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. Information Technology

(SEMESTER PATTERN WITH CHOICE BASED CREDIT SYSTEM)

LEARNING OUTCOME BASED CURRICULUM FRAMEWORK

(For the candidates admitted in the Academic year 2024-27 and hereafter)

LEARNING OUTCOME BASED CURRICULUM FRAMEWORK

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

PREAMBLE

B.Sc. (INFORMATION TECHNOLOGY) is a systematically designed three-year programme that prepares the student for a career in IT Industry. The B.Sc. (IT) program develops requisite professional skills and problem-solving abilities for pursuing a career in Software Industry. The main objective of this B.Sc. (IT) program is to inculcate among the students, the technical as well as the theoretical knowledge about the computers and its various applications in different fields. This programme is designed in such a way that students can have a detailed knowledge of subjects as well as the knowledge of IT related applications. Throughout this program the students will go through the IT scenario, its scope, career and the essentials of the IT world. The courses offered in the IT Program aims to focus on enabling the students to familiarize with the new technologies, and at the same time enhance and strengthen the fundamental knowledge in Computer Applications, Mathematics, and Statistics.

VISION

To provide an outstanding ICT education for our students and enable them to be leaders with successful careers in industry, academia and government

MISSION

- The future of students is driven by their aspirations and not bound by their Circumstances.
- The IT course will nurture creativity, lateral thinking and Problem-solving skills.
- To train young minds into industry ready professionals.
- Up – Knowledge Up – skilling

PROGRAM EDUCATIONAL OUTCOMES (PEOs)

PEO 1: 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.

PEO 2: Employability & Entrepreneurship

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

PEO 3: 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.

PEO 4: 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.

PEO 5: 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.

PROGRAMME OUTCOMES
B.Sc. INFORMATION TECHNOLOGY

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.

PROGRAMME SPECIFIC OUTCOMES
B.Sc. INFORMATION TECHNOLOGY

PSO 1: Apply modern programming practices for software development in emerging technologies like Cloud Computing, Data Analytics, IoT, Computer Networking, and Cybersecurity.

PSO 2: Adept in designing and managing databases, including the ability to create efficient database structures, query databases, implement data security measures & create meaningful and insightful visualization to aid data-driven decision making.

PSO 3: Gain Knowledge and skills required to manage computer networks understanding network protocols, routers, switches ensuring network security.

PSO 4: Ability to analyze business requirements, design appropriate system architecture incorporating principals of software engineering and project management.

PSO 5: Proficiently use contemporary computer languages and platforms to build a tangible portfolio showcasing their practical skills and mini project work, which can be valuable for employment or higher education opportunities.

PEO – PO mapping

	PEO 1	PEO2	PEO3	PEO4	PEO5
PO 1	3	3	3	3	3
PO 2	3	3	3	3	3
PO3	2	3	3	3	3
PO 4	2	3	3	3	3
PO 5	2	3	3	3	3

PO – PSO mapping

	PO 1	PO2	PO3	PO4	PO5
PSO 1	3	3	3	3	3
PSO 2	3	3	3	2	3
PSO3	3	3	3	3	2
PSO 4	3	3	3	3	3
PSO 5	3	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. Information Technology
Credit distribution for each semester

Semester 1 Course Component		Subject	Hrs/Week	Credit	Marks		Total
					Internals	Externals	
Part 1	Language	Language – I	6	3	50	50	100
Part II	English	English – I	4	3	50	50	100
Part III	Core-I	Programming in C and Linux	6	4	50	50	100
	Core-II	Practical-I: Programming in C and Linux	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/ Web flow Lab	2	2	50	50	100
	Soft Skills I	Communication and personality development	2	2	50	50	100
	Total		**30**	**23**			
Semester II Course Component		Subject	Hrs/Week	Credit	Marks		Total
					Internals	Externals	
Part 1	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	3	50	50	100
	Allied II	Statistics	6	5	50	50	100
Part IV	Non-Major Elective-II	Basic Tamil II/ Advanced Tamil II / Google Apps and Fundamentals Lab	2	2	50	50	100
	Soft Skills II	Interview and Resume Writing	2	2	50	50	100
	Total		**30**	**22**			
Semester III Course Component		Subject	Hrs/Week	Credit	Marks		Total
					Internals	Externals	
Part III	Core-V	Data Structures and Algorithms	6	4	50	50	100

	Core-VI	Relational Database Management Systems	5	4	50	50	100
	Core-VII	Practical-III: Relational Database Management Systems	5	4	50	50	100
	Core-VIII	Operating Systems	6	4	50	50	100
	Allied-III	Discrete Mathematics	6	5	50	50	100
Part IV	Soft Skills-III	Adobe UX Foundation	2	2	50	50	100
	Self-Study (Compulsory) Course	Indian Heritage and Knowledge/ Contemporary World and Sustainable Development	-	2	-	100	100
	Total		**30**	**25**			

Semester IV Course Component		Subject	Hrs/Week	Credit	Marks		Total
					Internals	Externals	
Part III	Core-IX	Big Data Analytics	5	4	50	50	100
	Core-X	Programming in Python	5	4	50	50	100
	Core-XI	Practical-IV: Python Programming	5	4	50	50	100
	Core-XII	Cryptography	5	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**	**25**			

Semester V Course Component		Subject	Hrs/Week	Credit	Marks		Total
					Internals	Externals	
Part III	Core XIII	Web Technology	6	4	50	50	100
	Core XIV	Practical -V: Web Technology	6	4	50	50	100
	Core XV	Software Engineering and Testing	6	4	50	50	100
	Elective – I	Enterprise Resource Planning / Artificial Intelligence/ Machine Learning	6	5	50	50	100

	Elective – II	Inter Disciplinary Elective – Data Visualization using Excel	5	5	50	50	100
Part IV	Value Education	Value Education	1	2	50	50	100
	Internship	Internship	-	2	-	-	-
	Total		**30**	**26**			
Semester VI Course Component		Subject	Hrs/Week	Credit	Marks		Total
					Internals	Externals	
Part III	Core XVI	Mini project	6	3	50	50	100
	Core XVII	Internet of Things	6	4	50	50	100
	Core XVIII	R Programming for Data science	6	4	50	50	100
	Core XIX	Practical –VI: R Programming for Data Science	6	4	50	50	100
	Elective - III	Cloud Computing/ Mobile Computing / Parallel Computing	6	5	50	50	100
Part V	Extension Activity		-	1	-	-	-
	Total		**30**	**21**			

Total credit distribution for all the 3 years

		No. of Paper	Credits
Part 1	Language	2	6
Part II	English	2	6
Part III	Core	19	74
	Allied	4	20
	Elective	3	15
Part IV	NME	2	4
	Soft Skills	5	10
	EVS	1	2
	Value Education	1	2
	Internship	1	2
Part V	Extension activity	1	1
	Total	41	142

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 & Practical) 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)	• 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)	• 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)	• 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)	• 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)	• 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)	• 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. IT	**BATCH: 2024-27**
PART: III	**COURSE COMPONENT: CORE-I**
COURSE NAME: PROGRAMMING IN C AND LINUX	**COURSE CODE:**
SEMESTER: I	**MARKS:100**
CREDITS: 4	**TOTAL HOURS: 90**

COURSE OBJECTIVE:

To develop the ability to analyze a problem and develop an algorithm to solve it using C Programming

COURSE OUTCOMES:

1. Describe the concepts of Programming techniques and C fundamentals.
2. Understand the usage of Data Input output functions and Control structures.
3. Apply the concepts of Functions and storage classes.
4. Analyze and manage files in Linux.
5. Create and execute shell scripts for task automation.

UNIT-I **(18 hours)**

C Fundamentals: Character set – Identifier and Keywords – Data Types – Constants – Variables – Declarations – Expressions – Statements – Operators: Arithmetic, Unary, Relational , Logical, Assignment , Conditional and Bitwise - Library Functions - Simple C programs.

UNIT-II **(18 hours)**

Flow of control – if, if-else, Nested if, Ladder if, while, do-while, for loop – Switch, Break and continue, go to statements – Comma operator- Arrays: Defining and Processing – Multi-Dimensional Arrays.

UNIT-III **(18 hours)**

Functions: Definition – Proto-types – Passing arguments – Recursions, Storage Classes – Automatic, External, Static, Register Variable – Structure – Union-File Creating, Processing, Opening and Closing a data file.

UNIT-IV **(18 hours)**

Introduction to Linux – Linux Components –Managing Files and Directories: Directory Commands in LINUX-Files Commands in LINUX-Creating files using the vi editor: Text editors-The vi editor.

UNIT-V **(18 hours)**

Shell Scripts: – Variables – Export, Read, and Exit Commands – Control Structures – Structure of an AWK Script – AWK Control Structures – Executing AWK Scripts with the Shell – Simple Program using Shell Scripts.

PRESCRIBED BOOKS:

1. E. Balaguruswamy,, "Programming in ANSI C"- 8th edition, TMH publishing Company LTD
2. A Practical Guide to Linux Commands, Editors, and Shell Programming" by Mark G. Sobell - 4th Edition (2020)

REFERENCE BOOKS:

1. N.B. Venkateswarlu , Introduction to Linux: Installation and Programming, BS Publications, 2016, 8th Edition
2. N. Kanthane, 2008, Programming with ANSI and Turbo C, Pearson Education

E-LEARNING RESOURCES:

1. https://www.geeksforgeeks.org/c-language-introduction/
2. https://www.man7.org/training/download/Linux_System_Programming-man7.org-mkerrisk-NDC- TechTown-2020.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	3	2	2
II	3	1	1
III	2	1	1
IV	2	2	1
V	2	1	1
TOTAL			
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	2	3	3	3
CO 4	3	3	3	3	3
CO 5	3	3	3	3	3
AVG	**3**	**2.8**	**3**	**3**	**3**

PSO-CO-question paper mapping

CO No:	**COURSE OUTCOME**	**PSOs ADDRESSED**	**COGNITIVE LEVEL (K1 to K6)**
CO1	Describe the concepts of Programming techniques and C fundamentals.	PSO 1, PSO 5	K1
CO2	Understand the usage of Data Input output functions and Control structures.	PSO 1, PSO 4	K2
CO3	Apply the concepts of Functions and storage classes.	PSO 1, PSO 5	K3
CO4	Analyze and manage files in Linux.	PSO 1, PSO 5	K4
CO5	Create and execute shell scripts for task automation.	PSO 1, PSO 4	K5

PROGRAMME: B.Sc. IT	**BATCH: 2024-27**
PART: III	**COURSE COMPONENT: CORE-II**
COURSE NAME: PRACTICAL-I: PROGRAMMING IN C AND LINUX	**COURSE CODE:**
SEMESTER: I	**MARKS:100**
CREDITS: 4	**TOTAL HOURS: 60**

COURSE OBJECTIVE

To Read, understand, develop and trace the execution of programs written in C language.

