pollution
- g. Nuclear hazards

- Solid waste Management: Causes, effects and control measures of urban and industrial wastes. - Role of an individual in prevention of pollution. - Pollution case studies. - Disaster management: floods, earthquake, cyclone and landslides.

QUESTION PAPER PATTERN: MCQ

SEMESTER V

PROGRAMME: B.Sc., COMPUTER SCIENCE	BATCH: 2024 -2027
PART: III	COURSE COMPONENT: CORE – IX
COURSE NAME: DIGITAL LOGIC AND COMPUTER ARCHITECTURE	COURSE CODE:
SEMESTER: V	MARKS:100
CREDITS: 4	TOTAL HOURS:90
THEORY	

COURSE OBJECTIVE:

To impart knowledge about number systems, basic digital gates used in digital system and acquaint students with the basic concepts of Computer architecture and Memory.

COURSE OUTCOMES:

1. Understand Boolean Algebra, including Boolean Laws and applying them to simplify Boolean expressions.
2. Design and analyze sequential and combinational logic circuits
3. Attain knowledge and apply the concepts related to computer organization and Design.
4. Analyze various levels of memory hierarchy and stack organization.
5. Identify I/O systems for efficient data transfer in digital systems.

UNIT I

(20 HOURS)

Number System: Binary Numbers – Base Conversion – Octal – Hexadecimal numbers – Complement – Signed Binary numbers – BCD Codes – Excess- 3 Codes - Gray Code. **Boolean Algebra & Logic Gates:** Boolean Laws- Truth Tables – Universal Gates – Simplification of Boolean functions–SOP – POS - K-map – Two, three and four variable maps.

UNIT II

(15 HOURS)

Sequential Logic: Flip Flops – RS – Clocked RS – D- JK –Master Slave JK –T - Flip- Flops.
Combinational Logic: Adders – Subtractors - Multiplexer–Demultiplexer -Encoder – Decoder.

UNIT III

(20 HOURS)

Register: Shift Registers - Types of Shift Registers -. **Computer Organization and Design:** Computer Registers - Bus System - Instruction Set - Timing and Control - Instruction Cycle - Memory Reference - Input-Output and Interrupt.

UNIT IV

(20 HOURS)

Central Processing Unit: Register Organization - Arithmetic and Logical - Micro-Operations - Stack Organization - Micro Programmed - Control Codes –Instruction Formats - Addressing Modes - Machine Language - Assembly Language - Input Output Programming.

UNIT V

(15 HOURS)

Input-output Organization: Peripheral Devices - I/O Interface - Modes of Data Transfer - Direct Memory Access.

PRESCRIBED BOOKS:

1. M.Morris Mano, 2014, 4th Edition, Digital Logic and Computer Design, Prentice- Hall of India Pvt Ltd.
2. M.Mano, Computer System Architecture, Pearson Education 2007, 3rd Edition.

REFERENCE BOOKS:

1. W.Stallings, Computer Organization and Architecture Designing for Performance, Prentice Hall of India, 2010.
2. Fundamentals of Digital Logic and Microcomputer Design Hardcover – Import, 1 July 2005.
3. V.Vijayendran, 2004, Digital Fundamentals, S.Viswanathan (Printers & Publishers) Pvt.Ltd.
4. William Stallings, Computer Organization and Architecture: Designing for Performance, 8th Edition, Prentice Hall of India.
5. Fundamentals of Digital Logic with Verilog Design (IRWIN ELEC & COMPUTER ENGINEERING) Hardcover – 16 March 2013.

E-LEARNING RESOURCES:

1. <https://www.javatpoint.com/digital-electronics>
2. <https://elearn.NPTEL.ac.in/shop/NPTEL/computer-architecture-and-organization/>
3. <https://www.geeksforgeeks.org/digital-electronics-logic-design-tutorials/>
4. https://onlinecourses.NPTEL.ac.in/noc20_cs64/preview
5. https://onlinecourses.NPTEL.ac.in/noc20_ee32/preview

GUIDELINES TO THE QUESTION PAPER SETTERS

QUESTION PAPER PATTERN

SECTION	QUESTION COMPONENT	NUMBERS	MARKS	TOTAL
A	Answer any 10 out of 12 questions(each in 50 words)	1-12	3	30
B	Answer any 5 out of 7 questions(each in 300 words)	13-19	6	30
C	Answer any 4 out of 6 questions(each in 1200 words)	20-25	10	40
TOTAL MARKS				100

BREAK UP OF QUESTIONS

UNITS	SECTION A	SECTION B	SECTION C
I	3	2	1
II	2	1	1
III	3	1	1
IV	2	2	2
V	2	1	1
TOTAL	12	7	6
SECTION A – 12		SECTION B - 7	SECTION C - 6

PSO – CO mapping

	PSO 1	PSO 2	PSO 3	PSO 4	PSO5
CO 1	3	3	3	3	3
CO 2	3	3	3	2	3
CO 3	3	3	3	2	2
CO 4	3	3	2	3	3
CO 5	2	2	3	3	2
Ave.	2.8	2.8	2.8	2.6	2.6

PSO-CO-question paper mapping

CO No:	COURSE OUTCOME	PSOs ADDRESSED	COGNITIVE LEVEL (K1 to K6)
CO1	Understand Boolean Algebra, including Boolean Laws and applying them to simplify Boolean expressions.	PSO1,PSO2,PSO3, PSO4,PSO5	K1, K2, K3, K4, K5
CO2	Design and analyze sequential and combinational logic circuits	PSO1,PSO2,PSO3, PSO4,PSO5	K1, K2, K3, K4, K5
CO3	Attain knowledge and apply the concepts related to computer organization and Design.	PSO1,PSO2,PSO3, PSO4,PSO5	K1, K2, K3, K4, K5
CO4	Analyze various levels of memory hierarchy and stack organization.	PSO1,PSO2,PSO3, PSO4,PSO5	K1, K2, K3, K4, K5
CO5	Identify I/O systems for efficient data transfer in digital systems.	PSO1,PSO2,PSO3, PSO4,PSO5	K1, K2, K3, K4, K5

K1= Remember, K2= Understand, K3= Apply, K4=Analyse, K5= Evaluate, K6= Create

PROGRAMME: B.Sc., COMPUTER SCIENCE	BATCH: 2024 -2027
PART: III	COURSE COMPONENT: CORE – X
COURSE NAME: ADVANCED WEB PROGRAMMING	COURSE CODE:
SEMESTER: V	MARKS:100
CREDITS: 4	TOTAL HOURS:90
THEORY	

COURSE OBJECTIVE:

To understand the basic concepts of front end programming languages and develop interactive, client-side, executable web applications.

COURSE OUTCOMES:

1. Demonstrate the knowledge of fundamental elements and concepts related to web clients.
2. Design static client side web documents using markup languages and style sheets.
3. Develop dynamic web pages using Javascript.
4. Understand the basic concepts of Bootstrap front-end framework.
5. Build applications that manipulate the Document Object Model to fetch and display information using jQuery.

UNIT I

(18 HOURS)

Introduction to HTML5: Introduction- Headings –Linking – Images - Special Characters and Horizontal Rules –Lists –Tables –Forms -Internal Linking- meta Elements -HTML5 Form Input Types- input and datalist elements and autocomplete attribute- Page-Structure Elements.

UNIT II

(18 HOURS)

Introduction to Cascading Style Sheets (CSS3): Introduction-Inline Styles-Embedded Style Sheets-Conflicting Styles-Linking External Style Sheets-Positioning Elements-Backgrounds- -Box Model and Text Flow-Drop-Down Menus-Text Shadows-Rounded Corners-Color-Box Shadows-Image Borders-Animation-Transitions and Transformations.

UNIT III

(18 HOURS)

JavaScript: Introduction to Scripting-Data Types-Variables-Operators-Control and Looping Structures-Functions-Arrays-Objects-Math Object-String Object-Date Object-Boolean and Number Object-Document Object - Document Object Model-Form Validations.

UNIT IV

(18 HOURS)

Bootstrap: Introduction- Bootstrap Grid System - Typography- Bootstrap Tables-Forms- Buttons- Images-Icons. **Bootstrap Layout Components:** Dropdown Menus- Button Groups- Buttons with Dropdowns- Navigation Elements- Navbar-Pagination-Typographic Elements.

UNIT V

(18 HOURS)

JQuery: jQuery Basics- Exploring Fundamentals of jQuery - Loading and using jQuery - Describing call back functions - Exploring jQuery Selectors - Methods – Manipulators - Events and Effects - Exploring jQuery and AJAX.

PRESCRIBED BOOKS:

1. Internet & World Wide Web –How to Program, Paul Deitel, Harvey Deitel, Abbey Deitel, Fifth Edition, Pearson Education 2012. (HTML5, CSS, JavaScript)
2. Bootstrap, Jake Spurlock, First Edition, O'reilly 2013.
3. Pro jQuery 2.0, Adam Freeman, Apress 2013.

REFERENCE BOOKS:

1. HTML & CSS: The Complete Reference, Thomas A. Powell, Fifth Edition, The McGraw-Hill Companies, Inc 2010.
2. Web Technologies, A Computer Science Perspective, Jeffrey C.Jackson, Pearson Education 2011.
3. Web Programming with HTML, XHTML, and CSS, Jon Duckett, Second Edition, Wiley Publishing Inc.
4. Introducing Bootstrap 4, Jörg Krause, Apress 2016.
5. Web Development with jQuery, Richard York, John Wiley & Sons, Inc 2015.

E-LEARNING RESOURCES:

1. MOOC Courses entitled “Web Technology”.
2. <https://www.udemy.com/course/full-stack-web-development-bootcamp-for-beginners-2019/>
3. <https://www.coursera.org/courses?query=full%20stack%20web%20development>
4. <https://www.geeksforgeeks.org/what-is-full-stack-development/>
5. https://www.w3schools.com/whatis/whatis_fullstack.asp
6. <https://studylib.es/doc/9071653/internet-and-world-wide-web-how-to-program-5th-rev-ed-978...>
7. <https://pepa.holla.cz/wp-content/uploads/2015/10/Bootstrap.pdf>

GUIDELINES TO THE QUESTION PAPER SETTERS

QUESTION PAPER PATTERN

SECTION	QUESTION COMPONENT	NUMBERS	MARKS	TOTAL
A	Answer any 10 out of 12 questions(each in 50 words)	1-12	3	30
B	Answer any 5 out of 7 questions(each in 300 words)	13-19	6	30
C	Answer any 4 out of 6 questions(each in 1200 words)	20-25	10	40
TOTAL MARKS				100

BREAK UP OF QUESTIONS

UNITS	SECTION A	SECTION B	SECTION C
I	2	2	1
II	2	2	1
III	3	1	2
IV	3	1	1
V	2	1	1
TOTAL	12	7	6
SECTION A – 12		SECTION B – 7	SECTION C - 6

PSO – CO mapping

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	3	3	3	3	3
CO 2	3	3	3	3	3
CO 3	3	3	3	3	3
CO 4	3	3	3	2	3
CO 5	3	3	3	2	3
Ave.	3	3	3	2.6	3

PSO-CO-question paper mapping

CO No:	COURSE OUTCOME	PSOs ADDRESSED	COGNITIVE LEVEL (K1 to K6)
CO1	Demonstrate the knowledge of fundamental elements and concepts related to web clients.	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4, K5
CO2	Design static client side web documents using markup languages and style sheets.	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4, K5
CO3	Develop dynamic web pages using Javascript.	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4, K5
CO4	Understand the basic concepts of Bootstrap front-end framework.	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4, K5
CO5	Build applications that manipulate the Document Object Model to fetch and display information using jQuery.	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4, K5

K1= Remember, K2= Understand, K3= Apply, K4=Analyse, K5= Evaluate, K6= Create

PROGRAMME: B.Sc., COMPUTER SCIENCE	BATCH: 2024 -2027
PART: III	COURSE COMPONENT: CORE – XI
COURSE NAME: PRACTICAL-V: ADVANCED WEB PROGRAMMING	COURSE CODE:
SEMESTER: V	MARKS:100
CREDITS: 4	TOTAL HOURS: 90
PRACTICAL	

COURSE OBJECTIVE:

To learn to design web pages using HTML5, CSS3, JavaScript and to build responsive designs with Bootstrap and JQuery.

COURSE OUTCOMES:

1. Acquire expertise in creating web pages using HTML.
2. Apply CSS techniques to style pages and incorporate dynamic effects.
3. Develop a deep understanding of JavaScript to design dynamic websites with advanced functionalities.
4. Attain practical skills in utilizing Bootstrap Grid System and Layouts for responsive web design.
5. Construct interactive web pages using jQuery Selectors and Events.

PROGRAMS:

HTML5 (18 HOURS)

1. Create a webpage to illustrate heading, text formatting, list tags.
2. Develop a web page to display table, frames and links.
3. Create a web page to display images, Audio and Video File.

CSS3 (18 HOURS)

4. Create a webpage with all types of CSS.
5. Design a web page using different CSS Properties like border, background, text, font and color.
6. Design a web page using CSS with Animation, Transitions and Transformations.

JAVASCRIPT (18 HOURS)

7. Demonstrate string and math objects predefined methods available in JavaScript.

8. Create Registration form and perform validation.
9. Write a JavaScript program using DOM manipulation.

BOOTSTRAP

(18 HOURS)

10. Create web page using Bootstrap Grid System.
11. Illustrate the use of Bootstrap Layout components such as Dropdown Menus, Button Groups, Buttons with Dropdowns, Navbar, and Pagination.
12. Illustrate the use of Bootstrap Navigation and Typographic Elements.

JQUERY

(18 HOURS)

13. Change text contents of the elements on button click in JQuery.
14. Select elements using JQuery Selectors.
15. Create mouseover and mouseleave Event in JQuery.

PSO – CO mapping

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	3	3	3	3	3
CO 2	3	3	3	3	2
CO 3	3	3	3	3	3
CO 4	3	3	3	3	2
CO 5	3	3	3	3	3
Ave.	3	3	3	3	2.6

PSO-CO-question paper mapping

CO No:	COURSE OUTCOME	PSOs ADDRESSED	COGNITIVE LEVEL (K1 to K6)
CO1	Acquire expertise in creating web pages using HTML.	PSO1, PSO2, PSO3, PSO4, PSO5	K3, K4, K5, K6
CO2	Apply CSS techniques to style pages and incorporate dynamic effects.	PSO1, PSO2, PSO3, PSO4, PSO5	K3, K4, K5, K6
CO3	Develop a deep understanding of JavaScript to design dynamic websites with advanced functionalities.	PSO1, PSO2, PSO3, PSO4, PSO5	K3, K4, K5, K6
CO4	Attain practical skills in utilizing Bootstrap Grid System and Layouts for responsive web design.	PSO1, PSO2, PSO3, PSO4, PSO5	K3, K4, K5, K6
CO5	Construct interactive web pages using jQuery Selectors and Events.	PSO1, PSO2, PSO3, PSO4, PSO5	K3, K4, K5, K6

K1= Remember, K2= Understand, K3= Apply, K4=Analyse, K5= Evaluate, K6= Create

PROGRAMME: Open to all Programmes except BSc. COMPUTER SCIENCE	BATCH: 2024 -2027
PART: III	COURSE COMPONENT: ELECTIVE – I (Interdisciplinary Elective)
COURSE NAME: PRACTICAL: WEB DESIGNING WITH OPEN SOURCE TECHNOLOGY	COURSE CODE:
SEMESTER: V	MARKS:100
CREDITS: 5	TOTAL HOURS: 75
PRACTICAL	

COURSE OBJECTIVE:

To provide hands-on experience in designing and developing modern websites using open-source technologies.

COURSE OUTCOMES:

1. Understand the fundamental concepts of PHP.
2. Implement conditional and looping statements for solving problems.
3. Develop array manipulation techniques.
4. Create interactive web forms for collecting user input.
5. Illustrate various MySQL database queries through PHP.

UNIT I

(6 HOURS)

Introduction: History- Features –Installing PHP - Other ways to run PHP - variables- Storing Data in variable –Data Types - Setting and Checking variables Data types - Constants – statements.

UNIT II

(6 HOURS)

Operators: Arithmetic operators - Assignment operators - Comparison operators – Increment & Decrement operators - Logical operators - Array operators - Conditional assignment operators.
Conditional statements: if – switch – nesting conditions – loops –while – do while– for-foreach loop iteration with break and continue.

UNIT III

(6 HOURS)

Arrays: Creating an array- modifying array. **Functions:** Build in functions - User defined function - Defining global and local variable - Super Global variable.

UNIT IV

(6 HOURS)

Working with Forms: Introduction of Forms – Form Elements: Text box – Text Area – Password –Radio Button – Check box – The Combo Box – Submit and Reset Buttons.

UNIT V

(6 HOURS)

Database Connectivity – Creating table in MYSQL with PHP – Inserting, Updating, and Deleting Record in MYSQL with PHP – Searching the data using SELECT statement - handling errors.

PRESCRIBED BOOKS:

1. PHP and MySQL for Dynamic Web Sites by Larry Ullman, 2017.
2. Vikram Vaswani, PHP and MySQL, TataMcGraw-Hill, 2007.

REFERENCE BOOKS:

1. Benforta, - MYSQL Crash course /SAMS, 2006, 2nd Edition.
2. C.J Date – An Introduction to Database system, Pearson, 8th Edition, 2003.
3. Ramesh, Elmasri and Shamkant B.Navathe, fundamentals of Database Systems, Pearson Education, 7th Edition, 2015
4. Tim Converse, Joyce Park and Clark Morgan, PHP 5 and MySQL, Wiley India, 2008.
5. Robert Sheldon, Geoff Moes, Beginning MySQL, Wrox, 2005.
6. Steve Suehring, Tim Converse and Joyce Park, -PHP6 and MySQL, Wiley India, 2009.

E-LEARNING RESOURCES:

1. <http://www.w3programmers.com/professional-web-development-with-php-mysql/>
2. <https://www.mysqltutorial.org/>
3. <https://www.tutorialspoint.com/mysql/index.htm>
4. <https://www.w3schools.com/php/>
5. NPTEL & MOOC courses titled PHP AND MYSQL.

PROGRAMS:

(15 HOURS)

1. Creating simple webpage using PHP.
2. Use of if-else conditional statement in PHP.
3. Use of Nested if conditional statement in PHP.
4. Use of Switch statement in PHP.
5. Use of while looping statements in PHP.

(15 HOURS)

6. Use of Do while looping statements in PHP.
7. Use of For looping statements in PHP.
8. Use of Foreach looping statements in PHP.
9. Creating Numerical Array in PHP.
10. Creating an Associative Array in PHP.

(15 HOURS)

11. Creating simple applications.
12. Database connectivity in PHP with MYSQL.
13. Creating simple table with constraints
14. Insertion, Updating and Deletion of rows in MYSQL.
15. Search a Record Using MYSQL.

PROGRAMME: B.Sc., COMPUTER SCIENCE	BATCH: 2024 -2027
PART: III	COURSE COMPONENT: ELECTIVE-II
COURSE NAME: BIG DATA ANALYTICS	COURSE CODE:
SEMESTER: V	MARKS:100
CREDITS: 5	TOTAL HOURS:90
THEORY	

COURSE OBJECTIVE:

To learn the concepts of big data analytics.

COURSE OUTCOMES:

1. Understand the types of digital data and big data environment.
2. Acquire knowledge of Big data analytics and its Technologies.
3. Apply NoSQL databases commands and management techniques.
4. Analyze data using Hadoop.
5. Design data using MapReduce.

UNIT I

(18 HOURS)

Introduction to Big Data: Data, Characteristics of data and Types of digital data: Unstructured, Semi-structured and Structured, Sources of data, Working with unstructured data, Evolution and Definition of big data, Characteristics and Need of big data, Challenges of big data, Data environment versus big data environment.

UNIT II

(18 HOURS)

Big Data Analytics: Overview of business intelligence, Data science and Analytics, Meaning and Characteristics of big data analytics, Need of big data analytics, Classification of analytics, Challenges to big data analytics, Importance of big data analytics, Basic terminologies in big data environment.

UNIT III

(18 HOURS)

Databases and Big Data Technology: Introduction to NoSQL, Uses, Features and Types, Need, Advantages, Disadvantages and Application of NoSQL, Overview of NewSQL, Comparing SQL, NoSQL and NewSQL, Introduction of apache cassandra and its needs, Characteristics of Cassandra.

UNIT IV

(18 HOURS)

Hadoop Foundation for Analytics: History, Needs, Features, Key advantage and Versions of Hadoop, Essential of Hadoop ecosystems, RDBMS versus Hadoop, Key aspects and Components of Hadoop, Hadoop architectures.

UNIT V

(18 HOURS)

Hadoop MapReduce: Introduction to MapReduce, Processing data with Hadoop using MapReduce, MapReduce application, Data serialization and Working with common serialization formats, Big data serialization formats.

PRESCRIBED BOOKS:

1. Seema Acharya and Subhashini Chellappan, “Big Data and Analytics”, Wiley India Pvt. Ltd., 2016.

REFERENCE BOOKS:

1. “Hadoop: The Definitive Guide”, Tom White, O'Reilly Media, 2010.
2. “Big Data” by Judith Hurwitz, Alan Nugent, Dr. Fern Halper and Marcia Kaufman, Wiley Publications, 2014.
3. Lars George, "HBase: The Definitive Guide", O'Reilley,2011.
4. Eben Hewitt, "Cassandra: The Definitive Guide", O'Reilley,2010.
5. Hadoop MapReduce Cookbook, Srinath Perera, Thilina Gunarathne, Packt Publishing Ltd, 2013.

E-LEARNING RESOURCES:

1. <https://www.javatpoint.com/what-is-big-data>
2. https://www.tutorialspoint.com/big_data_tutorials.htm
3. Hadoop: <http://hadoop.apache.org/>
4. <http://strata.oreilly.com/2010/09/the-smaq-stack-for-big-data.html>
5. http://blogs.computerworld.com/18840/big_data_smaq_down_storage_mapreduce_and_query

GUIDELINES TO THE QUESTION PAPER SETTERS

QUESTION PAPER PATTERN

SECTION	QUESTION COMPONENT	NUMBERS	MARKS	TOTAL
A	<i>Answer any 10 out of 12 questions(each in 50 words)</i>	1-12	3	30
B	<i>Answer any 5 out of 7 questions(each in 300 words)</i>	13-19	6	30
C	<i>Answer any 4 out of 6 questions(each in 1200 words)</i>	20-25	10	40
TOTAL MARKS				100

BREAK UP OF QUESTIONS

UNITS	SECTION A	SECTION B	SECTION C
I	2	2	1
II	3	2	1
III	2	1	2
IV	3	1	1
V	2	1	1
TOTAL	12	7	6
SECTION A – 12		SECTION B – 7	SECTION C - 6

PSO – CO mapping

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	3	3	3	3	3
CO 2	3	2	3	3	2
CO 3	3	3	3	2	2
CO 4	3	3	3	2	3
CO 5	3	3	3	2	3
Ave.	3	2.8	3	2.4	2.6

PSO-CO-question paper mapping

CO No:	COURSE OUTCOME	PSOs ADDRESSED	COGNITIVE LEVEL (K1 to K6)
CO1	Understand the types of digital data and big data environment.	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4, K5
CO2	Acquire knowledge of Big data analytics and its Technologies.	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4, K5
CO3	Apply NoSQL databases commands and management techniques.	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4, K5
CO4	Analyze data using Hadoop.	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4, K5
CO5	Design data using MapReduce.	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4, K5

K1= Remember, K2= Understand, K3= Apply, K4=Analyse, K5= Evaluate, K6= Create

PROGRAMME: B.Sc., COMPUTER SCIENCE	BATCH: 2024 -2027
PART: III	COURSE COMPONENT: ELECTIVE-II
COURSE NAME: INTERNET OF THINGS AND ITS APPLICATIONS	COURSE CODE:
SEMESTER: V	MARKS:100
CREDITS: 5	TOTAL HOURS:90
THEORY	

COURSE OBJECTIVE:

To comprehensively understand IoT fundamentals and applications across industries.

COURSE OUTCOMES:

1. Acquire insights of IoT architectures and enabling technologies.
2. Design interconnected systems for various applications in smart environments.
3. Apply wireless technologies for IoT and their protocols.
4. Analyze data handling, analytics, and big data technologies.
5. Demonstrate various IoT applications.

UNIT I

(18 HOURS)

Fundamentals of IoT: Introduction, Definitions & Characteristics of IoT, IoT Architectures, Physical & Logical Design of IoT, Enabling Technologies in IoT, History of IoT, About Things in IoT, The Identifiers in IoT, About the Internet in IoT, IoT frameworks, IoT and M2M.

UNIT II

(18 HOURS)

Sensors Networks: Definition, Types of Sensors, Types of Actuators, Examples and Working Development Boards: Arduino IDE and Board Types, RaspberriPi Development Kit, RFID Principles and components, **Wireless Sensor Networks:** History and Context, The node, Connecting nodes, Networking Nodes, WSN and IoT.

UNIT III

(18 HOURS)

Wireless Technologies for IoT: WPAN Technologies for IoT - IEEE 802.15.4, Zigbee, Z-Wave. IP-Based Protocols for IoT IPv6, 6LowPAN, RPL, REST, AMPQ, CoAP, MQTT.Edge connectivity and protocols.

UNIT IV

(18 HOURS)

Data Handling & Analytics: Introduction, Bigdata, Types of data, Characteristics of Big data, Data handling Technologies, Flow of data, Data acquisition, Data Storage, Introduction to Hadoop. Introduction to data Analytics, Types of Data analytics, Local Analytics, Cloud analytics and applications.

UNIT V

(18 HOURS)

Applications of IoT: Home Automation, Smart Cities, Energy, Retail Management, Logistics, Agriculture, Health and Lifestyle, Industrial IoT, Legal challenges, IoT design Ethics, IoT in Environmental Protection.

PRESCRIBED BOOKS:

1. IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things, David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry, Cisco Press, 2017.
2. Internet of Things – A hands-on approach, Arshdeep Bahga, Vijay Madiseti, Universities Press, 2015.
3. Internet of Things: Architecture, Design Principles And Applications, Rajkamal, McGraw Hill Higher Education.