COURSE OUTCOMES:

1. Implement the concepts of sequential programming Conditional Structures in C.
2. Implement the iterative concepts in C.
3. Develop Programs with function and perform various arithmetic operations.
4. Develop C programs for manipulating strings and Arrays
5. Develop Linux programs to understand arguments and LINUX commands.

C Programs:

1. Write a program to check if a number is even or odd.
2. Write a program to find the largest of three numbers.
3. Write a program to check for prime number.
4. Write a program to check for Armstrong number.
5. Write a program to check whether a string is a palindrome or not.
6. Write a program to print Fibonacci series using function.
7. Write a program for counting the number of vowels, consonants, words, white spaces in a line of text.
8. Write a program to add two matrices.
9. Write a program to find factorial of a number using recursive function.
10. Write a program to arrange a set of numbers in ascending order.

Linux Programs:

1. Check whether the given number is prime or not.
2. Accepts any number of arguments and prints them in the reverse order.
3. Write a script that does the following:
    a. Display the name of the script being executed.
    b. Display the total number of arguments passed to the script.
4. Design a menu driven program for rename, remove and copy commands.
5. Check whether the given user has logged in or not.

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	2	3	3
CO 4	3	3	3	3	3
CO 5	3	3	3	3	3
AVG	**3**	**3**	**2.8**	**3**	**3**

PSO-CO-question paper mapping

CO No:	**COURSE OUTCOME**	**PSOs ADDRESSED**	**COGNITIVE LEVEL (K1 to K6)**
CO1	Implement the concepts of sequential programming Conditional Structures in C.	PSO 1, PSO 4, PSO 5	K3
CO2	Implement the iterative concepts in C.	PSO 1, PSO 4, PSO 5	K3
CO3	Develop Programs with function and perform various arithmetic operations.	PSO 1, PSO 4, PSO 5	K5
CO4	Develop C programs for manipulating strings and Arrays	PSO 1, PSO 4, PSO 5	K5
CO5	Develop Linux programs to understand arguments and LINUX commands.	PSO 1, PSO 4, PSO 5	K5

PROGRAMME: B.Sc. IT	BATCH: 2024 - 25
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), eigenvalues 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 $\text{Sin}^n\theta$, $\text{Cos}^n\theta$, $\text{Sin}^m\theta\ \text{Cos}^n\theta$, expansion of $\text{Sin}n\theta$ and $\text{Cos}n\theta$, 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, $\phi(x) = \text{Sin mx}$ (or) Cos mx (or) x^m. Chapter5, Section 5.2,5.2.1

PRESCRIBED BOOK:

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

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: For other Programmes except BSc. IT	**BATCH: 2024-27**
PART: IV	**COURSE COMPONENT: Non Major Elective - I**
COURSE NAME: WEB FLOW LAB	**COURSE CODE:**
SEMESTER: I	**MARKS:100**
CREDITS: 2	**TOTAL HOURS: 30**

COURSE OBJECTIVE:

To learn and explore the in-browser design tool Webflow, that gives students the power to design, build, and launch responsive websites visually from scratch.

COURSE OUTCOMES:

1. Implement the creation of a free website account and navigation within the Webflow platform.
2. Implement the selection and customization of templates to meet specific design requirements.
3. Develop the setup of website structure, including pages and navigation elements.
4. Develop the addition, replacement, and optimization of images to improve website aesthetics and performance.
5. Develop the editing of text, buttons, colors, and hover states to achieve desired website design and functionality.

Lab Exercises:

1. Creating a free website account
2. Selecting a template
3. Setting up website structure
4. Adding/Replacing images in the website
5. Editing Text, buttons and colours in the website
6. Changing Hover State
7. Creating a new page
8. Editing navigation
9. Adding animation in Webflow
10. Checking for Responsiveness
11. Adding Third Party Apps

PSO – CO mapping

	PSO 1	PSO 2	PSO 3	PSO 4	PSO5
CO 1	3	2	3	3	3
CO 2	3	3	3	3	3
CO 3	3	3	3	3	3
CO 4	3	3	3	3	3
CO 5	3	3	3	3	3
AVG	**3**	**2.8**	**3**	**3**	**3**

PSO-CO-question paper mapping

CO No:	**COURSE OUTCOME**	**PSOs ADDRESSED**	**COGNITIVE LEVEL (K1 to K6)**
CO1	Implement the creation of a free website account and navigation within the Webflow platform.	PSO 1, PSO 4, PSO 5	K3
CO2	Implement the selection and customization of templates to meet specific design requirements.	PSO 1, PSO 4, PSO 5	K3
CO3	Develop the setup of website structure, including pages and navigation elements.	PSO 1, PSO 4, PSO 5	K5
CO4	Develop the addition, replacement, and optimization of images to improve website aesthetics and performance.	PSO 1, PSO 4, PSO 5	K5
CO5	Develop the editing of text, buttons, colors, and hover states to achieve desired website design and functionality.	PSO 1, PSO 4, PSO 5	K5

SEMESTER - II

PROGRAMME: B.Sc. IT	**BATCH: 2024-27**
PART: III	**COURSE COMPONENT: CORE-III**
COURSE NAME: PROGRAMMING IN JAVA	**COURSE CODE:**
SEMESTER: II	**MARKS:100**
CREDITS: 4	**TOTAL HOURS: 90**

COURSE OBJECTIVE:

To gain knowledge of the structure and model of the Java programming language.

COURSE OUTCOMES:

1. Describe the concept of object-oriented design principles and Java fundamentals.
2. Understand the structure and model of the Java programming language
3. Apply the concepts of multi-threading and synchronization.
4. Analyze various exceptions and understand the concepts of graphics.
5. Explain the concepts of Java Swing.

UNIT I **(18 hours)**

Introduction to Java - Features of Java - Basic Concepts of Object Oriented Programming - Java Tokens - Java Statements – Constants – Variables - Data Types - Type Casting –Operators – Expressions - Control Statements: Branching and Looping Statements.

UNIT II **(18 hours)**

Classes, Objects and Methods - Constructors - Methods Overloading – Inheritance -Overriding Methods - Finalizer and Abstract Methods - Visibility Control –Arrays - Strings and Vectors - String Buffer Class.

UNIT III **(18 hours)**

Interfaces – Packages - Creating Packages - Accessing a Package - Multithreaded Programming – Creating Threads - Stopping and Blocking a Thread - Life Cycle of a Thread - Using Thread Methods - Thread Priority – Synchronization - Implementing the Runnable Interface.

UNIT IV **(18 hours)**

Managing Errors and Exceptions - Syntax of Exception Handling Code - Using Finally Statement - Throwing Our Own Exceptions - Applet Programming - Applet Life Cycle-Graphics Programming.

UNIT V **(18 hours)**

Introduction to Java Swing-Swing Components-Creating Windows and Dialogs-Event Handling in Swing-Layout Management in Swing-Working with Text and Graphics in Swing-Using Swing Controls and Menus

PRESCRIBED BOOKS

i. Y. Daniel Liang, 2018, An Introduction to JAVA Programming, Prentice – Hall ofIndia Pvt. Ltd.
ii. Cay S. Horstmann and Gary Cornell, 2013, Core Java™2 Volume I, Fundamental9th Edition, Pearson Education..

REFERENCE BOOKS

iii. E. Balagurusamy 2004, Programming with JAVA – 7th Edition, Tata McGraw-Hill Publishing Co. Ltd, New Delhi.
iv. Herbert Schildt, The Complete Reference Java TM 2-5th Edition, Tata McGraw-Hill Publishing Co. Ltd, New Delhi

E-LEARNING RESOURCES

i. https://www.w3schools.com/java/java_intro.asp

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

PSO – CO Mapping

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	2	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
AVG	**3**	**3**	**2.8**	**3**	**3**

PSO-CO-Question Paper Mapping

CO No:	**COURSE OUTCOME**	**PSOs ADDRESSED**	**COGNITIVE LEVEL (K1 to K6)**
CO1	Describe the concept of object-oriented design principles and Java fundamentals.	PSO1, PSO3	K1
CO2	Understand the structure and model of the Java programming language	PSO1, PSO2	K2
CO3	Apply the concepts of multi-threading and synchronization.	PSO1, PSO4	K3
CO4	Analyze various exceptions and understand the concepts of graphics.	PSO1, PSO2	K4
CO5	Explain the concepts of Java Swing.	PSO1, PSO5	K5

PROGRAMME: B.Sc. IT	**BATCH: 2024-27**
PART: III	**COURSE COMPONENT: CORE-IV**
COURSE NAME: PRACTICAL-II: PROGRAMMING IN JAVA	**COURSE CODE:**
SEMESTER: II	**MARKS:100**
CREDITS: 3	**TOTAL HOURS: 60**

COURSE OBJECTIVE:

To Implement Object Oriented programming concept and to build Java Application.

COURSE OUTCOMES:

1. Implement Object Oriented programming concept using basic syntaxes of controls Structures, strings and function for developing skills of logic building activity
2. Implement classes, objects, members of a class and the relationships among them needed for a finding the solution to specific problem
3. Develop how to achieve reusability using inheritance, interfaces and packages and describes faster application development can be achieved
4. Develop Java applications with threads and generics classes
5. Develop and use of different exception handling mechanisms and concept of multithreading for robust faster and efficient application development

Application

1. Create a Java program that checks whether a given number is prime or not.
2. Write a Java program to read student marks for five subjects and print the total and average.
3. Write a Java program to calculate the factorial of a given number using a loop.
4. Write Java code to swap the values of two variables without using a temporary variable.
5. Implement a Java program that calculates the area of a circle using the formula A = πr^2.
6. Create a Java program to find the sum of all even numbers in an array.
7. Define a Java class named Person with attributes like name, age, and address. Create objects of this class and demonstrate their usage.
8. Write a Java program to find the largest and smallest elements in an array of integers using methods.
9. Implement a class Rectangle with methods to calculate its area and perimeter. Inherit from this class to create a Square class and demonstrate method overriding.
10. Create a Java program to demonstrate constructor overloading in a class called Student.
11. Design a Java class Book with attributes like title, author, and publication year. Create an array of Book objects and sort them based on their publication years.
12. Define an interface Shape with methods for calculating area and perimeter. Implement this interface in classes like Circle and Rectangle. Calculate the total area and perimeter of different shapes.