REFERENCE BOOKS:

1. Daniel Minoli, — “Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications”, ISBN: 978-1-118-47347-4, Willy Publications
2. Pethuru Raj and Anupama C. Raman, "The Internet of Things: Enabling Technologies, Platforms, and Use Cases", CRC Press.
3. “From Machine-to-Machine to the Internet of Things – Introduction to a New Age of Intelligence”, Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stamatis, Karnouskos, Stefan Avesand. David Boyle and Elsevier, 2014.
4. Dhivya Bala, “ESP8266: Step by Step Tutorial for ESP8266 IoT, Arduino NODEMCU Dev. Kit”, 2018.
5. Walteneus Dargie, Christian Poellabauer, "Fundamentals of Wireless Sensor Networks: Theory and Practice”, Wiley 2014.

E-LEARNING RESOURCES:

1. https://onlinecourses.NPTEL.ac.in/noc17_cs22/course
2. http://www.cse.wustl.edu/~jain/cse570-15/ftp/iot_prot/index.html
3. <https://kp.kiit.ac.in/wp-content/uploads/2022/01/IOT-Study-materials.pdf>
4. https://ptgmedia.pearsoncmg.com/images/9781587144561/samplepages/9781587144561_CH08.pdf

GUIDELINES TO THE QUESTION PAPER SETTERS

QUESTION PAPER PATTERN

SECTION	QUESTION COMPONENT	NUMBERS	MARKS	TOTAL
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C	<i>Answer any 4 out of 6 questions(each in 1200 words)</i>	20-25	10	40
TOTAL MARKS				100

BREAK UP OF QUESTIONS

UNITS	SECTION A	SECTION B	SECTION C
I	2	2	1
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PSO – CO mapping

	PSO 1	PSO 2	PSO 3	PSO 4	PSO5
CO 1	3	3	2	3	2
CO 2	3	2	3	3	2
CO 3	3	3	3	3	2
CO 4	3	2	3	3	3
CO 5	3	3	2	3	2
Ave.	3	2.6	2.6	3	2.2

PSO-CO-question paper mapping

CO No:	COURSE OUTCOME	PSOs ADDRESSED	COGNITIVE LEVEL (K1 to K6)
CO1	Acquire insights of IoT architectures and enabling technologies.	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4, K5
CO2	Design interconnected systems for various applications in smart environments.	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4, K5
CO3	Apply wireless technologies for IoT and their protocols.	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4, K5
CO4	Analyze data handling, analytics, and big data technologies.	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4, K5
CO5	Demonstrate various IoT applications.	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4, K5

K1= Remember, K2= Understand, K3= Apply, K4=Analyse, K5= Evaluate, K6= Create

PROGRAMME: B.Sc., COMPUTER SCIENCE	BATCH: 2024 -2027
PART: III	COURSE COMPONENT: ELECTIVE-II
COURSE NAME: ARTIFICIAL INTELLIGENCE	COURSE CODE:
SEMESTER: V	MARKS:100
CREDITS: 5	TOTAL HOURS:90
THEORY	

COURSE OBJECTIVE:

To become familiar with basic principles of AI, Heuristic Search Techniques, Game Theory, Knowledge representation and AI applications.

COURSE OUTCOMES:

1. Attain fundamental knowledge of Artificial Intelligence.
2. Apply intelligent search algorithms on AI problems.
3. Understand the fundamental aspects of Game playing.
4. Utilize AI techniques for knowledge representation.
5. Acquire a deep understanding of AI applications.

UNIT I

(18 HOURS)

Artificial Intelligence: Introduction – Foundations of AI - History of AI -Risks and Benefits of AI.
Intelligent Agents: Agents and Environments- The Concept of Rationality - The Nature of Environments - Structure of Agents.

UNIT II

(18 HOURS)

Solving Problems By Searching: Problem-Solving Agents – Search Algorithms - Uninformed Search Strategies - Breadth First Search – Uniform-cost Search – Depth First Search – Depth-limited and iterative deepening search -**Informed (Heuristic) Search Techniques:** Greedy Best First Search-A* Search –Memory bounded search - Heuristic Functions.

UNIT III

(18 HOURS)

Search in Complex Environments: Local Search and Optimization Problems - Hill Climbing - Simulated Annealing- Local Search in Continuous Spaces. **Adversarial Search and Games:** Game Theory- Optimal Decisions in Games- The minimax search algorithm - Optimal decisions in multiplayer games-Alpha-Beta Pruning–Move ordering- Heuristic Alpha–Beta Tree Search- Stochastic Games.

UNIT IV

(18 HOURS)

Knowledge Representation: Logical Agents – Knowledge-Based Agents – Logic - Propositional Logic - First-Order Logic - Syntax and Semantics of First-Order Logic - Forward Chaining - Backward Chaining.

UNIT V

(18 HOURS)

Applications of AI: Natural Language Processing–Language Models – Grammar – Parsing – Augmented Grammars - Natural Language Tasks - Robotics – Robots – Robot Hardware - Robotic Perception - Planning and Control.

PRESCRIBED BOOKS:

1. S. Russell, P. Norvig, Artificial Intelligence: A Modern Approach, 4th Edition, Pearson Education, 2020.

REFERENCE BOOKS:

1. Vinod Chandra S. S. and Anand Hareendran S. “Artificial Intelligence: Principles and Applications”, 2nd Edition, PHI Learning Pvt Ltd, 2020.
2. Elaine Rich, Kevin Knight, & Shivashankar B Nair, Artificial Intelligence, McGraw Hill, 3rd Edition, 2009.
3. Mishra R. B, Artificial Intelligence, Prentice Hall of India, 2nd Edition, 2011.
4. Prachi Joshi, and Parag Kulkarni, “Artificial Intelligence: Building Intelligent Systems”, 2nd Edition, MIT Press, 2012.
5. Dr. Dheeraj Mehrotra, “Basics of Artificial Intelligence & Machine Learning”, Notion Press, 2019.

E-LEARNING RESOURCES:

1. MOOC courses entitled Artificial Intelligence
2. <https://in.coursera.org/courses?query=artificial%20intelligence>
3. <https://www.udemy.com/topic/artificial-intelligence/>
4. <https://www.geeksforgeeks.org/artificial-intelligence-an-introduction/>
5. https://www.tutorialspoint.com/fundamentals_of_science_and_technology/artificial_intelligence.
6. <https://dl.ebooksworld.ir/books/Artificial.Intelligence.A.Modern.Approach.4th.Edition.Peter.Norvig.%20Stuart.Russell.Pearson.9780134610993.EBooksWorld.ir.pdf>

GUIDELINES TO THE QUESTION PAPER SETTERS

QUESTION PAPER PATTERN

SECTION	QUESTION COMPONENT	NUMBERS	MARKS	TOTAL
A	Answer any 10 out of 12 questions(each in 50 words)	1-12	3	30
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C	Answer any 4 out of 6 questions(each in 1200 words)	20-25	10	40
TOTAL MARKS				100

BREAK UP OF QUESTIONS

UNITS	SECTION A	SECTION B	SECTION C
I	2	2	1
II	2	2	1
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TOTAL	12	7	6
SECTION A – 12		SECTION B – 7	SECTION C - 6

PSO – CO mapping

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	3	3	3	3	3
CO 2	3	2	3	3	2
CO 3	3	3	3	2	2
CO 4	3	3	3	2	3
CO 5	3	3	3	2	3
Ave.	3	2.8	3	2.4	2.6

PSO-CO-question paper mapping

CO No:	COURSE OUTCOME	PSOs ADDRESSED	COGNITIVE LEVEL (K1 to K6)
CO1	Attain fundamental knowledge of Artificial Intelligence.	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4, K5
CO2	Apply intelligent search algorithms on AI problems.	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4, K5
CO3	Understand the fundamental aspects of Game playing.	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4, K5
CO4	Utilize AI techniques for knowledge representation.	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4, K5
CO5	Acquire a deep understanding of AI applications.	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4, K5

K1= Remember, K2= Understand, K3= Apply, K4=Analyse, K5= Evaluate, K6= Create

PROGRAMME: ALL UG	BATCH: 2024 – 2027
PART: IV	COURSE COMPONENT: VALUE EDUCATION
COURSE NAME: VALUE EDUCATION	COURSE CODE:
SEMESTER: V	MARKS:100
CREDITS: 2	TOTAL HOURS: 15
THEORY	

COURSE OBJECTIVE:

To teach and inculcate the importance of value based education.

COURSE OUTCOMES:

1. Explore the relationship between education and values, their origins, and their impact on societal norms.
2. Foster personal growth by instilling virtues like truthfulness and self-discipline, addressing contemporary challenges faced by adolescents.
3. Investigate the principles of human rights, including those of marginalized groups, and advocate for social cohesion.
4. Embrace a spectrum of values—constitutional, social, professional, religious, moral, and environmental—to drive national and global progress.
5. Examine the enduring relevance of Guru Nanak Devji's teachings, Sikh values, and rights in modern contexts.

UNIT I - EDUCATION AND VALUES

(3 HOURS)

Definition, Concept, Classification, Theory, Criteria and Sources of values Aims and objectives of value education Role and Need for value education in the contemporary society, Role of education in transformation of values in society Role of parents, teachers, society, peer group and mass media in fostering values.

UNIT II - VALUE EDUCATION AND PERSONAL DEVELOPMENT (3 HOURS)

Human Values: Truthfulness, Sacrifice, Sincerity, Self-Control, Altruism, Scientific Vision, relevancy of human values to good life. Character Formation towards Positive Personality

Modern challenges of adolescents: emotions and behavior Self-analysis and introspection: sensitization towards gender equality, differently abled, Respect for - age, experience, maturity, family members, neighbors, strangers, etc.

UNIT III - HUMAN RIGHTS AND MARGINALIZED PEOPLE (3 HOURS)

Concept of Human Rights – Principles of human rights – human rights and Indian constitution – Rights of Women and children – violence against women – Rights of marginalized People – like women, children, minorities, transgender, differently abled etc.

Social Issues and Communal Harmony Social issues – causes and magnitude - alcoholism, drug addiction, poverty, unemployment – communal harmony –concept –religion and its place in public domain –secular civil society

UNIT IV - VALUE EDUCATION TOWARDS NATIONAL AND GLOBAL DEVELOPMENT (3 HOURS)

Constitutional Values :(Sovereign, Democracy, Socialism, Secularism, Equality, Justice, Liberty, Freedom, Fraternity)

Social Values: (Pity and Probity, Self-Control, Universal Brotherhood).

Professional Values :(Knowledge Thirst, Sincerity in Profession, Regularity, Punctuality, Faith).

Religious and Moral Values: (Tolerance, Wisdom, character).

Aesthetic Values: (Love and Appreciation of literature, fine arts)

Environmental Ethical Values

National Integration and international understanding.

Need of Humanistic value for espousing peace in society. Conflict of cross-cultural influences, cross-border education.

UNIT V (3 HOURS)

Guru Nanak Devji's Teachings

Relevance of Guru Nanak Devji's teachings' relevance to Modern Society

The Guru Granth sahib

The five Ks

Values and beliefs

Rights and freedom (Right of equality, Right to Education, Right to Justice, Rights of women, Freedom of religion, Freedom of culture, Freedom of assembly, Freedom of speech)

Empowerment of women

Concept of Langar

Eminent Sikh personalities

REFERENCE BOOKS:

1. Dr.Abdul Kalam. My Journey-Transforming Dreams into Actions. Rupa Publications, 2013.
2. Steven R Covey, 8th Habit of Effective People (From Effectiveness to Greatness), Free Press, NewYork, 2005.
3. Prem Singh, G.J. (2004). 'Towards Value Based Education', University News. Vol. 42 (45): P.11-12.
4. V.R. Krishna Iyer. Dialectics & Dynamics of Human Rights in India (Tagore Law Lectures) The Yesterday, Today and Tomorrow, Eastern Law House (1999, Reprint 2018)
5. <http://www.ncert.nic.in/rightside/links/pdf/framework/english/nf2005.pdf>

QUESTION PAPER PATTERN: MCQ

PROGRAMME: B.Sc., COMPUTER SCIENCE	BATCH: 2024 -2027
PART: IV	COURSE COMPONENT: INTERNSHIP
COURSE NAME: INTERNSHIP	COURSE CODE:
SEMESTER: V	MARKS: -
CREDITS: 2	TOTAL HOURS: -
INTERNSHIP	

COURSE OBJECTIVE:

To provide students with practical, hands-on experience in the field of computer science, complementing their academic learning with real-world applications.

GUIDELINES:

Each student should undergo training in software industry or related field for a minimum period of 4 weeks during IV Semester summer vacation. Student has to produce his/her Internship completion certificate from the concerned organization when the college reopens for V Semester.

SEMESTER VI

PROGRAMME: B.Sc., COMPUTER SCIENCE	BATCH: 2024 -2027
PART: III	COURSE COMPONENT: CORE-XII
COURSE NAME: COMPUTER NETWORKS	COURSE CODE:
SEMESTER: VI	MARKS:100
CREDITS: 4	TOTAL HOURS:75
THEORY	

COURSE OBJECTIVE:

To learn how computer networks work for efficient communication and data sharing.