13. Create a Java program that throws a custom exception when dividing by zero. Handle the exception to display an error message.
14. Write a Java Swing program to create a simple GUI window with a "Hello, Swing!" label.
15. Create a Java Swing program that displays a window containing a button. On clicking the button, display a message dialog with a custom message.

PSO – CO Mapping

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	2
CO5	3	3	3	3	3
AVG	**3**	**3**	**3**	**3**	**2.8**

PSO-CO-Question Paper Mapping

CO No:	**COURSE OUTCOME**	**PSOs ADDRESSED**	**COGNITIVE LEVEL (K1 to K6)**
CO1	Implement Object Oriented programming concept using basic syntaxes of controls Structures,strings and function for developing skills of logic building activity	PSO1, PSO4	K3
CO2	Implement classes, objects, members of a class and the relationships among them needed for afinding the solution to specific problem	PSO1, PSO3	K3
CO3	Develop how to achieve reusability using inheritance, interfaces and packages anddescribes faster application development can be achieved	PSO1, PSO4	K5
CO4	Develop Java applications with threads and generics classes	PSO1, PSO2	K5
CO5	Develop and use of different exception handling mechanisms and concept ofmultithreading for robust faster and efficient application development	PSO1, PSO5	K5

PROGRAMME: B.Sc. IT	**BATCH: 2024 - 25**
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:

To 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 Bayer'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:

Treatment and content as in "Statistical Methods" – S.P. Gutpa,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-andmathematics-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

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

PROGRAMME: For other Programmes except BSc. IT	**BATCH: 2024-27**
PART: IV	**COURSE COMPONENT: Non Major Elective -II**
COURSE NAME: GOOGLE APPS AND FUNDAMENTALS LAB	**COURSE CODE:**
SEMESTER: II	**MARKS:100**
CREDITS: 2	**TOTAL HOURS: 30**

COURSE OBJECTIVE

To master Google Suite for productivity, collaboration, and communication in diverse contexts.

COURSE OUTCOMES:

1. Implement proficiency in Google Suite across documents, data, presentations, surveys, and tasks.
2. Implement efficient document creation and collaboration using Google Docs.
3. Develop effective data analysis and visualization with Google Sheets.
4. Develop engaging presentations incorporating multimedia elements using Google Slides.
5. Develop streamlined surveys, feedback collection, and task management using Google Forms, Drive, and Calendar.

Practical Lab Questions:

1. **Google Docs:** Create a CV incorporating various features of google docs.
2. **Google Sheets:** Create a student mark spreadsheet containing marks of various subjects. Perform mathematical operation and find the total, average, maximum and minimum marks.
3. **Google Slides:** Design a presentation about your favourite personality using google slides incorporating images, charts and transitions.
4. **Google Forms:** Develop a survey to gather feedback on a recent event or product, including various question types.
5. **Google Drive:** Organize and share a folder containing documents, spreadsheets, and presentations related to a specific project.
6. **Google Calendar:** Schedule a series of exam schedule for a student using google calendar and set reminders.
7. **Google Keep:** Make a checklist for assignments, class activities including class tests and exam preparations.
8. **Google Photos:** Create an album capturing the highlights of a recent trip or event, and share it with friends.
9. **Google Translate:** Translate a short paragraph from English to another language, ensuring accuracy and fluency.
10. **Google Earth:** Explore and share a virtual tour of a historical landmark or a place you would love to visit.

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	3
CO 4	3	3	3	3	3
CO 5	3	2	3	3	3
AVG	**3**	**2.8**	**3**	**3**	**3**

PSO-CO-question paper mapping

CO No:	**COURSE OUTCOME**	**PSOs ADDRESSED**	**COGNITIVE LEVEL (K1 to K6)**
CO1	Implement proficiency in Google Suite across documents, data, presentations, surveys, and tasks.	PSO 1, PSO 4, PSO 5	K3
CO2	Implement efficient document creation and collaboration using Google Docs.	PSO 1, PSO 4, PSO 5	K3
CO3	Develop effective data analysis and visualization with Google Sheets.	PSO 1, PSO 4, PSO 5	K5
CO4	Develop engaging presentations incorporating multimedia elements using Google Slides.	PSO 1, PSO 4, PSO 5	K5
CO5	Develop streamlined surveys, feedback collection, and task management using Google Forms, Drive, and Calendar.	PSO 1, PSO 4, PSO 5	K5

SEMESTER - III

PROGRAMME: B.Sc. IT	**BATCH: 2024-27**
PART: III	**COURSE COMPONENT: CORE - V**
COURSE NAME: DATA STRUCTURES AND ALGORITHMS	**COURSE CODE:**
SEMESTER: III	**MARKS:100**
CREDITS: 4	**TOTAL HOURS: 90**

COURSE OBJECTIVE

To learn and analyze the different data structures and algorithms for problem solving.

COURSE OUTCOMES:

1. Describe algorithms, data structures, and asymptotic analysis.
2. Understand various data structures for problem-solving.
3. Implement and use stacks and queues effectively.
4. Analyze linked lists, trees, and graphs in applications.
5. Explain divide and conquer and greedy algorithms for sorting and optimization.

UNIT-I INTRODUCTION TO ALGORITHMS AND DATA STRUCTURES (18 Hours)

Algorithms: Definition, Properties, Performance Analysis-Space Complexity, Time Complexity, Asymptotic Notations. Data structures: Introduction, Data Structures types, DS Operations.

UNIT-II STACKS AND QUEUES (18 Hours)

Stacks: Introduction, Stack Operations, Applications: Infix to Postfix Conversion, Evaluation of Postfix Expression. Queues: Introduction, Operations on queues, Circular queues.

UNIT-III LINKED LISTS AND APPLICATIONS (18 Hours)

Linked lists: Introduction, Singly linked lists, Circular linked lists, Doubly linked lists, Applications: Polynomial Representation. Trees and graphs: Introduction, Definition and basic terminologies, graph definition, representation.

UNIT-IV DIVIDE AND CONQUER (18 Hours)

Divide and Conquer: General method, finding maximum and minimum, Merge sort, Quick sort, Greedy Method: General Method, Knapsack problem, Job sequencing with dead lines

UNIT-V DYNAMIC PROGRAMMING (18 Hours)

Dynamic programming: General Method, Multi stage graphs, All pairs shortest paths, String editing, 0/1 Knap sack problem.

PRESCRIBED BOOKS

G.A.V PAI, Data Structures and Algorithms, Concepts, Techniques and Applications, Volume1, 1stEdition, Tata McGraw-Hill, 2017.

Horowitz and Sahani, Fundamentals of Computer Algorithms, 2ND Edition, 2012**.**

REFERENCE BOOKS:

1. Langsam,M. J. Augenstein, A. M. Tanenbaum, Data structures using C and C++, 2nd Edition, PHI Education, 2015.

2. Sartaj Sahni, Ellis Horowitz, Fundamentals of at Structures in C, 2nd Edition, Orientblackswan, 2010.

E-LEARNING RESOURCES:

1. https://www.geeksforgeeks.org/data-structures/
2. https://www.programiz.com/dsa
3. https://www.w3schools.in/data-structures-tutorial/intro/

GUIDELINES TO THE QUESTION PAPER SETTERS

QUESTION PAPER PATTERN

Section	Question Component	Numbers	Marks	Total
A	***Definition / Principles*** *Answer any 10 out of 12 questions*	*1 – 12*	*3*	***30***
B	***Short Answer*** *Answer any 5 out of 7 questions*	*13–19*	*6*	***30***
C	***Essay*** *Answer any 4 out of 6 questions*	*20– 25*	*10*	***40***
TOTAL MARKS				**100**

BREAK UP OF QUESTIONS

UNITS	SECTION A	SECTION B	SECTION C
I	3	2	2
II	3	1	1
III	2	1	1
IV	2	2	1
V	2	1	1
TOTAL			
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	3	3
CO 4	3	3	3	2	3
CO 5	3	3	3	3	3
AVG	**3**	**3**	**3**	**2.8**	**3**

PSO-CO-question paper mapping

CO No:	COURSE OUTCOME	PSOs ADDRESSED	COGNITIVE LEVEL (K1 to K6)
CO1	Describe algorithms, data structures, and asymptotic analysis.	PSO 2, PSO 4	K1
CO2	Understand various data structures for problem-solving.	PSO 2, PSO 5	K2
CO3	Implement and use stacks and queues effectively.	PSO 2, PSO 4, PSO 5	K3
CO4	Analyze linked lists, trees, and graphs in applications.	PSO 2, PSO 5	K4
CO5	Explain divide and conquer and greedy algorithms for sorting and optimization.	PSO 2, PSO 4, PSO 5	K5

PROGRAMME: B.Sc. IT	**BATCH: 2024-27**
PART: III	**COURSE COMPONENT: CORE-VI**
COURSE NAME: RELATIONAL DATABASE MANAGEMENT SYSTEMS	**COURSE CODE:**
SEMESTER: III	**MARKS:100**
CREDITS: 4	**TOTAL HOURS: 75**

COURSE OBJECTIVE

To analyze the existing design of a database schema and Create database for real-lifeapplication, with constraints and keys, using SQL and PL/SQL.

COURSE OUTCOMES:

1. Describe the conceptual models of a database using ER modelling
2. Understand the relational model in Database
3. Apply the existing design of a database schema and apply concepts of normalization to design an optimal database
4. Analyze and populate a database for a real-life application, with constraints and keys, using SQL
5. Explain PL/SQL structure in databases

UNIT – I **(15 Hours)**

Introduction to DBMS– Data and Information- Database – Database Management System – Objectives - Advantages – Components - Architecture. ER Model: Building blocks of ER Diagram – Relationship Degree – Classification – ER diagram to Tables – ISA relationship – Constraints – Aggregation and Composition – Advantages.

UNIT – II **(15 Hours)**

Relational Model: CODD's Rule- Relational Data Model - Key - Integrity – Relational Algebra Operations – Advantages and limitations – Relational Calculus – Domain Relational Calculus - QBE.

UNIT – III **(15 Hours)**

Structure of Relational Database. Introduction to Relational Database Design - Objectives – Tools – Redundancy and Data Anomaly – Functional Dependency - Normalization – 1NF – 2NF – 3NF – BCNF. Transaction Processing – Database Security.

UNIT – IV **(15 Hours)**

SQL: Commands – Data types – DDL - Selection, Projection, Join and Set Operations – Aggregate Functions – DML – Modification - Truncation - Constraints – Subquery.

UNIT – V **(15 Hours)**

PL/SQL: Structure - Elements – Operators Precedence – Control Structure – Iterative Control - Cursors - Procedure - Function - Packages – Exceptional Handling - Triggers.

PRESCRIBED BOOKS

1. Abraham Silberchatz, Henry F. Korth, S. Sudarshan, "Database System Concepts", 7th McGrawHill, 2021.
2. Fundamentals of Relational Database Management System, Dr. J. Vanathi and Mr. T. Ravishankar, 2022, Island Publishers Tamilnadu, India

REFERENCE BOOKS

1. Alexis Leon & Mathews Leon, "Fundamentals of DBMS", 2nd Edition, Vijay NicolePublications, 2014.
2. S. Sumathi, S. Esakkirajan, "Fundamentals of Relational Database Management Systems ",Springer International Edition, 2007.

E-LEARNING RESOURCES

1. NPTEL & MOOC courses titled Relational Database Management Systems
2. https://nptel.ac.in/courses/106106093/
3. https://nptel.ac.in/courses/106106095/
4. https://www.javatpoint.com/what-is-rdbms

GUIDELINES TO THE QUESTION PAPER SETTERS

QUESTION PAPER PATTERN

Section	Question Component	Numbers	Marks	Total
A	***Definition / Principles*** *Answer any 10 out of 12 questions*	*1 – 12*	*3*	***30***
B	***Short Answer*** *Answer any 5 out of 7 questions*	*13–19*	*6*	***30***
C	***Essay*** *Answer any 4 out of 6 questions*	*20– 25*	*10*	***40***
TOTAL MARKS				**100**

BREAK UP OF QUESTIONS

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

PSO – CO Mapping

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	2	3
AVG	**3**	**3**	**3**	**2.8**	**3**

PSO-CO-Question Paper Mapping

CO No:	**COURSE OUTCOME**	**PSOs ADDRESSED**	**COGNITIVE LEVEL (K1 to K6)**
CO1	Describe the conceptual models of a database using ER modelling	PSO1, PSO3	K1
CO2	Understand the relational model in Database	PSO1, PSO5	K2
CO3	Apply the existing design of a database schema and apply concepts of normalization to design an optimal database	PSO1, PSO2	K3
CO4	Analyze and populate a database for a real-life application, with constraints and keys, using SQL	PSO1, PSO4	K4
CO5	Explain PL/SQL structure in databases	PSO1, PSO3	K5

PROGRAMME: B.Sc. IT	**BATCH: 2024-27**
PART: III	**COURSE COMPONENT: CORE-VII**
COURSE NAME: PRACTICAL – III: RELATIONAL DATABASE MANAGEMENT SYSTEMS	**COURSE CODE:**
SEMESTER: III	**MARKS:100**
CREDITS: 4	**TOTAL HOURS: 75**

COURSE OBJECTIVE

To understand the SQL essentials: DDL, DML, queries, PL/SQL, and database app development.

COURSE OUTCOMES:

1. Implement the various DDL commands
2. Implement the various DML commands
3. Implement queries in SQL to retrieve information from data base
4. Implement PL/SQL statements: Exception Handling, Cursors, Triggers.
5. Develop database applications using front-end tools and back-end.

LAB EXERCISES

1) DDL commands with constraints.
2) DML Commands with constraints.
3) SQL Queries: Queries, sub queries, Aggregate function
4) PL/SQL: Exceptional Handling
5) PL/SQL: Cursor
6) PL/SQL: Trigger
7) PL/SQL: Packages
8) Design and Develop Application for Library Management
9) Design and Develop Application for Student Mark Sheet Processing
10) Design and Develop Application for Pay Roll Processing

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	3
CO 4	3	3	3	3	3
CO 5	3	3	3	3	2
AVG	**3**	**3**	**3**	**3**	**2.8**

PSO-CO-question paper mapping

CO No:	**COURSE OUTCOME**	**PSOs ADDRESSED**	**COGNITIVE LEVEL (K1 to K6)**
CO1	Implement the various DDL commands	PSO2, PSO5	K3
CO2	Implement the various DML commands	PSO2, PSO5	K3
CO3	Implement queries in SQL to retrieve information from data base	PSO2, PSO5	K3
CO4	Implement PL/SQL statements: Exception Handling, Cursors, Triggers.	PSO2, PSO5	K3
CO5	Develop database applications using front-end tools and back-end.	PSO2, PSO5	K5

PROGRAMME: B.Sc. IT	**BATCH: 2024-27**
PART: III	**COURSE COMPONENT: CORE-VIII**
COURSE NAME: OPERATING SYSTEMS	**COURSE CODE:**
SEMESTER: III	**MARKS:100**
CREDITS: 4	**TOTAL HOURS: 90**

COURSE OBJECTIVE:

To Understand and Evaluate the requirement for process synchronization and coordination handled by operating system.

COURSE OUTCOMES:

1. Describe the important computer system resources and the role of operating system in their management policies and algorithms.
2. Understand the process management policies and scheduling of processes by CPU
3. Use the knowledge of process synchronization and coordination
4. Analyze the memory management and its allocation policies
5. Evaluate the storage management policies with respect to different storage management technologies

UNIT- I **(18 Hours)**

Introduction to Operating Systems: Introduction- History & evolution of OS- Types of Operating Systems- Simple Batch Systems, Multiprogramming and Time Sharing systems. Personal Computer Systems, Parallel Systems, Distributed Systems and Real time Systems. Operating System Structures: Operating System Services, System components, system calls.

UNIT- II **(18 Hours)**

Process Management: Process states, Process creation, process termination, Process Scheduling Algorithms-Non-Preemptive and Preemptive Scheduling Algorithms- Concurrent and Dependent Processes- Inter-process Communication

UNIT III **(18 Hours)**

Process Synchronization: Critical Section problem- Semaphores - Deadlock: Deadlock Characterization, Necessary and Sufficient Conditions for Deadlock, Deadlock Handling Approaches: Deadlock Prevention, Deadlock Avoidance and Deadlock Detection and Recovery.

UNIT - IV **(18 Hours)**

Memory Management: Physical and Virtual Address Space; Memory Allocation Strategies– Fixed and -Variable Partitions, Paging, Segmentation, Virtual Memory. File Management: Directory Structure, File Operations, File Allocation Methods.

UNIT - V **(18 Hours)**

Advanced OS: Basic Model of Real Time Systems - Characteristics- Applications of Real Time Systems–Real Time Task Scheduling - Handling Resource Sharing - Mobile Operating Systems.

PRESCRIBED BOOKS

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Concepts", 9th Edition, John Wiley and Sons Inc., 2012

REFERENCE BOOKS

1. H.M. Deitel , An Introduction to Operating system,- Second Edition, Addison Wesley.
2. Andrew S.Tanenbaum, Modern Operating Systems, Pearson Education, 2nd edition.

E-LEARNING RESOURCES

i. https://www.geeksforgeeks.org/what-is-an-operating-system/

GUIDELINES TO THE QUESTION PAPER SETTERS
QUESTION PAPER PATTERN

Section	Question Component	Numbers	Marks	Total
A	***Definition / Principles*** *Answer any 10 out of 12 questions*	*1 – 12*	*3*	***30***
B	***Short Answer*** *Answer any 5 out of 7 questions*	*13–19*	*6*	***30***
C	***Essay*** *Answer any 4 out of 6 questions*	*20– 25*	*10*	***40***
TOTAL MARKS				**100**

BREAK UP OF QUESTIONS

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

PSO – CO Mapping

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	2	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
AVG	**3**	**2.8**	**3**	**3**	**3**

PSO-CO-Question Paper Mapping

CO No:	**COURSE OUTCOME**	**PSOs ADDRESSED**	**COGNITIVE LEVEL (K1 to K6)**
CO1	Describe the important computer system resources and the role of operating system in theirmanagement policies and algorithms.	PSO1, PSO2	K1
CO2	Understand the process management policies and scheduling of processes by CPU	PSO1, PSO4	K2
CO3	Use the knowledge of process synchronization and coordination	PSO1, PSO3	K3
CO4	Analyze the memory management and its allocation policies	PSO1, PSO2	K4
CO5	Evaluate the storage management policies with respect to different storagemanagement technologies	PSO1, PSO5	K5

PROGRAMME: B.Sc. IT	**BATCH: 2024 - 25**
PART: III	**COURSE COMPONENT: Allied-III**
COURSE NAME: Discrete Mathematics	**COURSE CODE:**
SEMESTER: III	**MARKS:100**
CREDITS: 5	**TOTAL HOURS: 90**
THEORY AND PROBLEMS	

COURSE OBJECTIVE:

To introduce the concepts of discrete mathematics and enhance math computing skills.

COURSE OUTCOMES:

1. To recollect the fundamental ideas of logic, combinatorics, graph introductions, set structures, and lattices.
2. To understand concepts related to logic, combinatorics, graphs, sets and lattices.
3. To apply the concepts of logic, graph introductions, combinatorics set structures and lattices into practice.
4. To analyze lattices, graph introductions, logic, combinatorics, and set structures.
5. To Evaluate the concepts of logic, combinatorics, graph introductions, set structures, and lattices.

UNIT I **(18 Hours)**

Logic and Proofs: Propositional Logic, Propositional equivalences, Predicates and quantifiers Chapter - 1(Page No.: 1 to 26 and 29 to 42 (Text Book 1)

UNIT II **(18 Hours)**

Combinatorics: Mathematical induction, Strong induction and well ordering, The basics of counting, The Pigeonhole Principle, Permutation and combinations. Chapter – 6 (Page No.: 314 to 342) (Text Book 1)

UNIT III **(18 Hours)**

Graph Theory: Graphs and graph models, Graph terminology and special types of graphs, presenting graphs and graph isomorphism, connectivity, Euler and Hamilton paths. Chapter - 7(Page No. :366 to 393) (Text Book 1)

UNIT IV **(18 Hours)**

Structured Sets: Algebraic structures, Groups, Semigroups, monoid, co-sets, Lagrange's Theorem, homomorphism. Chapter – 5 (Page No.: 232 to 266) (Volume 1)

UNIT V **(18 Hours)**

Lattices and Boolean Algebra: Partial ordering, Posets – Lattices and Posets, Properties of lattices, Lattices as algebraic systems, Sub lattices, Direct product and homomorphism, Boolean algebra. Chapter - 4: Section 4.1, 4.2, 4.5, 4.7, 4.10, 4.11, 4.12 (Text Book 2)

PRESCRIBED BOOKS:

1. T. Veerarajan, “Discrete Mathematics” Tata McGraw Hill Pub. Co. Ltd., New Delhi,
2. J.P.Singh, “Discrete Mathematics for undergraduates” Ane Book Pvt. Ltd.