COURSE OUTCOMES:

1. Understand the basic concept of computer hardware and software.
2. Recognize the types of Transmission Media and working principles of Public Switched Telephone Network.
3. Observe the general techniques of Error control, Flow control in Data Link Protocols
4. Analyze the Routing and Congestion Control Algorithms in Network Layer; recall the underlying protocol in Transport Layer.
5. Examine the various techniques in cryptography.

UNIT I (15 HOURS)

Introduction: Network Hardware - Software - Reference Models: OSI and TCP/IP Models – Example Networks: Internet, ATM, Ethernet and Wireless LANs.

UNIT II (15 HOURS)

Physical Layer: Guided Transmission Media - Wireless Transmission – Communication Satellites - Telephone System: Structure, Local Loop, Trunks and Multiplexing and Switching.

UNIT III (15 HOURS)

Data Link Layer: Error Detection and Correction - Elementary Data Link Protocols - Sliding Window Protocols - Network Layer Design Issues: Store– and – forward packet switching, Connection Oriented and Connectionless Service.

UNIT IV (15 HOURS)

Network Layer: Routing Algorithms - Congestion Control Algorithms - IP Protocol – IP Addresses - Internet Control Protocols - Transport Layer: Services - **Connection Management:** Addressing, Establishing and Releasing a Connection.

UNIT V

(15 HOURS)

Network Security: Cryptography: Introduction, Ciphers - Communication Security: Firewalls - Email Security – Web Security.

PRESCRIBED BOOKS:

1. A. S. Tanenbaum, Feamster and Wethrall “Computer Networks”, Global Edition 2021, 6th Edition.
2. A. S. Tanenbaum, “Computer Networks”, Prentice-Hall of India 2008, 5th Edition.

REFERENCE BOOKS:

1. Stallings, “Data and Computer Communications”, Pearson Education 2012, 7th Edition.
2. B. A. Forouzan, “Data Communications and Networking”, Tata McGraw Hill 2007, 4th Edition.
3. F. Halsall, “Data Communications, Computer Networks and Open Systems”, Pearson Education 2008.
4. D. Bertsekas and R. Gallager, “Data Networks”, PHI 2008, 2nd Edition.
5. Lamarca, “Communication Networks”, Tata McGraw Hill 2002.

E-LEARNING RESOURCES:

1. NPTEL & MOOC courses titled Introduction on Computer Networks
<https://NPTEL.ac.in/courses/106106091/>
2. <https://www.javatpoint.com/computer-network-tutorial>
3. <https://www.coursera.org/courses?query=computer%20network>
4. <https://www.geeksforgeeks.org/computer-network-tutorials/>
5. https://www.tutorialspoint.com/data_communication_computer_network/

GUIDELINES TO THE QUESTION PAPER SETTERS

QUESTION PAPER PATTERN

SECTION	QUESTION COMPONENT	NUMBERS	MARKS	TOTAL
A	Answer any 10 out of 12 questions (each in 50 words)	1-12	3	30
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BREAK UP OF QUESTIONS

UNITS	SECTION A	SECTION B	SECTION C
I	2	2	1
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PSO-CO-question paper mapping

CO No:	COURSE OUTCOME	PSOs ADDRESSED	COGNITIVE LEVEL (K1 to K6)
CO1	Understand the basic concept of computer hardware and software.	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4, K5
CO2	Recognize the types of Transmission Media and working principles of Public Switched Telephone Network.	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4, K5
CO3	Observe the general techniques of Error control, Flow control in Data Link Protocols	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4, K5
CO4	Analyze the Routing and Congestion Control Algorithms in Network Layer; recall the underlying protocol in Transport Layer.	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4, K5
CO5	Examine the various techniques in cryptography.	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4, K5

K1= Remember, K2= Understand, K3= Apply, K4=Analyze, K5= Evaluate, K6= Create

PROGRAMME: B.Sc., COMPUTER SCIENCE	BATCH: 2024 -2027
PART: III	COURSE COMPONENT: CORE-XIII
COURSE NAME: OPERATING SYSTEMS WITH LINUX	COURSE CODE:
SEMESTER: VI	MARKS:100
CREDITS: 4	TOTAL HOURS:75
THEORY	

COURSE OBJECTIVE:

To become familiar in operating system components, process management, deadlocks and process synchronization and to gain insight on Linux operating system.

COURSE OUTCOMES:

1. Understand OS components and compare the performances of Scheduling Algorithms.
2. Illustrate concurrent processing, process synchronization and Deadlock.
3. Elucidate Memory management techniques like paging, segmentation, demand paging.
4. Demonstrate the knowledge of the components of Virtual memory management and file management systems
5. Analyze resource management techniques used in Linux.

UNIT I

(15 HOURS)

Introduction: Views - Types of System - OS Structure – Components - Services - System Calls-System Structure-System Design and Implementation. **Process Management:** Process-Process Scheduling – Co operating process - Inter-process Communication. **CPU Scheduling:** CPU Schedulers - Scheduling Criteria –Scheduling Algorithms.

UNIT II

(15 HOURS)

Process Synchronization: Critical- Section Problem - Synchronization Hardware - Semaphores – Classical Problems of Synchronization–Monitors – Critical Regions. **Deadlocks:** Characterization-Methods for Handling Deadlocks –Deadlock Prevention-Avoidance -Detection -Recovery.

UNIT III

(15 HOURS)

Memory Management: Hardware - Address Binding – Address Space - Dynamic Loading and Linking –Swapping– Contiguous Allocation -Segmentation -Paging– Structure of the Page Table.

UNIT IV

(15 HOURS)

Virtual Memory Management: Demand Paging - Page Replacement Algorithms - Thrashing - System Protection-Goals - Domain –Access matrix - File System - File Concept -. Access Methods - File System Structures –Allocation Methods –Free Space Management.

UNIT V

(15 HOURS)

Linux: Linux History - Design principles - Kernel Modules - Process Management –Scheduling- Memory Management- File Systems-Input and Output - Interprocess Communication - Network Structure and Security.

PRESCRIBED BOOKS:

1. Silberschatz A., Galvin P.B., Gange., 2012, Operating System Principles, Tenth Edition, John Wiley & Sons.
2. Richard Petersen, 2017, Linux: The Complete Reference, Sixth Edition, McGraw Hill Education.

REFERENCE BOOKS:

1. H.M. Deitel, 2004, An Introduction to Operating System – Third Edition, Addison Wesley Pearson Publication
2. Operating Systems, D.M. Dhamdhere, Tata McGraw Hill, 2nd edition.
3. Modern Operating Systems by Andrew S Tanenbaum, Prentice hall India, 1992.
4. Operating System Concepts by James L Peterson.
5. Operating System by Milan Milenkovic, McGraw Hill, 1987.

E-LEARNING RESOURCES:

1. https://www.tutorialspoint.com/operating_system/index.htm
2. <http://www.ics.uci.edu/~ics143/lectures.html>
3. <http://williamstallings.com/Extras/OS-Notes/notes.html>
4. <https://www.geeksforgeeks.org/introduction-to-linux-operating-system/>

GUIDELINES TO THE QUESTION PAPER SETTERS

QUESTION PAPER PATTERN

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BREAK UP OF QUESTIONS

UNITS	SECTION A	SECTION B	SECTION C
I	2	2	1
II	3	1	1
III	2	2	1
IV	2	1	2
V	3	1	1
TOTAL	12	7	6
SECTION A – 12		SECTION B - 7	SECTION C – 6

PSO – CO mapping

	PSO 1	PSO 2	PSO 3	PSO 4	PSO5
CO 1	3	3	3	3	3
CO 2	3	3	3	3	3
CO 3	3	3	3	2	2
CO 4	3	3	3	3	2
CO 5	3	3	3	3	2
Ave.	3	3	3	2.8	2.4

PSO-CO-question paper mapping

CO No:	COURSE OUTCOME	PSOs ADDRESSED	COGNITIVE LEVEL (K1 to K6)
CO1	Understand OS components and compare the performances of Scheduling Algorithms.	PSO1,PSO2, PSO3,PSO4, PSO5	K1, K2, K3, K4, K5
CO2	Illustrate concurrent processing, process synchronization and Deadlock.	PSO1,PSO2, PSO3,PSO4, PSO5	K1, K2, K3, K4, K5
CO3	Elucidate Memory management techniques like paging, segmentation, demand paging.	PSO1,PSO2, PSO3,PSO4, PSO5	K1, K2, K3, K4, K5
CO4	Demonstrate the knowledge of the components of Virtual memory management and file management systems	PSO1,PSO2, PSO3,PSO4, PSO5	K1, K2, K3, K4, K5
CO5	Analyze resource management techniques used in Linux.	PSO1,PSO2, PSO3,PSO4, PSO5	K1, K2, K3, K4, K5

K1= Remember, K2= Understand, K3= Apply, K4=Analyse, K5= Evaluate, K6= Create

PROGRAMME: B.Sc., COMPUTER SCIENCE	BATCH: 2024 -2027
PART: III	COURSE COMPONENT: CORE-XIV
COURSE NAME: FULL STACK DEVELOPMENT TECHNOLOGIES	COURSE CODE:
SEMESTER: VI	MARKS:100
CREDITS: 4	TOTAL HOURS:75
THEORY	

COURSE OBJECTIVE:

To understand the basic concepts of back end programming languages and to develop interactive, server side, executable web applications and databases.

COURSE OUTCOMES:

1. Develop websites that make use of various Node.js features.
2. Design and implement server side programming using PHP.
3. Acquire MySQL skills for effective database management.
4. Implement CRUD operations and distributed data operations using MongoDB.
5. Query a database using MySQL and MongoDB commands.

UNIT I

(15 HOURS)

Introduction to Node.js: Overview-Features & Advantages of Node.js-Node.js Process Model – Working with REPL-Node JS Console-Modules-Node Package Manager-Creating Web Server-File Systems.

UNIT II

(15 HOURS)

Introduction to PHP: The Structure of PHP- Comments-Variables-Constants-Control Structures: Conditional Statements & Control Loops-Arrays-Date & Time Functions-Functions-Objects-Regular Expressions-Cookies-Sessions.

UNIT III

(15 HOURS)

Introduction to MySQL: Database Design-Normalization(1NF, 2NF, 3NF, BCNF and 4NF)-Data Types-Managing Database and Tables-Implementing Keys & Constraints-Creating Databases-Creating Tables-Altering Tables-Deleting Databases and Tables-Inserting, Updating and Deleting Data-Querying with SQL Select-Aggregate Functions -Having and Group By Clause- Joining Tables.

UNIT IV

(15 HOURS)

Introduction to MongoDB: Overview-Features and Advantages of Mongo DB-Data Modeling-Environment-CRUD Operations-Projection-Limiting and Sorting-Indexing-Aggregation-Replication-Sharding.

UNIT V

(15 HOURS)

Accessing MySQL Using PHP: Database Connectivity with MySQL using PHP - MySQL Functions in PHP-Executing Queries-Inserting data and retrieving data with PHP. **Accessing MySQL and MongoDB from Node.js:** Connect to MySQL-Performing MySQL Operations using Node.js-Connect to Mongo DB-Basic MongoDB operations using Node.js.

PRESCRIBED BOOKS:

1. Node JS Guidebook, Dhruvi Shah, BPB Publications 2018.
2. Learning PHP, MySQL & JavaScriptWith jQuery, CSS & HTML5, Robin Nixon, Fourth Edition, O'Reilly 2014. (PHP and MySQL)
3. MongoDB: The Definitive Guide, Kristina Chodorow, Second Edition, O'Reilly 2013.
4. Node.js, MongoDB and Angular Web Development, Brad Dayley, Brendan Dayley, Caleb Dayley, Second Edition, Addison-Wesley 2018.

REFERENCE BOOKS:

1. Learning Node, Shelly Powers, First Edition, O'Reilly 2012.
2. Beginning Node.js, Basarat Ali Syed, Apress 2014.
3. Web Database Applications with PHP and MySQL, Hugh E. Williams &DavidLane, Second Edition, O'Reilly 2004.
4. Beginning PHP and MySQL from Novice to Professional, W. Jason Gilmore, Fourth Edition, Apress 2010.
5. PHP and MySQL® Web Development, Luke Welling, Laura Thomson, Fifth Edition, Addison-Wesley 2016.
6. MongoDB in Action, Kyle Banker, Peter Bakkum, Shaun Verch, Douglas Garrett, Tim Hawkins, Second Edition, Manning Publications Co 2016.

E-LEARNING RESOURCES:

1. MOOC Courses entitled “PHP and MySQL”.
2. <https://www.udemy.com/course/full-stack-web-development-bootcamp-for-beginners-2019/>

3. <https://www.coursera.org/courses?query=full%20stack%20web%20development>
4. <https://www.geeksforgeeks.org/what-is-full-stack-development/>
5. <https://www.tutorialspoint.com/the-full-stack-web-development/index.asp>
6. <https://shorturl.at/tJMVW>
7. <https://www.perlego.com/book/2028291/nodejs-guidebook-comprehensive-guide-to-learn-nodejs-pdf>
8. <https://pepa.holla.cz/wp-content/uploads/2016/07/MongoDB-The-Definitive-Guide-2nd-Edition.pdf>
9. <https://rb.gy/zh5byo>

GUIDELINES TO THE QUESTION PAPER SETTERS

QUESTION PAPER PATTERN

SECTION	QUESTION COMPONENT	NUMBERS	MARKS	TOTAL
A	<i>Answer any 10 out of 12 questions(each in 50 words)</i>	<i>1-12</i>	<i>3</i>	<i>30</i>
B	<i>Answer any 5 out of 7 questions(each in 300 words)</i>	<i>13-19</i>	<i>6</i>	<i>30</i>
C	<i>Answer any 4 out of 6 questions(each in 1200 words)</i>	<i>20-25</i>	<i>10</i>	<i>40</i>
TOTAL MARKS				100

BREAK UP OF QUESTIONS

UNITS	SECTION A	SECTION B	SECTION C
I	2	1	1
II	3	2	1
III	3	1	2
IV	2	2	1
V	2	1	1
TOTAL	12	7	6
SECTION A – 12		SECTION B – 7	SECTION C – 6

PSO – CO mapping

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	3	3	3	3	3
CO 2	3	3	3	3	2
CO 3	3	3	3	3	3
CO 4	3	3	3	2	2
CO 5	3	3	3	3	3
Ave.	3	3	3	2.8	2.6

PSO-CO-question paper mapping

CO No:	COURSE OUTCOME	PSOs ADDRESSED	COGNITIVE LEVEL (K1 to K6)
CO1	Develop websites that make use of various Node.js features.	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4, K5
CO2	Design and implement server side programming using PHP.	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4, K5
CO3	Acquire MySQL skills for effective database management.	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4, K5
CO4	Implement CRUD operations and distributed data operations using MongoDB.	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4, K5
CO5	Query a database using MySQL and MongoDB commands.	PSO1, PSO2, PSO3, PSO4, PSO5	K1, K2, K3, K4, K5

K1= Remember, K2= Understand, K3= Apply, K4=Analyse, K5= Evaluate, K6= Create

PROGRAMME: B.Sc., COMPUTER SCIENCE	BATCH: 2024 -2027
PART: III	COURSE COMPONENT: CORE-XV
COURSE NAME: PRACTICAL-VI: FULL STACK DEVELOPMENT TECHNOLOGIES WITH RDBMS	COURSE CODE:
SEMESTER: VI	MARKS:100
CREDITS: 4	TOTAL HOURS: 90
PRACTICAL	

COURSE OBJECTIVE:

To build dynamic web sites using Node.js and PHP and master MySQL and MongoDB for managing databases in web applications.

COURSE OUTCOMES:

1. Apply the basics of the server-side runtime environment.
2. Create File System module and the concepts of making external HTTP calls in Node.js.
3. Develop applications of PHP form handling, session and cookie management.
4. Acquire hands-on experience in working with MySQL through PHP.
5. Attain proficiency in MongoDB operations with PHP and Node.js.

PROGRAMS:

NODE.JS

(20 HOURS)

1. Create a simple “Hello, World!” server using Node.js.
2. Write a program to illustrate File Systems in Node.js.
3. Write a node.js program for making external http calls.
4. Write a node.js program using REPL environment.

PHP

(30 HOURS)

5. Write a program to create Chess Board in PHP using for loop.
6. Write a PHP program to access an array using forms in PHP.
7. Write a PHP program that displays a different message based on time of day. For example page should display “Good Morning” if it is accessed in the morning.
8. Write a PHP program using Functions.
9. Write a program to calculate Electricity bill in PHP using class and object.

10. Validate the form using PHP Regular Expression.
11. Create a PHP page for login system using session.
12. Create an application to create a cookie, access a cookie and destroy the cookie.

MYSQL & MONGODB

(40 HOURS)

13. Write a PHP program to perform DDL and DML operations using MySQL.
14. Write a Node.js program to perform basic operations using MySQL.
15. Write a Node.js program to perform CRUD operations using MongoDB.

PSO – CO mapping

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	3	3	3	3	3
CO 2	3	3	3	3	2
CO 3	3	3	3	3	3
CO 4	3	3	3	3	2
CO 5	3	3	3	3	3
Ave.	3	3	3	3	2.6

PSO-CO-question paper mapping

CO No:	COURSE OUTCOME	PSOs ADDRESSED	COGNITIVE LEVEL (K1 to K6)
CO1	Apply the basics of the server-side runtime environment.	PSO1, PSO2, PSO3, PSO4, PSO5	K3, K4, K5
CO2	Create File System module and the concepts of making external HTTP calls in Node.js.	PSO1, PSO2, PSO3, PSO4, PSO5	K3, K4, K5, K6
CO3	Develop applications of PHP form handling, session and cookie management.	PSO1, PSO2, PSO3, PSO4, PSO5	K3, K4, K5, K6
CO4	Acquire hands-on experience in working with MySQL through PHP.	PSO1, PSO2, PSO3, PSO4, PSO5	K3, K4, K5, K6
CO5	Attain proficiency in MongoDB operations with PHP and Node.js.	PSO1, PSO2, PSO3, PSO4, PSO5	K3, K4, K5, K6

K1= Remember, K2= Understand, K3= Apply, K4=Analyse, K5= Evaluate, K6= Create

PROGRAMME: B.Sc., COMPUTER SCIENCE	BATCH: 2024 -2027
PART: III	COURSE COMPONENT: CORE – XVI
COURSE NAME: MINI PROJECT	COURSE CODE:
SEMESTER: VI	MARKS:100
CREDITS: 3	TOTAL HOURS:45
PRACTICAL	

Students should develop a software application in small scale, based on the concepts they have learnt in the previous five semesters the programme. It may be based on Database concepts, Object Oriented Programming concepts, Web development, Data Science, Machine Learning, Internet of Things and Big Data etc. Students can take individual or group project.

COURSE OBJECTIVE:

To demonstrate the ability to analyze requirements, identify challenges, and devise effective solutions to solve real world problems.

COURSE OUTCOMES:

1. Gain hands-on experience with programming languages, development tools, and technologies relevant to the project.
2. Utilize computer science principles and methodologies learned in coursework to solve real-world problems.
3. Work as team to manage project tasks, share responsibilities, and assimilate components developed by team members.
4. Integrate different technologies and platforms as needed to achieve project goals.
5. Perform effective testing and debugging to ensure the functionality and reliability of the software.

GUIDELINES:

- A student is expected to complete planning, analysing, designing and implementing the project in 3 months timeframe.
- Each individual students’ contribution is mandatory for internal assessment and to appear for the final viva.

EVALUATION:

Internal assessment will be based on initial project proposal, two reviews and a comprehensive final report of the project.

External assessment will be based on the presentation of the project work and Viva Voce.

PSO – CO Mapping

	PSO 1	PSO 2	PSO 3	PSO 4	PSO5
CO 1	3	3	3	3	3
CO 2	3	3	3	3	2
CO 3	3	3	3	3	3
CO 4	3	3	3	3	3
CO 5	3	3	2	3	2
Ave.	3	3	2.8	3	2.6

PROGRAMME: B.Sc., COMPUTER SCIENCE	BATCH: 2024 -2027
PART: III	COURSE COMPONENT: ELECTIVE – III
COURSE NAME: PRACTICAL-VII: MACHINE LEARNING	COURSE CODE:
SEMESTER: VI	MARKS:100
CREDITS: 5	TOTAL HOURS: 90
PRACTICAL	

COURSE OBJECTIVE:

To learn the basic concepts of machine learning techniques.

COURSE OUTCOMES:

1. Exhibit the ability to pre-process data, address missing values, and perform categorical data encoding.
2. Demonstrate competence in data manipulation, dataset loading, and the creation of insightful visualizations.
3. Implement essential machine learning algorithms.
4. Acquire skills on various regression techniques.
5. Explore clustering techniques and partitioning methods.

UNIT I

(9 HOURS)

Machine Learning: Introduction – What is Machine Learning - Types of Machine Learning - Applications of Machine Learning - State-of-The-Art Languages / Tools in Machine Learning.

Preparing to Model: Machine Learning Activities - Basic Types of Data in Machine Learning - Exploring Structure of Data - Data Pre-Processing.

UNIT II

(9 HOURS)

Modelling and Evaluation: Selecting a Model - Training a Model - Model Representation and Interpretability - Evaluating Performance of a Model - **Basics of Feature Engineering:** Introduction - Feature Transformation - Feature Transformation - Naive Bayes classifier - Applications of Naive Bayes classifier.

UNIT III

(9 HOURS)

Supervised Learning :Classification - Example of Supervised Learning – Classification Model - Classification Learning Steps - Common Classification Algorithms - k-Nearest Neighbour (KNN) - Decision tree - Support vector machines.

UNIT IV

(9 HOURS)

Regression: Introduction - Example of Regression - Common Regression Algorithms - Simple linear regression - Multiple linear regression-Polynomial Regression Model - Logistic Regression.

UNIT V

(9 HOURS)

Unsupervised Learning: Introduction- Unsupervised vs Supervised Learning - Application of Unsupervised Learning. **Clustering:** Clustering as a machine learning task - Different types of clustering techniques - Partitioning methods.

PRESCRIBED BOOKS:

1. Saikat Dutt, Subramanian Chandramouli, Amit Kumar Das, "Machine Learning", First Edition, Pearson Education 2018.

REFERENCE BOOKS:

1. AurélienGéron, "Hands-on Machine Learning with Scikit-Learn", Keras and,O'Reilly Media, Inc. 2017.
2. EthemAlpaydin, Introduction to Machine Learning, 2nd Edition, the MIT Press, 2009.
3. Tom M. Mitchell, "Machine Learning", McGraw-Hill Education, 2017.
4. Mevin P. Murphy, "Machine Learning: A Probabilistic Perspective" by The MIT Press, 2012.

E-LEARNING RESOURCES:

- 1.[https://aitskadapa.ac.in/ebooks/AI&ML/MACHINE%20LEARNING/Machine%20Learning%20\(%20etc.\)%20\(z-lib.org\).pdf](https://aitskadapa.ac.in/ebooks/AI&ML/MACHINE%20LEARNING/Machine%20Learning%20(%20etc.)%20(z-lib.org).pdf)
- 2.<https://www.geeksforgeeks.org/machine-learning-an-introduction/>
- 3.<https://www.javatpoint.com/machine-learning>
- 4.<https://www.techtarget.com/searchenterpriseai/definition/machine>
- 5.<https://www.tensorflow.org/tutorials>.

PROGRAMS:

(9 HOURS)

1. Write a program to get the number of observations, non-values and perform categorical data encoding for the given data set.
2. Develop a program to retrieve missing values and handle the same in a dataset.
3. Write a Python script to pre-process text data by converting text to numerical features.

(9 HOURS)

4. Write a program to load and explore the dataset of .csv and excel files using pandas.
5. Write a program to load the data from a given csv file into a data frame and print the shape of the data, type of the data, number of rows-columns, feature names and the description.
6. Write a program to visualize the dataset to gain insights using Matplotlib or Seaborn by plotting scatter plots, bar charts, box plots and histogram.

(9 HOURS)

7. Write a program to implement Logistic Regression.
8. Write a program to perform the K Nearest Neighbor.

(9 HOURS)

9. Write a program to perform the Support vector machines.
10. Write a program to implement the Simple Linear Regression.

(9 HOURS)

11. Write a program to compare the Supervised Machine Learning algorithms.
12. Write a program to perform the K Means Clustering.

PSO – CO mapping

	PSO 1	PSO 2	PSO 3	PSO 4	PSO5
CO 1	3	3	3	3	3
CO 2	3	2	2	2	3
CO 3	3	3	2	2	3
CO 4	3	3	3	3	3
CO 5	3	3	3	3	3
Ave.	3	2.8	2.6	2.6	3

PSO-CO-question paper mapping

CO No:	COURSE OUTCOME	PSOs ADDRESSED	COGNITIVE LEVEL (K1 to K6)
CO1	Exhibit the ability to pre-process data, address missing values, and perform categorical data encoding.	PSO1,PSO2,PSO3, PSO4,PSO5	K3, K4, K5,K6
CO2	Demonstrate competence in data manipulation, dataset loading, and the creation of insightful visualizations.	PSO1,PSO2,PSO3, PSO4,PSO5	K3, K4, K5,K6
CO3	Implement essential machine learning algorithms.	PSO1,PSO2,PSO3, PSO4,PSO5	K3, K4, K5,K6
CO4	Acquire skills on various regression techniques.	PSO1,PSO2,PSO3, PSO4,PSO5	K3, K4, K5,K6
CO5	Explore clustering techniques and partitioning methods.	PSO1,PSO2,PSO3, PSO4,PSO5	K3, K4, K5,K6

K1= Remember, K2= Understand, K3= Apply, K4=Analyse, K5= Evaluate, K6= Create

PROGRAMME: B.Sc., COMPUTER SCIENCE	BATCH: 2024 -2027
PART: III	COURSE COMPONENT: ELECTIVE – III
COURSE NAME: PRACTICAL-VIII: DATA SCIENCE	COURSE CODE:
SEMESTER: VI	MARKS:100
CREDITS: 5	TOTAL HOURS: 90
PRACTICAL	

COURSE OBJECTIVE:

To familiarize with the principles, methods, and tools involved in data science.