REFERENCE BOOKS:

1. Grimaldi. R.P. "Discrete and Combinatorial Mathematics: An Applied Introduction", 5thEdition, Pearson Education Asia, Delhi, 2013.
2. Koshy. T. "Discrete Mathematics with Applications", Elsevier Publications, 2006.
3. Lipchitz. S. and Mark Lipson., "Discrete Mathematics", Schaum’s Outlines, Tata McGraw Hill Pub. Co. Ltd., New Delhi, 3rd Edition, 2010.

E-LEARNING RESOURCES:

1. https://mu.ac.in/wp-content/uploads/2021/05/Decision-Making-and-Mathematical-Modeling-Final-1-converted.pdf
2. https://www.geeksforgeeks.org/mathematics-combinatorics-basics/
3. https://nptel.ac.in/courses/111106050
4. https://www.geeksforgeeks.org/groups-discrete-mathematics/
5. https://calcworkshop.com/relations/lattices/

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 FOR THEORY

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	2	-	1	-	1	-
V	1	1	-	1	-	1
Any Unit	-	2	1	1	-	1
TOTAL	6	6	3	4	2	4
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	2
CO 2	2	2	3	2	3
CO 3	3	3	2	3	2
CO 4	3	3	3	3	3
CO 5	3	2	3	2	3
Ave.	2.8	2.6	2.8	2.6	2.6

PSO-CO-Question Paper Mapping

CO No:	COURSE OUTCOME	PSOs ADDRESSED	COGNITIVE LEVEL (K1 to K6)
CO1	To recollect the fundamental ideas of logic, combinatorics, graph introductions, set structures, and lattices.	1-5	K1
CO2	To understand concepts related to logic, combinatorics, graphs, sets and lattices.	1-5	K2
CO3	To apply the concepts of logic, graph introductions, combinatorics set structures and lattices into practice.	1-5	K3
CO4	To analyze lattices, graph introductions, logic, combinatorics, and set structures.	1-5	K4, K5
CO5	To Evaluate the concepts of logic, combinatorics, graph introductions, set structures, and lattices.	1-5	K5, K6

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

SEMESTER - IV

PROGRAMME: B.Sc. IT	**BATCH: 2024-27**
PART: III	**COURSE COMPONENT: CORE-IX**
COURSE NAME: BIG DATA ANALYTICS	**COURSE CODE:**
SEMESTER: IV	**MARKS:100**
CREDITS: 4	**TOTAL HOURS: 75**

COURSE OBJECTIVE:

To Understand the key issues in big data management and its associatedapplications in intelligent business and scientific computing.

COURSE OUTCOMES:

1. Describe the key issues in big data management and its associated applications in intelligent business and scientific computing
2. Understand the fundamental enabling techniques and scalable algorithms like Hadoop; Map Reduce and NO SQL in big data analytics
3. Interpret business models and scientific computing paradigms, and apply software tools for big data analytics
4. Analyze adequate perspectives of big data analytics in various applications like recommender systems, social media applications etc.
5. Explain modelling and design of data warehouses.

Unit-1 : (15 Hours)

Basicnomenclature-Analyticsprocessmodel–Analyticsmodelrequirements – Job Profiles inAnalytics – Types of Data Sources- Sampling – Sampling - Types of Data Elements

Unit-2: (15 Hours)

Missing Values–Outlier Detection and Treatments– Weight of Evidence Coding. Predictive Analytics basics – Linear Regression-Logistic Regression - Decision Trees

Unit-3 : (15 Hours)

Descriptive Analytics: Association Rules- Support and Confidence- Applications of Association Rule – Sequence Rules – Segmentation.

Unit-4 : (15 Hours)

Hierarchical clustering -Social Network Analytics: Social Network Definitions –Social Network Metrics - Social Network Learning -Relational Neighbor Classifier

Unit-5 : (15 Hours)

Data Quality - Software–Privacy - Model Design and Documentation- Corporate Governance Example applications: Credit Risk Modeling

PRESCRIBED BOOKS

1. Baesens,2014,Analyticsina Big Data World :The Essential Guide to Data Science and Its applications, Wiley India Private Limited.

REFERENCE BOOKS

1. Anand Rajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press, 2016.
2. Kim H. Pries and Robert Dunnigan, "Big Data Analytics: A Practical Guide for Managers " CRC Press, 2015.

E-LEARNING RESOURCES

i. https://www.simplilearn.com/what-is-big-data-analytics-article

GUIDELINES TO THE QUESTION PAPER SETTERS

QUESTION PAPER PATTERN

Section	Question Component	Numbers	Marks	Total
A	***Definition / Principles*** *Answer any 10 out of 12 questions*	*1 – 12*	*3*	***30***
B	***Short Answer*** *Answer any 5 out of 7 questions*	*13–19*	*6*	***30***
C	***Essay*** *Answer any 4 out of 6 questions*	*20– 25*	*10*	***40***
TOTAL MARKS				**100**

BREAK UP OF QUESTIONS

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

PSO – CO Mapping

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
AVG	**3**	**3**	**3**	**3**	**3**

PSO-CO-Question Paper Mapping

CO No:	**COURSE OUTCOME**	**PSOs ADDRESSED**	**COGNITIVE LEVEL (K1 to K6)**
CO1	Describe the key issues in big data management and its associated applications in intelligent business and scientific computing	PSO3, PSO1	K1
CO2	Understand the fundamental enabling techniques and scalable algorithms like Hadoop; MapReduce and NO SQL in big data analytics	PSO1, PSO4	K2
CO3	Interpret business models and scientific computing paradigms, and apply software tools for big data analytics	PSO1, PSO3	K3
CO4	Analyze adequate perspectives of big data analytics in various applications like recommender systems, social media applications etc.	PSO2, PSO1	K4
CO5	Explain modelling and design of data warehouses.	PSO1, PSO5	K5

PROGRAMME: B.Sc. IT	**BATCH: 2024-27**
PART: III	**COURSE COMPONENT: CORE-X**
COURSE NAME: PROGRAMMING IN PYTHON	**COURSE CODE:**
SEMESTER: IV	**MARKS:100**
CREDITS: 4	**TOTAL HOURS: 75**

COURSE OBJECTIVE:

To explore the mechanism of python programming using modules and package.

COURSE OUTCOMES:

1. Describe the basic concepts of Python Syntax and Semantics
2. Understand the control structures in Python programs
3. Apply the functional concepts and strings in Python.
4. Analyze the data structure concepts in Python
5. Explain the concepts of OOPS in Python.

UNIT I (15 HOURS)

Introduction: Introduction to Python, Expressions, Statements: Variables, Keywords, Operators & Operands, Order of Operations, String Operations, Comments, Keyboard Input. Functions: Type Conversion function, Math functions, Composition of Functions, defining own function, Parameters, Arguments, Importing Functions.

UNIT II (15 HOURS)

Conditions & Iterations: Conditions, Modulus Operators, If Statement. Iteration while, for, break, continue, Nested loop. Recursion: Python recursion, Recursion error. Strings: Accessing values in String, Updating String, Slicing String.

UNIT III (15 HOURS)

String Methods – upper(), find(), lower(), capitalize(), count(), join(), len(), isalnum(), isalpha(), isdigit(), islower(), isnumeric(), isspace(), isupper() max(), min(), replace(), split(). Structures & Functions: List: Introduction, Traversal, Operations, Slice, Methods, Delete element, Difference between Lists and Strings. Dictionaries: Introduction, Brief idea of Dictionaries & Lists

UNIT IV (15 HOURS)

Tuples: Introduction, Brief idea of Lists & Tuples, Brief idea of Dictionaries & Tuples**.** Date & Time, Modules, Defining Functions, Exit function, Default arguments. Classes & Objects: Creating class, Instance objects, Accessing attributes, Built in class attributes, destroying objects, Inheritance, Method overriding, Overloading methods, Overloading operators, Data hiding

UNIT V (15 HOURS)

Anonymous Functions: lambda - Functional Programming Tools - Timing Iteration Alternatives - Modules and Packages - Python Program Architecture - Module Coding Basics : Module Creation, Usage , Namespaces -Reloading Modules – Module design Concepts .Exceptions in Python, Detecting and Handling Exceptions, Exceptions as Strings, Raising Exceptions, Assertions, Standard Exceptions.

PRESCRIBED BOOKS

1. Allen Downey, Jeffrey Elkner, Chris Meyers, ―How to Think Like a ComputerScientist - Learning with Python, Green Tea Press,2015, 2nd edition.
2. Python programming made easy, 2020, Dr. J. Vanathi, G. SriPradha, T. Ravishankar, Pranesh Publication, No. 16, Chinnappa st, Triplicane, Chennai.

RFERENCE BOOKS

1. Prentice Hall of India, 2014.
2. MarkLutz,―LearningPython:PowerfulObject-OrientedProgramming,FifthEdition, O'Reilly, Shroff Publishers and Distributors, 2014.