COURSE OUTCOMES:

1. Understand predictive or descriptive models based on the analyzed data.
2. Adapt new technologies in data science.
3. Create and analyze data visualizations charts.
4. Acquire knowledge in data warehousing and data mining techniques.
5. Predict harmful URLs from big datasets through real-world case study.

UNIT I

(9 HOURS)

Introduction to Data Science–Benefits and uses–Facets of data–Data science process–Big data ecosystem and data science.

UNIT II

(9 HOURS)

The Data Science process – Overview – research goals - retrieving data- transformation – Exploratory Data Analysis–Model building.

UNIT III

(9 HOURS)

Exploratory Data Analysis – Developing the visual aesthetic – chart types – Great visualizations – Reading graphs – Interactive visualizations.

UNIT IV

(9 HOURS)

Introduction to Data warehousing – Design consideration of data warehouse - Data loading process – case study – Data mining – Data mining techniques – Tools and platforms – case study.

UNIT V

(9 HOURS)

Handling large data on a single computer - The problem you face when handling large – General techniques for handling large volumes of data-General programming tips for dealing with large data sets- Case Study- Predicting malicious URLs.

PRESCRIBED BOOKS:

1. Davy Cielen, Arno D.B. Meysman, Mohamed Ali, “Introducing Data Science”, manning publications 2016.
2. Maheshwari A, Data analytics made accessible, Second Edition, Amazon Digital Services 2023.

REFERENCE BOOKS:

1. Roger Peng, “The Art of Data Science”, lulu.com 2016.
2. Murtaza Haider, “Getting Started with Data Science–Making Sense of Data with Analytics”, IBMpress, E-book.
3. Davy Cielen, Arno D.B. Meysman, Mohamed Ali, “Introducing Data Science: Big Data, Machine Learning, and More, Using Python Tools”, Dreamtech Press 2016.
4. Jean, H. (2023). Data science, Certybox Education.
5. Pierson, L. (2021). Data science for dummies, John Wiley & Sons.

E-LEARNING RESOURCES:

1. <https://www.analyticsvidhya.com/>
2. <https://www.simplilearn.com>
3. <https://www.ibm.com/in-en/topics/data-science>
4. <https://www.mygreatlearning.com/blog/what-is-data-science/>
5. NPTEL online course– Data Science for Engineers -
<https://NPTEL.ac.in/courses/106106179/>

PROGRAMS:

(9 HOURS)

1. Develop a Pandas program to load a dataset, clean the data by handling missing values, and perform basic data exploration tasks (e.g., checking for duplicates and summary statistics).
2. Reading data from the web.
3. Reading data from a text file using Panda.

(9 HOURS)

4. Working with Pandas Data Frames.
5. Create a program to visualize time series data using line plots, area plots, or heat maps.
6. Perform the following preprocessing techniques on the loan prediction dataset,
 - a. Feature Standardization
 - b. One Hot Encoding

(9 HOURS)

7. Create a Python program to perform EDA on a real-world dataset (e.g., Iris dataset) and generate descriptive statistics and visualizations to understand the data better.
8. Write SQL queries to create a data warehouse schema and load sample data into it from CSV files.

(9 HOURS)

9. Develop an application using data science techniques (e.g., recommendation system, fraud detection) and showcase its functionality with a sample dataset.
10. Develop a python program for Correlation & Scatter Plots.

(9 HOURS)

11. Apply and explore various Plotting functions on any dataset.
Examples: UCI, Iris, Pima Indian Diabetes, etc.
12. Develop a case study utilizing Python libraries such as scikit-learn and matplotlib for predicting malicious URLs.

PSO – CO mapping

	PSO 1	PSO 2	PSO 3	PSO 4	PSO5
CO 1	3	3	3	2	3
CO 2	3	3	3	3	2
CO 3	3	2	3	3	3
CO 4	3	3	3	3	2
CO 5	3	2	3	2	3
Ave.	3	2.6	3	2.6	2.6

PSO-CO-question paper mapping

CO No:	COURSE OUTCOME	PSOs ADDRESSED	COGNITIVE LEVEL (K1 to K6)
CO1	Understand predictive or descriptive models based on the analyzed data.	PSO1, PSO2, PSO3, PSO4, PSO5	K3, K4, K5,K6
CO2	Adapt new technologies in data science.	PSO1, PSO2, PSO3, PSO4, PSO5	K3, K4, K5,K6
CO3	Create and analyze data visualizations charts.	PSO1, PSO2, PSO3, PSO4, PSO5	K3, K4, K5,K6
CO4	Acquire knowledge in data warehousing and data mining techniques.	PSO1, PSO2, PSO3, PSO4, PSO5	K3, K4, K5,K6
CO5	Predict harmful URLs from big datasets through real-world case study.	PSO1, PSO2, PSO3, PSO4, PSO5	K3, K4, K5,K6

K1= Remember, K2= Understand, K3= Apply, K4=Analyse, K5= Evaluate, K6= Create

PROGRAMME: B.Sc., COMPUTER SCIENCE	BATCH: 2024 -2027
PART: III	COURSE COMPONENT: ELECTIVE – III
COURSE NAME: PRACTICAL-IX: MOBILE APPLICATIONS DEVELOPMENT	COURSE CODE:
SEMESTER: VI	MARKS:100
CREDITS: 5	TOTAL HOURS: 90
PRACTICAL	

COURSE OBJECTIVE:

To gain knowledge about the basic concepts and characteristics of mobile applications development.

COURSE OUTCOMES:

1. Understand the fundamentals of developing mobile applications.
2. Use mobile development framework to develop a mobile app with user interfaces.
3. Describe the concepts of basic views and Specialized Fragments.
4. Acquire and implement practical skills with content providers.
5. Develop mobile apps using web & binding services and JSON.

UNIT I (9 HOURS)

Mobile Application Development: The Mobile Application Development Lifecycle- Getting Started with Android Programming - Using Eclipse for Android Development - Using Android Emulator.

UNIT II (9 HOURS)

Understanding Activities: Linking Activities Using Intents-Fragments-Displaying Notifications Understanding the Components of a Screen-Adapting to Display Orientation - Getting to know the Android User Interface.

UNIT III (9 HOURS)

Using Basic Views: Using Picker Views -Using List Views to Display Long Lists- Understanding Specialized Fragments - Using Image Views to Display Pictures -Using-Menus with Views.

UNIT IV (9 HOURS)

Sharing Data in Android: Creating Your Own Content Providers -Using the Content Provider- SMS Messaging -Sending Email-Displaying Maps- Getting Location Data- Monitoring a Location.

UNIT V

(9 HOURS)

Consuming Web Services Using HTTP - Consuming JSON Services - Creating Your Own Services - Binding Activities to Services - Understanding Threading.

PRESCRIBED BOOKS:

1. Jerome DiMarzio, Beginning Android Programming with Android Studio, 4th Edition.
2. Lee Wei-Meng, 2012, "Beginning Android 4 Application Development", Wiley India.

REFERENCE BOOKS:

1. Cinar Onur , "Android Apps with Eclipse", 2012, Apress, Springer(India) Private Limited.
2. Meier Reto, "Professional Android 2 Application Development", 2010, Wiley India.
3. Dawn Griffiths, David Griffiths, "Head First Android Development: A Brain-Friendly Guide", 2017.
4. Neil Smyth , "Android Studio 3.0 Development Essentials: Android", 8th Edition.
5. Pradeep Kothari, "Android Application Development (With Kitkat Support)", Black Book 2014.

E-LEARNING RESOURCES:

1. <http://developer.android.com/training/basics/firstapp/index.html>
2. <https://developer.android.com/guide>
3. https://en.wikipedia.org/wiki/Android_10
4. Develop App for Free
5. https://en.wikipedia.org/wiki/Mobile_app_development
6. MOOC courses entitled Mobile Application Development

PROGRAMS:

(9 HOURS)

1. Write a program to Design user interfaces for mobile apps using basic building blocks.
2. Develop an application that finds greatest among three numbers using GUI components
3. Write a program to develop UI components and application structure using Emulator.

(9 HOURS)

4. Develop an application to display your personal details using GUI Components.
5. Develop an application that uses the radio button and image button.

(9 HOURS)

6. Develop an application that uses Layout Managers
7. Develop an application that uses audio and video mode.

(9 HOURS)

8. Develop an application that uses to send messages from one mobile to another mobile.
9. Develop an application that uses to send email.

(9 HOURS)

10. Develop an application for Student Mark sheet processing. Validate data using alert dialog box.
11. Develop an application for Login Page in Database.
12. Develop an application for Google map locator.

PSO – CO mapping

	PSO 1	PSO 2	PSO 3	PSO 4	PSO5
CO 1	3	3	3	3	3
CO 2	3	3	3	3	3
CO 3	3	3	3	3	2
CO 4	3	3	2	2	3
CO 5	2	3	3	2	2
Ave.	2.8	3	2.8	2.6	2.6

PSO-CO-question paper mapping

CO No:	COURSE OUTCOME	PSOs ADDRESSED	COGNITIVE LEVEL (K1 to K6)
CO1	Understand the fundamentals of developing mobile applications.	PSO1, PSO2, PSO3, PSO4, PSO5	K3, K4, K5, K6
CO2	Use mobile development framework to develop a mobile app with user interfaces.	PSO1, PSO2, PSO3, PSO4, PSO5	K3, K4, K5, K6
CO3	Describe the concepts of basic views and Specialized Fragments.	PSO1, PSO2, PSO3, PSO4, PSO5	K3, K4, K5, K6
CO4	Acquire and implement practical skills with content providers.	PSO1, PSO2, PSO3, PSO4, PSO5	K3, K4, K5, K6
CO5	Develop mobile apps using web & binding services and JSON.	PSO1, PSO2, PSO3, PSO4, PSO5	K3, K4, K5, K6

K1= Remember, K2= Understand, K3= Apply, K4=Analyse, K5= Evaluate, K6= Create

UG- SOFT SKILLS

SOFT SKILLS: COMMON TO ALL	BATCH: 2024- 2027
PART: IV	COURSE COMPONENT: SOFT SKILL-I
COURSE NAME: COMMUNICATION SKILLS AND PERSONALITY DEVELOPMENT SKILLS	COURSE CODE:
SEMESTER: I	MARKS:100
CREDITS: 2	TOTAL HOURS: 30
THEORY	

COURSE OBJECTIVE:

To build communication skills for personal and professional development.

COURSE OUTCOMES:

1. Students will demonstrate the ability to actively listen to others, understand diverse perspectives, and paraphrase key points accurately, enhancing their comprehension skills in various personal and professional contexts.
2. Students will be able to articulate thoughts, ideas, and information clearly and concisely, using appropriate language and structure to convey messages effectively in both written and verbal communication
3. Students will develop confidence in expressing opinions, asserting boundaries, and advocating for themselves and others, leading to enhanced self-assurance and effectiveness in interpersonal and group communication.
4. Students will learn to adapt their communication style and approach based on the audience, context, and purpose of communication, fostering flexibility and versatility in interacting with diverse individuals and groups.
5. Students will acquire techniques for resolving conflicts, managing disagreements, and negotiating mutually beneficial outcomes through effective communication strategies, promoting constructive problem-solving and collaboration in personal and professional settings.

UNIT I Types of Communication

(6 Hours)

Verbal Communication - Nonverbal Communication - Visual Communication - Written Communication - Interpersonal Communication - Group Communication - Mass Communication - Digital Communication- Barriers – Language- Cultural- Psychological- Semantic- Technological Barriers.

UNIT II Etiquette & Ethical Practices in Communication

(6 Hours)

Active Listening - Respectful Language - Clarity and Conciseness – Truthfulness-

Professionalism-Tone -Timeliness - Constructive Feedback - Confidentiality - Cultural Sensitivity - Emotional Intelligence-Social Intelligence- Social Etiquettes-Accountability.

UNIT III Self Actualization

(6 Hours)

SWOC Analysis- Self Regulation-Self Evaluation, Self-Monitoring, Self- Criticism, Self-Motivation, Self-awareness and Reflection.

UNIT IV Leadership and Teamwork

(6 Hours)

Leadership Skills: Leadership styles- Goal-setting and decision-making- Motivation and influence- Team Dynamics: Team building activities- Conflict resolution- Collaborative problem-solving

UNIT V Stress and Time Management

(6 Hours)

Definition of Stress, Types of Stress, Symptoms of Stress, Stress coping ability, Stress Inoculation Training, Time Management and Work-Life Balance: Self-discipline Goal-setting

RECOMMENDED TEXTBOOKS

1. Goleman, Daniel (2006) *Emotional Intelligence*, Bantam Books
2. Linden, Wolfgang (2004) *Stress Management- From Basic Science to Better Practice-* University of British Columbia, Vancouver, Canada.
3. Hasson, Gill (2012) *Brilliant Communication Skills*. Great Britain: Pearson Education.
4. Monippally, Matthukutty, M. *Business Communication Strategies*. New Delhi: Tata McGraw-Hill Publishing Company Ltd., 2001.
5. Raman, Meenakshi & Sangeetha Sharma (2011) *Communication Skills*, Oxford University Press.

REFERENCE BOOKS

1. N.Krishnaswamy *Current English for College* (1st Edition) - Trinity Press
2. Wood, Julia T (2015) *Interpersonal Communication: Everyday Encounters* 8th Edition,Cengage Learning.

E-LEARNING RESOURCES

1. <http://www.albion.com/netiquette/corerules.html>
2. <http://www.englishdaily626.com/c-errors.php>
3. <https://www.helpguide.org/articles/relationships-communication/nonverbal-communication.htm>
4. <https://www.communicationtheory.org/verbal-vs-non-verbal-communication-with-examples/>
5. <https://letstalkscience.ca/educational-resources/backgrounders/digital-citizenship-ethics>
6. <https://www.switchboard.app/learn/article/teamwork-leadership-skills>

GUIDELINES TO THE QUESTION PAPER SETTERS

QUESTION PAPER PATTERN

Section	Question Component	Numbers	Marks	Total
A	Answer any 5 out of 7 questions (answer in 50 words)	1-7	2	10
B	Answer any 4 out of 6 questions (answer in 300 words)	8-13	5	20
C	Answer any two Internal (Choice)	14-15	10	20
	Internal & Viva Voce		50	50

BREAK UP OF QUESTIONS

UNITS	SECTION A	SECTION B	SECTION C
I	2	2	----
II	2	1	1
III	1	1	1
IV	1	1	1
V	1	1	1
TOTAL	7	6	4
SECTION A – 7		SECTION B – 6	SECTION C – 4

SOFT SKILLS: COMMON TO ALL	BATCH: 2024- 2027
PART: IV	COURSE COMPONENT: SOFT SKILL-II
COURSE NAME: INTERVIEW SKILLS AND RESUME WRITING	COURSE CODE:
SEMESTER: II	MARKS:100
CREDITS: 2	TOTAL HOURS: 30
THEORY	

COURSE OBJECTIVE:

To equip the students to acquire the relevant skills for better employability.

COURSE OUTCOMES:

1. Students will gain an overall understanding of the concept, the purpose, and the objectives of an interview
2. Students will become aware of the various types of interviews and the nuances of each one of them
3. Students will understand and equip themselves with the techniques and strategies required to ace an interview
4. Students will be able to draft a biodata /CV/Resume in the proper format
5. Students will embark on acquiring the relevant skills and will learn to leverage them effectively for better employability

UNIT I Introduction to Interview Skills (6 Hours)

Definition- meaning- concept of interview –Purpose- Objectives of interview-Characteristic features of job interviews

UNIT II Types of Interview (6 Hours)

Traditional one on one job interview- Panel interview- Behavioral interview-Group interview- Phone Interview- Preliminary Interview-Patterned Interview Depth Interview, Stress Interview, Exit Interview- Interview through tele and video conferencing

UNIT III Interviews: Techniques and Strategies (6 Hours)

Preparing for the Interview Process- Before the interview-During the interview-After the interview -Tips to ace an interview -Commonly asked questions in interview -Do’s and Don’ts of interview - Reasons for rejections

UNIT IV Preparing Biodata/CV/Resume (6 Hours)

Essential characteristics of a job Application-Difference between Biodata- CV-Resume-covering letter-Tips to draft an application

UNIT V Leveraging Employability Skills (6 Hours)

Personality Development-Organizational skills-Time Management–Stress Management-Effective Communication Skills -Reasoning Ability-Verbal Ability- Group Discussion-Technical skills -Presentation skills

RECOMMENDED TEXTBOOKS

1. Monipally, Matthukutty M. (2017) *Business Communication: From Principles to Practice*
2. Peter, Francis. (2012) *Soft Skills and Professional Communication*. New Delhi: Tata McGraw Hill.

REFERENCE BOOKS

1. Higgins, Jessica JD (2018) *10 Skills for Effective Business Communication: Practical Strategies from the World's Greatest Leaders*
2. Nicholas, Sonji (2023) *Interviewing: Preparation, Types, Techniques, and Questions*, Pressbooks
3. Storey, James (2016) *The Art of The Interview: The Perfect Answers to Every Interview Question*

E-LEARNING RESOURCES

1. <https://careermobilityoffice.cs.ny.gov/cmo/documents/Resume%20&%20Interviewing%20Handout.pdf>
2. <https://edu.gcfglobal.org/en/interviewingskills/interview-etiquette/1/>
3. <https://findjobhub.com/en/types-of-interviews>
4. <https://egyankosh.ac.in/bitstream/123456789/23411/1/Unit-2.pdf>
5. https://bharatskills.gov.in/pdf/E_Books/CTS/ES/English/ES_Part_1_62%20hour_English.pdf
6. https://bharatskills.gov.in/pdf/E_Books/CTS/ES/English/ES_Part2_58hour_English.pdf

GUIDELINES TO THE QUESTION PAPER SETTERS

QUESTION PAPER PATTERN

Section	Question Component	Numbers	Marks	Total
A	Answer any 5 out of 7 questions (answer in 50 words)	1-7	2	10
B	Answer any 4 out of 6 questions (answer in 300 words)	8-13	5	20
C	Answer any two Internal (Choice)	14-15	10	20
	Internal & Viva Voce		50	50

BREAK UP OF QUESTIONS

UNITS	SECTION A	SECTION B	SECTION C
I	2	2	----
II	2	1	1
III	1	1	1
IV	1	1	1
V	1	1	1
TOTAL	7	6	4
SECTION A – 7		SECTION B – 6	SECTION C - 4

PROGRAMME: COMMON TO ALL IT STUDENTS, B.Com., ISM, B.Com., CA	BATCH: 2024-2027
PART: IV	COURSE COMPONENT: SOFT SKILL-III
COURSE NAME: ADOBE UX FOUNDATION	COURSE CODE:
SEMESTER: III	MARKS: - 100
CREDITS: 2	TOTAL HOURS: 30
PRACTICAL	

(Common to B.Sc., CS, BCA, B.Sc., IT, B.Sc., DA, B.Com. ISM, B.Com., CA)

COURSE OBJECTIVE:

Adobe UX Foundation involves outlining the key skills and knowledge that participants should acquire by the end of the course.

COURSE OUTCOMES:

1. Define and explain the core concepts and principles of user experience.
2. Understand the key features and functionalities of Adobe XD for designing and prototyping.
3. Apply user-centered design principles to create interfaces that prioritize user needs and preferences.
4. Implement interactive and dynamic prototypes to simulate user interactions.
5. Explore collaboration tools within Adobe XD to work efficiently in a team environment.

UNIT I

(6 HOURS)

Introduction to User Experience Design: Define User Experience - User Experience Process – Seven Components of user Experience (UX) – Definition of a Good User Experience Design- Usability Heuristics-Examples of Good User Experience Design – Practical Activity.

UNIT II

(6 HOURS)

User Experience Research: What is User Experience Research – Designing Adobe XD :User Research & Testing – What is Competitor User Experience Research – User Experience Personas & User Profiles – Other types of User Experience Research – Qualitative and Quantitative User Experience Research – Running Interviews and Observations for User Experience –Understanding User – Practical Activity

UNIT III

(6 HOURS)

Visual Design : Definition- Introduction to Atomic Design – Elements of any Visual design:Color & Shape – Imagery – Typography - Buttons – Composition of Visual Design Elements: structure & Grid – Hierarchy of Content – States.

UNIT IV

(6 HOURS)

User Experience Design Strategy: An Introductory guide to information architecture – Techniques & Best practice for developing an information architecture: Software Process – Examples of Information Architecture – Sitemap – Sitemap for website – Examples – Navigation & Hierarchy : Taxonomy & metadata – Examples- Practical Activity

UNIT V

(6 HOURS)

Mock up : Different types of Design Mock –Ups – User Persona,Scenarios & stories – Design Ideation & Sketching – Storyboarding User Experiences – Design Wireframes –Design prototyping & types of prototypes – Practical Activity.

PRESCRIBED BOOKS:

1. The Design of Everyday Things by Don Norman, The revised and expanded edition,2013.
2. Lean UX: Designing Great Products with Agile Teams by Jeff Gothelf and Josh Seiden, 2013.

REFERENCE BOOKS:

1. Don't Make Me Think by Steve Krug, 3rd edition, 2014
2. The Elements of User Experience by Jesse James Garrett, 2nd edition, 2010
3. Information Architecture: For the Web and Beyond" by Louis Rosenfeld, Peter Morville, and Jorge Arango, 4th edition,2015.
4. Sketching User Experiences: Getting the Design Right and the Right Design" by Bill Buxton, 1st edition,2007.
5. About Face: The Essentials of Interaction Design" by Alan Cooper, Robert Reimann, and David Cronin, 4th edition, 2015.

E-LEARNING RESOURCES:

1. <https://learn.futureskillsprime.in/journey/adobe-ux-foundation-learning-journey-this-free-of-cost>.
2. <https://userresearch.google.com/>
3. <https://www.interaction-design.org/literature/topics/visual-design>
4. <https://www.nngroup.com/articles/ux-strategy/>
5. <https://www.mockupworld.co/>

PSO – CO mapping

	PSO 1	PSO 2	PSO 3	PSO 4	PSO5
CO 1	3	3	2	3	2
CO 2	3	3	2	2	2
CO 3	2	3	3	2	3
CO 4	3	2	2	3	2
CO 5	2	2	2	2	2
Ave.	2.6	2.6	2.2	2.4	2.2

PSO-CO-question paper mapping

CO No:	COURSE OUTCOME	PSOs ADDRESSED	COGNITIVE LEVEL (K1 to K6)
CO1	Define and explain the core concepts and principles of user experience.	PSO1,PSO2,PSO3, PSO4,PSO5	K1
CO2	Understand the key features and functionalities of Adobe XD for designing and prototyping.	PSO1,PSO2,PSO3, PSO4,PSO5	K2
CO3	Apply user-centered design principles to create interfaces that prioritize user needs and preferences.	PSO1,PSO2,PSO3, PSO4,PSO5	K3
CO4	Implement interactive and dynamic prototypes to simulate user interactions.	PSO1,PSO2,PSO3, PSO4,PSO5	K4
CO5	Explore collaboration tools within Adobe XD to work efficiently in a team environment.	PSO1,PSO2,PSO3, PSO4,PSO5	K5

K1= Remember, K2= Understand, K3= Apply, K4=Analyse, K5= Evaluate, K6= Create

PROGRAMME: ALL UG	BATCH: 2024 – 2027
PART: IV	COURSE COMPONENT: SOFT SKILL – IV
COURSE NAME: FOUNDATIONS OF QUANTITATIVE APTITUDE	COURSE CODE:
SEMESTER: IV	MARKS:100
CREDITS: 2	TOTAL HOURS: 30
THEORY AND PROBLEMS	

COURSE OBJECTIVE:

Develop learners' problem-solving skills and critical thinking abilities in the context of recruitment aptitude tests.

COURSE OUTCOME:

1. The learner will be able to recognize, describe and represent patterns and relationships, as well as to solve problems using algebraic language and skills.
2. To learn about factors and multiples that numbers have in common with each other.
3. The student will analyse monthly profit and loss statements for a school store and calculate profit margin percentages.
4. Students learn what different types of interest are, where it occurs in real life and understand the concept of simple and compound interests.
5. The learner will draw, interpret and compare pie charts, bar charts and frequency diagrams.

UNIT I: Number system and Number series

(6 HOURS)

Numbers: Numbers and their classification, test for divisibility of numbers, General properties of divisibility, division and remainder, remainder rules.

Number Series: Number series, three steps to solve a problem on series, two-line number series, sum rules on natural numbers.

UNIT II: HCF and LCM of Numbers

(6 HOURS)

Factors, Multiples, Principal of Prime factorization, Highest Common Factor (HCF) and Least Common Multiple (LCM), Product of two numbers, Difference between HCF and LCM.

UNIT III: Percentage, Profit and Loss**(6 HOURS)**

Percentage: Introduction, fraction to rate percent, rate percent to fraction, rate percent of a number, express a given quantity as a percentage of another given quantity, convert a percentage into decimals and convert a decimal into percentage.

Profit and Loss: Gain/Loss and % gain and % loss, relation among Cost price, Sale price , Gain/Loss and % gain and % loss.

UNIT IV: Simple Interest and Compound Interest**(6 HOURS)**

Simple Interest: Definition, effect of change of P , R and T on Simple Interest, amount.

Compound Interest: Introduction, conversion period, basic formula, to find the Principal/Rate/Time, Difference between Simple Interest and Compound Interest.

UNIT V: Data interpretation**(6 HOURS)**

Tabulation, Bar Graphs, Pie Charts, Line Graphs, average.