E-LEARNING RESOURCES

i. https://www.w3schools.com/python/

GUIDELINES TO THE QUESTION PAPER SETTERS

QUESTION PAPER PATTERN

Section	Question Component	Numbers	Marks	Total
A	***Definition / Principles*** *Answer any 10 out of 12 questions*	*1 – 12*	*3*	***30***
B	***Short Answer*** *Answer any 5 out of 7 questions*	*13–19*	*6*	***30***
C	***Essay*** *Answer any 4 out of 6 questions*	*20– 25*	*10*	***40***
TOTAL MARKS				**100**

BREAK UP OF QUESTIONS

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

PSO – CO Mapping

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
AVG	**3**	**3**	**3**	**3**	**3**

PSO-CO-Question Paper Mapping

CO No:	**COURSE OUTCOME**	**PSOs ADDRESSED**	**COGNITIVE LEVEL (K1 to K6)**
CO1	Describe the basic concepts of Python Syntax and Semantics	PSO1, PSO2	K1
CO2	Understand the control structures in Python programs	PSO1, PSO3	K2
CO3	Apply the functional concepts and strings in Python.	PSO1, PSO4	K3
CO4	Analyze the data structure concepts in Python	PSO1, PSO3	K4
CO5	Explain the concepts of OOPS in Python.	PSO1, PSO5	K5

PROGRAMME: B.Sc. IT	**BATCH: 2024-27**
PART: III	**COURSE COMPONENT: CORE- XI**
COURSE NAME: PRACTICAL – IV: PYTHON PROGRAMMING	**COURSE CODE:**
SEMESTER: IV	**MARKS:100**
CREDITS: 4	**TOTAL HOURS: 75**

COURSE OBJECTIVE:

To learn how to design and program complex and numeric Python applications.

COURSE OUTCOME

1. Compute the basic programs in python
2. Practice programs in python using control structures and functions.
3. Implement Object oriented programming in Python
4. Apply the concepts of List, Tuples and Dictionaries in Python
5. Develop programs using different File handling operations

Programming Questions:

1. Compute the GCD of two numbers.

2. Find the square root of a number (Newton's method).

3. Exponentiation (power of a number).

4. Find the maximum of a list of numbers.

5. Linear search and Binary search.

6. Selection sort, Insertion sort.

7. Merge sort.

8. First n prime numbers.

9. Multiply matrices.

10. Programs that take command line arguments (word count).

11. Find the most frequent words in a text read from a file.

12. Develop programs using Python packages.

PSO – CO Mapping

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
AVG	**3**	**3**	**3**	**3**	**3**

PSO-CO-Question Paper Mapping

CO No:	**COURSE OUTCOME**	**PSOs ADDRESSED**	**COGNITIVE LEVEL (K1 to K6)**
CO1	Compute the basic programs in python	PSO1, PSO2	K3
CO2	Practice programs in python using control structures and functions.	PSO1, PSO2	K3
CO3	Implement Object oriented programming in Python	PSO1, PSO5	K3
CO4	Apply the concepts of List, Tuples and Dictionaries in Python	PSO1, PSO3	K3
CO5	Develop programs using different File handling operations	PSO1, PSO4	K5

PROGRAMME: B.Sc. IT	**BATCH: 2024-27**
PART: III	**COURSE COMPONENT: CORE-XII**
COURSE NAME: CRYPTOGRAPHY	**COURSE CODE:**
SEMESTER: IV	**MARKS:100**
CREDITS: 4	**TOTAL HOURS: 75**

COURSE OBJECTIVE

To understand suitable project organization structure, leadership, decision and motivation styles, proper safety and ethical practices and be responsible to the society.

COURSE OUTCOMES:

1. Describe fundamental networking concepts and protocols for building a foundation in network security.
2. Understand Internet Protocol fundamentals, transport layer protocols, and their security implications.
3. Apply the importance of cryptography in securing network communications.
4. Analyze encryption techniques and key management for data security.
5. Explain expertise in network security measures such as authentication, digital signatures, email and web security, intrusion detection, and firewalls.

Unit 1: INTRODUCTION (15 Hours)

Types of Physical Medium-Topologies-Wireless Networking: Wireless Protocols. Data Link Layer: Layered Data Link Protocols-SLIP and PPP-MAC and ARP. Network Layer: Routing Risks-Addressing - Fragmentation-Security.

Unit 2: INTERNET PROTOCOL (15 Hours)

IP Addressing – ICMP - Security options. Transport Layer: Common Protocols- Transport Layer Functions-Gateways. TCP: Connection Oriented Protocols-TCP Connections-UDP. SessionLayer: Session State Machine-Session and Stacks. SSL: SSL Functionality-Certificates. SSH: SSH and Security-SSH Protocols. STMP: Email Goals-Common servers. HTTP: HTTP Goals- URL.

Unit 3: CRYPTOGRAPHY (15 Hours)

Importance - Threat Models - Concepts-Common Mitigation Methods. Network theory: Standards Bodies-Network Stacks-Multiple Stacks-Layers and Protocols-Common Tools. Cryptography: Securing Information-Necessary Elements-Authentication and Keys- cryptography and Randomness-Hashes-Ciphers-Encryption-Steganography.

Unit 4: TECHNIQUES (15 Hours)

Data Encryption Techniques-Data Encryption Standards-Symmetric ciphers. Public key Cryptosystems-Key Management.

Unit 5: SECURITY (15 Hours)

Authentication - Digital Signatures - E-Mail Security - Web Security – Intrusion - Firewall.

PRESCRIBED BOOKS:

1. V.K.Pachghare, Cryptography and Information Security, 3rd edition, PHI Learning Private Limited 2019.
2. William Stallings, Cryptography and Network Security, 7th edition, Prentice –Hall of India, 2017.

REFERENCE BOOK:

1. Neal Krawetz, Introduction Network Security, India Edition, Thomson Delmar Learning. 2007

E-LEARNING RESOURCES:

- https://www.geeksforgeeks.org/cryptography-and-network-security-principles/
- https://www.fortinet.com/resources/cyberglossary/what-is-cryptography

GUIDELINES TO THE QUESTION PAPER SETTERS

QUESTION PAPER PATTERN

Section	Question Component	Numbers	Marks	Total
A	***Definition / Principles*** *Answer any 10 out of 12 questions*	*1 – 12*	*3*	***30***
B	***Short Answer*** *Answer any 5 out of 7 questions*	*13–19*	*6*	***30***
C	***Essay*** *Answer any 4 out of 6 questions*	*20– 25*	*10*	***40***
TOTAL MARKS				**100**

BREAK UP OF QUESTIONS

UNITS	SECTION A	SECTION B	SECTION C
I	3	2	2
II	3	1	1
III	2	1	1
IV	2	2	1
V	2	1	1
TOTAL			
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	3	3
CO 4	3	3	3	3	3
CO 5	3	3	3	3	3
AVG	**3**	**3**	**3**	**3**	**3**

PSO-CO-question paper mapping

CO No:	**COURSE OUTCOME**	**PSOs ADDRESSED**	**COGNITIVE LEVEL (K1 to K6)**
CO1	Describe fundamental networking concepts and protocols for building a foundation in network security.	PSO 3, PSO 5	K1
CO2	Understand Internet Protocol fundamentals, transport layer protocols, and their security implications.	PSO 3, PSO 5	K2
CO3	Apply the importance of cryptography in securing network communications.	PSO 3, PSO 5	K3
CO4	Analyze encryption techniques and key management for data security.	PSO 2, PSO 3, PSO 5	K4
CO5	Explain expertise in network security measures such as authentication, digital signatures, email and web security, intrusion detection, and firewalls.	PSO 2, PSO 3, PSO 5	K5

PROGRAMME: B.Sc. (CS), BCA, B.Sc. (IT), B.Sc. (DA)	**BATCH: 2024 - 25**
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:

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

REFERENCE BOOKS:

1. Operations Research - Kandiswarup, P.K.Gupta,ManMohan, S.Chand & Sons Education Publications,NewDelhi,12thRevised 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

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

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

SEMESTER - V

PROGRAMME: B.Sc. IT	**BATCH: 2024-27**
PART: III	**COURSE COMPONENT: CORE-XIII**
COURSE NAME: WEB TECHNOLOGY	**COURSE CODE:**
SEMESTER: V	**MARKS:100**
CREDITS: 4	**TOTAL HOURS: 90**

COURSE OBJECTIVE

To develop a dynamic web page using client side and server-side scripting languages and understand concept of Web Security.

COURSE OUTCOMES:

1. Describe VB Script language programming constructs
2. Understand the basic concepts of JavaScript language
3. Apply JavaScript to add dynamic content to pages that meet specific needs and interests.
4. Develop web pages using ASP
5. Develop a dynamic web page using client side and server-side scripting languages

UNIT I **(18 Hours)**

Introduction to VBScript - Adding VBScript Code to an HTML Page - VB Script Basics - VBScript Data Types - VBScript Variables - VBScript Constants -VBScript Operators: Mathematical - Comparison - Logical - Using Conditional Statements - Looping Through Code - VBScript Procedures – Type Casting Variables - Math Functions – Date Functions – String Functions – Other Functions -VBScript Coding Conventions - Dictionary Object in VBScript - Err Object.

UNIT II **(18 Hours)**

Introduction to Java Script – Advantages of Java Script – Java Script syntax - Data Type – Variable - Array – Operator & Expression – Looping – Control Structures - Constructor Function – User Defined Function Dialog Box.

UNIT III **(18 Hours)**

Java Script Document Object Model – Introduction – Object in HTML – Event Handling – WindowObject – Document Object – Browser Object – Form Object – Navigator Object – Screen Object – Build in Object – User Defined Object – Cookies.

UNIT IV **(18 Hours)**

ASP.NET Language Structure – Page Structure – Page Event, Properties & Compiler Directives - HTML Server Controls – Anchor, Tables, Forms, Files. Basic Web server Controls – Label, Text Box,Button, Image Links, Check & Radio Button, Hyperlink, Data List Web Server Controls – Check BoxList. Radio Button List, Drop Down List, List Box, Data Grid, Repeater.