PRESCRIBED BOOK:

1. Quantitative Aptitude by R.S. Agarwal

REFERENCE BOOKS:

1. Quantitative Aptitude by Abhijit Guha, Fourth Edition.
2. Quantitative Aptitude by Ramandeep Singh.

E - LEARNING RESOURCES:

1. <https://byjus.com/maths/numeralsystem/#:~:text=crore%20is%207.,International%20Numeral%20System,8%20%E2%80%93%20Ones>
2. <https://byjus.com/maths/hcf-and-lcm/>
3. <https://byjus.com/maths/profit-loss-percentage/>
4. <https://www.vedantu.com/jee-main/maths-difference-between-simple-interest-and-compound-interest>
5. <https://sites.utexas.edu/sos/guided/descriptive/descriptivec/frequency/>

GUIDELINES TO THE QUESTION PAPER SETTERS

QUESTION PAPER PATTERN

SECTION	QUESTION COMPONENT	NUMBERS	MARKS	TOTAL
A	Multiple Choice Questions: Answer 20 out of 20 questions (each question carries one mark)	1 – 20	20	20
B	Answer any 5 out of 7 questions (each question carries 6 marks)	21 – 27	6	30
TOTAL MARKS				50

BREAK UP OF QUESTIONS FOR PROBLEMS

UNITS	SECTION A	SECTION B
I	4	1
II	4	1
III	4	1
IV	4	1
V	4	1
Any Unit	-	2
TOTAL	20	7

PROGRAMME: COMMON TO ALL	BATCH: 2024-2027
PART: IV	COURSE COMPONENT: SELF-STUDY
COURSE NAME: INDIAN HERITAGE AND KNOWLEDGE SYSTEM	COURSE CODE:
SEMESTER: III	MARKS:100
CREDITS: 2	TOTAL HOURS: SELF-STUDY
THEORY	

Course Description:

Delving into Indian Heritage, this course focuses on South Indian cultures and ancient knowledge like Yoga, Ayurveda, and Siddha, shaping the Nation's identity.

Course Objectives:

Analyzing Indian heritage's impact on national identity, South India's culture, and holistic traditions like Yoga, Ayurveda, Siddha, Jyotish, and Natya Shastra.

Course Outcomes:

- To develop a comprehensive understanding among students of Indian heritage, its richness and diversity, and its role in shaping the nation's cultural identity.
- Students will gain an enhanced insight into the artistic, architectural, and literary achievements of South India and other regions, fostering a sense of pride in Indian cultural heritage.
- To enhance students' cultural literacy by gaining insights into traditional practices preserved through folklore across India.
- To acquire knowledge among students of ancient Indian sciences for holistic well-being, promoting physical, mental, and spiritual health.
- Students will develop a deeper understanding of the interconnectedness of spiritual, medicinal, and artistic dimensions within Indian Heritage systems.

Course Structure:

Unit 1: Introduction to Indian Heritage

- **Concept of Heritage:** Definition, the importance of studying heritage, and its diverse forms.
- **Cultural Landscape of India:** Overview of major cultural zones in India, with a focus on South India.

Key Concepts: Cultural heritage, diversity, tangible heritage (e.g., monuments), intangible heritage (e.g., traditions, practices).

Unit 2: Cultural Tapestry of South India

- **Literature:** The classical Tamil literature of *Sangam poetry*, the epic Kannada works like the "*Kuvempu Ramayana*," the Telugu compositions of *Annamacharya*, and the poetic Malayalam works of Kerala's rich literary tradition.
- **Painting:** The intricate gold leaf work of *Tanjore* painting, the intricate patterns of *Mysore* painting, hand-painting or block-printing of *Kalamkari*.
- **Theatre:** The ancient art form of *Koothu* and the elaborate dance-dramas of *Bhagavata Mela* in Tamil Nadu, and the colourful folk theatre of *Yakshagana* in Karnataka.
- **UNESCO Indian Heritage Sites:** *Great Living Chola Temples* artistry, *Hampi-Virupaksha Temple* and the *Vijaya Vittala Temple, Mahabalipuram*- a treasure trove of *Pallava art*, *Mysore Palace*-Indo-Saracenic architecture, *Periyar National Park*- Western Ghats, *Kanchipuram*-City of Thousand Temples

Unit 3: Tamil Nadu Folklores

- **Origins and Significance:** Historical background of Tamil Nadu folklore and its cultural significance.
- **Folk Dances:** Exploration of traditional Tamil folk dances like *Karakattam*, *Kolattam*, and *Kummi*.

- **Folk Music:** Overview of folk music traditions in Tamil Nadu, including *Parai Attam* and *Villu Paatu*.
- **Rituals and Festivals:** Understanding the role of folklore in Tamil Nadu's rituals and festivals- *Pongal* and *Jallikattu*.

Key Concepts: Karakattam, Kolattam, Parai Attam, Villu Paatu, Tamil folk tales, cultural rituals.

Unit 4: Unveiling the Knowledge Systems

- **Cultural Landscape of India:** Overview of major cultural zones in India, with a focus on South India.
- **Yoga:** Exploring the various aspects of Yoga - its philosophy, Eight Limbs, practices (e.g., Asanas, Pranayama), and benefits for physical and mental well-being.
- **Ayurveda:** Understanding the core principles of Ayurveda - its focus on holistic health, diagnosis, and treatment methods.

Key Concepts: Yoga philosophy, Asanas, Pranayama, Tridosha theory (Ayurveda), Doshas (Vata, Pitta, Kapha), Panchakarma, herbal medicine, Ayurvedic lifestyle.

Unit 5: Siddha Tradition and Other Knowledge Systems

- **Siddha Tradition:** Origins, philosophy, medicinal practices, and spiritual aspects.
- **Other Important Knowledge Systems:** Jyotish Shastra (Indian astrology), Natya Shastra (Treatise on performing arts).

Key Concepts: Siddha literature, alchemy, and spirituality in Siddha tradition. Pancha Boothas (Siddha), herbal remedies, Planetary influences, elements of classical Indian dance and music, and aesthetics in Natya Shastra.

QUESTION PAPER PATTERN: MCQ

PROGRAMME: COMMON TO ALL	BATCH: 2024-2027
PART: IV	COURSE COMPONENT: SELF-STUDY
COURSE NAME: CONTEMPORARY WORLD AND SUSTAINABLE DEVELOPMENT	COURSE CODE:
SEMESTER: III	MARKS:100
CREDITS: 2	TOTAL HOURS: SELF-STUDY
THEORY	

Course Overview:

Delving into global dynamics, this course highlights Asia and India's pivotal role in achieving global sustainability objectives.

Course Objectives:

Exploring global challenges, Asian politics, conflict resolution, sustainability, and India's SDG efforts, with a focus on Tamil Nadu.

Course Outcomes:

- Students will gain a comprehensive understanding of the key actors, institutions, and dynamics shaping the contemporary world order.
- Students will acquire the ability to analyze the political, economic, and security challenges within major Asian regions, fostering informed perspectives on these critical issues.
- Through the study of recent wars, students will develop critical thinking skills to assess the root causes, human costs, and potential solutions to contemporary conflicts.
- Students will gain a deeper understanding of the principles and challenges of sustainable development, empowering them to advocate for responsible solutions at local, national, and international levels.

- Students will be equipped to critically evaluate India's contributions to the SDGs, particularly through specific programs implemented in Tamil Nadu, and assess their effectiveness in achieving sustainable development goals.

Course Structure:

Unit 1: Global Governance and Institutions

- **State & Non-State Actors:** Definition, types (nation-states, failed states), functions.
Key Actors: International states, Intergovernmental organizations (IGOs), nongovernmental organizations (NGOs), multinational corporations (MNCs).
- **United Nations (UN):** Structure, key organs (General Assembly, Security Council), functions, WB, & others.
Key Concepts: United Nations General Assembly, United Nations Security Council.
- **Regional Organizations:** European Union (EU), African Union (AU), North Atlantic Treaty Organization (NATO)
Key Concepts: European Union Commission, African Union Commission, North Atlantic Treaty Organization.
- **International Law and Treaties:** Significance, role in addressing global challenges.
Key Concepts: International Court of Justice, International Criminal Court, Geneva Conventions.

Unit 2: Contemporary Asia

Major Geographical Regions

- **Middle East:** Characterized by rich oil reserves, Complex political dynamics, and ongoing conflicts.
Key countries: Iran, Iraq, Israel, Saudi Arabia, Syria, Turkey
- **Southeast Asia:** Rapid economic growth, Challenges- maritime security and environmental degradation.
Key countries: Indonesia, Malaysia, Philippines, Singapore, Thailand, Vietnam
- **Far East:** Major economic powerhouses and Potential flashpoints.
Key countries: China, Japan, North Korea, South Korea

- **Rise of China:** Political-South China Sea, Territorial disputes and Competition for Resources. Economic- China's Belt and Road Initiative (BRI)
- **Major Economic Centers:** **Singapore-** Global financial hub, **Hong Kong-** Special Administrative Region of China, **United Arab Emirates (UAE)-** Diversified economy driven by oil and gas, tourism, and trade.

Regional Organizations:

- Association of Southeast Asian Nations (ASEAN)
- South Asian Association for Regional Cooperation (SAARC)
- Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC)
- Asia-Pacific Economic Cooperation (APEC)
- Shanghai Cooperation Organization (SCO)

Unit 3: Recent Wars of the World

- **Syrian Civil War (2011-present):** Bashar al-Assad regime, Syrian opposition groups, ISIS.

Key Concepts: Origins of the conflict, humanitarian crisis, foreign intervention, refugee crisis.

- **Yemeni Civil War (2015-present):** Houthi rebels, Yemeni government, Saudi-led coalition.

Key Concepts: Proxy war dynamics, humanitarian crisis, role of Iran and Saudi Arabia, UN peace efforts.

- **Ukraine Conflict (2014-present):** Ukrainian government, Russian-backed separatists, Russia.

Key Concepts: Annexation of Crimea, Donbas region conflict, Minsk agreements, NATO-Russia tensions.

- **Ethiopia Civil War (2020-present):** Ethiopian government, Tigray People's Liberation Front (TPLF), Eritrean forces.

Key Concepts: Tigray conflict, humanitarian crisis, regional implications, efforts for ceasefire and peace talks.

- **Nagorno-Karabakh War (2020):** Armenia, Azerbaijan, Russia.

Key Concepts: Conflict over Nagorno-Karabakh region, ceasefire agreement, role of Turkey, peace negotiations.

- **Myanmar Civil War (2021-present):** Myanmar military (Tatmadaw), ethnic armed groups, and Civilian resistance.

Key Concepts: Coup aftermath, Rohingya crisis, ethnic conflicts, ASEAN mediation efforts.

Unit 4: Sustainable Development Goals

- **Definition of Sustainable Development:** Balancing economic, social, and environmental needs.

Key Concepts: United Nations Development Programme (UNDP), World Wildlife Fund (WWF), Sustainable Development Solutions Network (SDSN).

- **UN Sustainable Development Goals (SDGs):** Overview, targets.

Key Concepts: United Nations, national governments, NGOs, private sector.

- **Challenges and Opportunities:** Achieving sustainability, global cooperation.

Key Concepts: United Nations, national governments, civil society organizations, multinational corporations.

Unit 5: India's Role in Achieving Sustainable Development Goals (SDGs) with Tamil Nadu Initiatives

Addressing Basic Needs:

- **Goal 1: No Poverty**
 - National Rural Employment Guarantee Act (NREGA)
 - Kalaignar Kanchi Thalaiyalar Scheme
 - Ungal Thozhil Udhayanam (UTOY)
- **Goal 2: Zero Hunger**
 - National Food Security Act (NFSA)
 - Nutritious Noon Meal Programme
 - Annadhanam Scheme
 - Amma Unavagam
- **Goal 3: Good Health and Well-being**
 - National Health Mission (NHM)
 - Health Insurance of Tamil Nadu
 - Chief Minister's Comprehensive Health Insurance Scheme
 - Maruthuva Mitri
 - Amma Mini Clinics

Ensuring Essential Services:

- **Goal 4: Quality Education**
 - Sarva Shiksha Abhiyan (SSA)
 - Rashtriya Madhyamik Shiksha Abhiyan (RMSA)
 - Namakkal District Library Scheme
 - Pudhumai Penn Scheme under Higher Education Assurance Scheme (HEAS)

- Free Coaching for Competitive Exams
- **Goal 6: Clean Water and Sanitation**
 - Swachh Bharat Mission (Clean India Mission)
 - National Rural Drinking Water Programme (NRDWP)
 - Jal Jeevan Mission Tamil Nadu
 - Namakku Naathey Scheme
 - Kudimaramathu Scheme
- **Goal 7: Affordable and Clean Energy**
 - National Solar Mission
 - Tamil Nadu Solar Energy Policy
 - Green House Scheme

Building Sustainable Communities:

- **Goal 11: Sustainable Cities and Communities**
 - Smart Cities Mission
 - Atal Mission for Rejuvenation and Urban Transformation (AMRUT)
 - Adi Dravidar Housing Scheme
- **Goal 13: Climate Action**
 - National Action Plan on Climate Change (NAPCC)
 - International Solar Alliance
 - Tamil Nadu Wind Energy Policy 2019
- **Goal 17: Partnerships for the Goals**
 - Development Assistance Programmes (DAPs)
 - International Development Cooperation (IDC)

QUESTION PAPER PATTERN: MCQ