UNIT V **(18 Hours)**

Request and Response Objects, Cookies, Working with Data – OLEDB Connection Class, Command Class, Transaction Class, Data Adaptor Class, Data Set Class. Advanced Issues – E-mail, Application Issues, Working with IIS and Page Directives, Error Handling.Security – Authentication, IP Address, Secure by SSL & Client Certificates

PRESCRIBED BOOKS

1. T.A. Powell,2017 , Complete Reference HTML, TMH,5th edition.
2. Powell, Thomas; Schneider, Fritz, JavaScript: The Complete Reference,3rd edition 2012, TMH

REFRENCE BOOK

1. Mike McGrath, XML Harness the Power of XML in easy steps, Dreamtech Publications,2007.

E-LEARNING RESOURCES

- https://www.geeksforgeeks.org/web-technology/

GUIDELINES TO THE QUESTION PAPER SETTERS

QUESTION PAPER PATTERN

Section	Question Component	Numbers	Marks	Total
A	***Definition / Principles*** *Answer any 10 out of 12 questions*	*1 – 12*	*3*	***30***
B	***Short Answer*** *Answer any 5 out of 7 questions*	*13–19*	*6*	***30***
C	***Essay*** *Answer any 4 out of 6 questions*	*20– 25*	*10*	***40***
TOTAL MARKS				**100**

BREAK UP OF QUESTIONS

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

PSO – CO Mapping

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
AVG	**3**	**3**	**3**	**3**	**3**

PSO-CO-Question Paper Mapping

CO No:	COURSE OUTCOME	PSOs ADDRESSED	COGNITIVE LEVEL (K1 to K6)
CO1	Describe VB Script language programming constructs	PSO1, PSO3	K1
CO2	Understand the basic concepts of JavaScript language	PSO1, PSO4	K2
CO3	Apply JavaScript to add dynamic content to pages that meet specific needs and interests.	PSO1, PSO3	K3
CO4	Develop web pages using ASP	PSO1, PSO2	K5
CO5	Develop a dynamic web page using client side and server-side scripting languages	PSO1, PSO5	K5

PROGRAMME: B.Sc. IT	**BATCH: 2024-27**
PART: III	**COURSE COMPONENT: CORE-XIV**
COURSE NAME: PRACTICAL-V: WEB TECHNOLOGY	**COURSE CODE:**
SEMESTER: V	**MARKS:100**
CREDITS: 4	**TOTAL HOURS: 90**

COURSE OBJECTIVE:

To understand Internet Technology to develop dynamic webpages using web technology.

COURSE OUTCOMES:

1. Implement basic programs using VB Script
2. Implement basic programs using Java Script
3. Develop programs to implement databases
4. Develop web pages using ASP
5. Develop a dynamic web page using client side and server-side scripting languages

VB SCRIPT & JAVASCRIPT

1. Write a program outputs the squares, roots, cubes and complements of integersbetween 1 and 100.
2. Create a calculator.
3. Write a script to Sort numbers and strings.
4. Create a program to generate a hit counter.
5. Create a program to verify whether email address provided by user is valid or invalid.
6. Write a program to scroll the text on status bar.
7. The form consists of two multiple choice list and one single choice list
   - **a.** The first multiple choice list displays the major dishes available.
   - **b.** The second multiple choice list displays the stocks available.
   - **c.** The single choice list display the miscellaneous(Milkshakes, soft drinks, softy available etc.)
8. Write a script to create a digital clock.
9. Create a web page using two image file which switch black and white one another asThe mouse pointer moves over the image. Use the On Mouseover and On Mouse event, on Dblclick handler.
10. Build a WWW page with an image and 3 buttons, Pick three favorite graphics, Label thebuttons and make each one swap in the graphic you have chosen.

11. Create a frameset that has two frames, side by side. Make the left-hand frame contain a formwith 3 radio buttons. The buttons should be for three search engines:
    - Yahoo (http://www.yahoo.com)
    - Altavista (http://www.altavista.com)
    - Infoseek (http://www.infoseek.com)

    When the user clicks on of the option buttons, the frame on the right hand side should be loaded with the right search engine.
12. Write a program to implement Employee database with all validation

ASP

1. Create a login form, to expire, if the user does not type the password within 100 seconds.
2. Create an employee database and manipulate the records using command object in ASP.
3. Develop an application to illustrate the usage of Request and Response Objects in ASP.
4. Write an ASP program using Request Object to give the exact list of headers sent by thebrowser to the Web server.
5. Create an Active Server Page to display the records one by one from a student database.The student database should contain roll no, name, marks & total.
6. Design an ASP application that describes books in the Online Bookshop. (Use AD RotatorComponent, Content Rotator Component, Content Linking Component)
7. Create a document and add a link to it. When the user moves the mouse over the link itshould load the linked document on its own (User is not required to click on the link).
8. Create a document, which opens a new window without a toolbar, address bar, or a statusbar that unloads itself after one minute.
9. Create a document that accepts the user's name in a text field form and displays the same thenext time when the user visits the site informing him that he has accessed the site for the second time, and so on.

PSO – CO Mapping

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	2
CO5	3	3	3	3	3
AVG	**3**	**3**	**3**	**3**	**2.8**

PSO-CO-Question Paper Mapping

CO No:	**COURSE OUTCOME**	**PSOs ADDRESSED**	**COGNITIVE LEVEL (K1 to K6)**
CO1	Implement basic programs using VB Script	PSO1, PSO2	K3
CO2	Implement basic programs using Java Script	PSO1, PSO3	K3
CO3	Develop programs to implement databases	PSO1, PSO4	K5
CO4	Develop web pages using ASP	PSO1, PSO2	K5
CO5	Develop a dynamic web page using client side and server-side scripting languages	PSO1, PSO5	K5

PROGRAMME: B.Sc. IT	**BATCH: 2024-27**
PART: III	**COURSE COMPONENT: CORE-XV**
COURSE NAME: SOFTWARE ENGINEERING AND TESTING	**COURSE CODE:**
SEMESTER: V	**MARKS:100**
CREDITS: 4	**TOTAL HOURS: 90**

COURSE OBJECTIVE

To understand and analyze software engineering principles and methodologies

COURSE OUTCOMES:

1. Define appropriate software process models, including agile methodologies.
2. Understand how elicit, document, and validate comprehensive software requirements.
3. Apply knowledge to design efficient software solutions using architectural principles, UML, and design metrics.
4. Analyze how to develop effective software testing strategies and apply advanced testing techniques.
5. Explain how to manage software projects with scheduling, tracking, risk assessment, and quality assurance

UNIT-I **(18 Hours)**

The Software Product and Software Process : Software Product and Process Characteristics, Software Process Models: Linear Sequential Model, Prototyping Model, RAD Model, Evolutionary Process Models like Incremental Model, Spiral Model, Component Assembly Model, RUP and Agile processes.

UNIT-II **(18 Hours)**

Requirement Elicitation, Analysis, and Specification : Functional and Non-functional requirements, Requirement Sources and Elicitation Techniques, Analysis Modeling for Function-oriented and Object-oriented software development, Requirement Validation.

UNIT-III **(18 Hours)**

Software Design: The Software Design Process, Design Concepts and Principles, Software Modeling and UML, Architectural Design, Architectural Views and Styles, User Interface Design, Function-oriented Design, Component Based Design, Design Metrics.

UNIT-IV **(18 Hours)**

Software Testing : Purpose- – Testing Vs Debugging - Bugs – Types of Bugs -Levels of Testing – Testing Approaches – Types of Testing – Test Cases - Test Plan- Flow/Graphs and Path Testing – Achievable paths – Path instrumentation – Transaction Flow Testing Techniques – Data Flow Testing Strategies -Linguistic –Metrics – Structural Metrics.

UNIT-V **(18 Hours)**

Software Maintenance and Software Project Management : Need of Maintenance – Software configuration Management – Software Change Management - Project Scheduling and Tracking, Risk Assessment and Mitigation, Software Quality Assurance (SQA), Project Plan, Project Metrics.

PRESCRIBED BOOKS:

1. Roger. S. Pressman, 2023, Software Engineering A Practitioners approach, 9th Edition, Tata McGraw-Hill, New Delhi.
2. Rajib Mal, 2018, -Fundamental of Software engineering , 5th Edition , PHI, New Delhi,2018.

REFERENCE BOOKS :

1. I. Sommerville, 2015, Software Engineering, 10th Edition, Addison Wesley, Boston.
2. N. E. Fenton, S. L. Pfleenger, 2020, 3rd edition, Software Metrics, Thomson Asia, Singapore.

E-LEARNING RESOURCES:

1. https://www.geeksforgeeks.org/software-testing-basics/
2. https://www.javatpoint.com/software-testing-tutorial

GUIDELINES TO THE QUESTION PAPER SETTERS

QUESTION PAPER PATTERN

Section	Question Component	Numbers	Marks	Total
A	***Definition / Principles*** *Answer any 10 out of 12 questions*	*1 – 12*	*3*	***30***
B	***Short Answer*** *Answer any 5 out of 7 questions*	*13–19*	*6*	***30***
C	***Essay*** *Answer any 4 out of 6 questions*	*20– 25*	*10*	***40***
TOTAL MARKS				**100**

BREAK UP OF QUESTIONS

UNITS	SECTION A	SECTION B	SECTION C
I	3	2	2
II	3	1	1
III	2	1	1
IV	2	2	1
V	2	1	1
TOTAL			
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	2	3	3	3
CO 3	3	3	3	3	3
CO 4	3	3	3	3	3
CO 5	3	3	3	3	3
AVG	**3**	**2.8**	**3**	**3**	**3**

PSO-CO-question paper mapping

CO No:	**COURSE OUTCOME**	**PSOs ADDRESSED**	**COGNITIVE LEVEL (K1 to K6)**
CO1	Define appropriate software process models, including agile methodologies.	PSO 1, PSO 4, PSO 5	K1
CO2	Understand how elicit, document, and validate comprehensive software requirements.	PSO 1, PSO 4, PSO 5	K2
CO3	Apply knowledge to design efficient software solutions using architectural principles, UML, and design metrics.	PSO 1, PSO 4, PSO 5	K3
CO4	Analyze how to develop effective software testing strategies and apply advanced testing techniques.	PSO 1, PSO 4, PSO 5	K4
CO5	Explain how to manage software projects with scheduling, tracking, risk assessment, and quality assurance.	PSO 1, PSO 4, PSO 5	K5

PROGRAMME: B.Sc. IT	**BATCH: 2024-27**
PART: III	**COURSE COMPONENT: Elective-I**
COURSE NAME: ENTERPRISE RESOURCE PLANNING	**COURSE CODE:**
SEMESTER: V	**MARKS:100**
CREDITS: 5	**TOTAL HOURS: 90**

COURSE OBJECTIVE

To provide a wide range of applications for diverse company processes, including accounting, human resources, manufacturing and marketing.

COURSE OUTCOMES:

1. Describe the real time information about business field strategies and business process of an Enterprise.
2. Understand the functionality of different ERP modules.
3. Apply the knowledge of architecture and interpret the key implementation issues.
4. Categorize some popular products available in Market.
5. Create insights to ERP industrial needs.

UNIT I ERP AND TECHNOLOGY (18 Hours)

ERP: An Overview, Enterprise – An Overview - Benefits of ERP - ERP and Related Technologies-Business Process Reengineering (BPR)-Data Warehousing-Data Mining- OLAP-SCM-CRM-MIS - Management Information System-DSS - Decision Support System- EIS - Executive Information System.

UNIT II ERP MODULES (18 Hours)

Overview of ERP software solutions- Small, medium and large enterprise vendor solutions, BPR and best business practices - Business Process Management, Functional modules – Finance, Quality Management, Materials Management, Marketing Total Quality Management

UNIT III E-BUSINESS ARCHITECTURE (18 Hours)

ERP Architecture, Types of ERP architecture, Systems development lifecycle - ERP implementation Lifecycle - Future of ERP applications.

UNIT V ERP MARKET (18 Hours)

Marketplace – Dynamics – SAP AG – Oracle – PeopleSoft – JD Edwards –QAD Inc –SSA Global – Lawson Software- ERP II, ERP and Internet, Future Directions and Trends in ERP.

UNIT V ERP FOR INDUSTRIES (18 Hours)

ERP for Pharma Industry-Healthcare – Educational institutions – Telecom –Bank insurance and utility companies.

PRESCRIBED BOOKS:

1. ERP: Concepts and Practices" by Rajeev Sharma: The latest edition available as of my last update was the 1st edition, published in 2013.
2. Enterprise Resource Planning: Text and Cases" by V. Rajaraman and P. Rajan: The latest edition available as of my last update was the 1st edition, published in 2013.

REFERENCE BOOKS:

1. Alexis Leon, "ERP DEMYSTIFIED", Tata McGraw Hill, 3rd Edition, 2014.
2. Biao Fu, "SAP BW: A Step-by-Step Guide", First Edition, Pearson Education, 2009

E-LEARNING RESOURCES:

1. https://www.investopedia.com/terms/e/erp.asp
2. https://www.oracle.com/erp/what-is-erp/

GUIDELINES TO THE QUESTION PAPER SETTERS

Section	Question Component	Numbers	Marks	Total
A	***Definition / Principles*** *Answer any 10 out of 12 questions*	*1 – 12*	*3*	***30***
B	***Short Answer*** *Answer any 5 out of 7 questions*	*13–19*	*6*	***30***
C	***Essay*** *Answer any 4 out of 6 questions*	*20– 25*	*10*	***40***
TOTAL MARKS				**100**

BREAK UP OF QUESTIONS

UNITS	SECTION A	SECTION B	SECTION C
I	3	2	2
II	3	1	1
III	2	1	1
IV	2	2	1
V	2	1	1
TOTAL			
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	3
CO 4	3	3	3	3	3
CO 5	3	3	3	3	3
AVG	**3**	**3**	**3**	**2.8**	**3**

PSO-CO-question paper mapping

CO No:	**COURSE OUTCOME**	**PSOs ADDRESSED**	**COGNITIVE LEVEL (K1 to K6)**
CO1	Describe the real time information about business field strategies and business process of an Enterprise.	PSO 4, PSO 5	K1
CO2	Understand the functionality of different ERP modules.	PSO 4, PSO 5	K2
CO3	Apply the knowledge of architecture and interpret the key implementation issues.	PSO 4, PSO 5	K3
CO4	Categorize some popular products available in Market.	PSO 4, PSO 5	K4
CO5	Create insights to ERP industrial needs.	PSO 4, PSO 5	K5

PROGRAMME: B.Sc. IT	**BATCH: 2024-27**
PART: III	**COURSE COMPONENT: Elective-I**
COURSE NAME: ARTIFICIAL INTELLIGENCE	**COURSE CODE:**
SEMESTER: V	**MARKS:100**
CREDITS: 5	**TOTAL HOURS: 90**

COURSE OBJECTIVE

To explore the fundamentals and applications of Artificial Intelligence.

COURSE OUTCOMES:

1. Describe the various characteristics of Intelligent agents
2. Understand the different search strategies in AI
3. Apply the knowledge in solving AI problems
4. Analyze the different ways of designing software agent
5. Explain the various applications of AI.

UNIT I **(18 Hours)**

Introduction–Definition - Future of Artificial Intelligence – Characteristics of Intelligent Agents– Typical Intelligent Agents – Problem Solving Approach to Typical AI problems.

UNIT II **(18 Hours)**

Problem solving Methods – Control Strategies - Search Strategies- Uninformed - Informed - Heuristics – Hill Climbing – Depth first and Breadth First Local Search Algorithms and Optimization Problems - Searching with Partial Observations – Constraint's Satisfaction Problem – Constraint Propagation - Backtracking Search – Game playing - Optimal Decisions in Games – Alpha - Beta Pruning - Stochastic Games

UNIT III **(18 Hours)**

Knowledge representation - Knowledge representation using Predicate Logic – Prolog Programming – Unification – Forward Chaining - Backward Chaining – Resolution - Ontological Engineering - Categories and Objects – Events - Mental Events and Mental Objects - Reasoning Systems for Categories - Reasoning with Default Information

UNIT IV **(18 Hours)**

Architecture for Intelligent Agents – Agent communication – Negotiation and Bargaining – Argumentation among Agents – Trust and Reputation in Multi-agent systems.

UNIT V **(18 Hours)**

AI applications – Language Models – Information Retrieval- Information Extraction – Natural Language Processing - Machine Translation – Speech Recognition – Robot – Hardware – Perception – Planning – Moving.

PRESCRIBED BOOKS:

1. S. Russell and P. Norvig, "Artificial Intelligence: A Modern Approach‖, Prentice Hall, 2020 4th edition
2. Gerhard Weiss, ―Multi Agent Systems‖, Second Edition, MIT Press, 2016

REFERENCE BOOKS:

1. Kevin Night and Elaine Rich, Nair B., 2017, 3rd edition "Artificial Intelligence (SIE)", McGraw Hill.
2. William F. Clocksin and Christopher S. Mellish,‖ Programming in Prolog: Using the ISO Standard‖, Fifth Edition, Springer, 2012

E-LEARNING RESOURCES:

1. https://www.britannica.com/technology/artificial-intelligence
2. https://www.geeksforgeeks.org/what-is-artificial-intelligence/

GUIDELINES TO THE QUESTION PAPER SETTERS

QUESTION PAPER PATTERN

Section	Question Component	Numbers	Marks	Total
A	***Definition / Principles*** *Answer any 10 out of 12 questions*	*1 – 12*	*3*	***30***
B	***Short Answer*** *Answer any 5 out of 7questions*	*13–19*	*6*	***30***
C	***Essay*** *Answer any 4 out of 6 questions*	*20– 25*	*10*	***40***
TOTAL MARKS				**100**

BREAK UP OF QUESTIONS

UNITS	SECTION A	SECTION B	SECTION C
I	3	2	2
II	3	1	1
III	2	1	1
IV	2	2	1
V	2	1	1
TOTAL			
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	3	3
CO 4	3	3	3	3	3
CO 5	3	3	3	3	3
AVG	**3**	**3**	**3**	**3**	**3**

PSO-CO-question paper mapping

CO No:	**COURSE OUTCOME**	**PSOs ADDRESSED**	**COGNITIVE LEVEL (K1 to K6)**
CO1	Describe the various characteristics of Intelligent agents	PSO 1, PSO 5	K1
CO2	Understand the different search strategies in AI	PSO 1, PSO 5	K2
CO3	Apply the knowledge in solving AI problems	PSO 1, PSO 5	K3
CO4	Analyze the different ways of designing software agent	PSO 1, PSO 5	K4
CO5	Explain the various applications of AI.	PSO 1, PSO 5	K5

PROGRAMME: B.Sc. IT	**BATCH: 2024-27**
PART: III	**COURSE COMPONENT: Elective-I**
COURSE NAME: MACHINE LEARNING	**COURSE CODE:**
SEMESTER: V	**MARKS:100**
CREDITS: 5	**TOTAL HOURS: 90**

COURSE OBJECTIVE

To provide a comprehensive course on machine learning fundamentals, models, techniques, and practical applications.

COURSE OUTCOMES:

1. Describe the foundational knowledge in machine learning concepts and practices.
2. Understand supervised learning, classification, and ranking.
3. Apply various learning models, including trees, rules, linear models, and probabilistic models.
4. Analyze advanced techniques in feature engineering and model ensembles.
5. Explain the process of model evaluation and experimentation in real-world applications.

Unit 1: (18 Hours)

The Fundamentals of Machine Learning: The Machine Learning Landscape - Types of Machine Learning Systems - Main Challenges of Machine Learning - Testing and Validating. End-to-End Machine Learning Project - Look at the Big Picture - Get the Data - Discover and Visualize the Data to Gain Insights - Prepare the Data for Machine Learning Algorithms - Select and Train a Model - Fine-Tune Your Model - Launch, Monitor, and Maintain Your System.

Unit 2: (18 Hours)

Ingredients of machine learning: Tasks – Models – Features. Supervised Learning: Classification – Binary classification and related tasks – Scoring and ranking – class probability estimation – Multi-class classification. Unsupervised Learning: Regression – Unsupervised and descriptive learning. Concept Learning: The hypothesis space – paths through the hypothesis space – beyond conjunctive concepts – learnability.

Unit 3: (18 Hours)

Tree Models: Decision trees – Ranking and probability estimation trees – tree learning as variance reduction. Rule Models: Learning ordered rule lists – learning unordered rule sets – descriptive rule learning – first–order rule learning. Linear Models: The least-squares method – The perceptron – Support vector machines.

Unit 4: (18 Hours)

Distance-based Models: Neighbours and exemplars – Nearest-neighbour classification – Distance-based clustering –K-Means algorithm – Hierarchical clustering. Probabilistic Models: The normal distribution and its geometric interpretations – probabilistic models for categorical data – Naïve Bayes model for classification – probabilistic models with hidden values – Expectation-Maximization.

Unit 5: **(18 Hours)**

Features: Kinds of features – Feature transformations – Feature construction and selection. Model ensembles: Bagging and random forests – Boosting – Mapping the ensemble landscape. Machine Learning experiments: Whatto measure – How to measure it – How to interpret it.

PRESCRIBED BOOKS:

1. Flach, P, "Machine Learning: The Art and Science of Algorithms that Make Sense of Data",
   i. Cambridge University Press, 2012
2. Aurélien Géron, "Hands-On Machine Learning with Scikit-Learn and Tensor Flow: Concepts, Tools, andTechniques to Build Intelligent Systems", First Edition, 2017 (Chapters 1 and 2)

REFERENCE BOOKS:

1. John D. Kelleher, Brian Mac Namee, Aoife D'Arcy, "Fundamentals of Machine Learning for Predictive Data Analytics: Algorithms, Worked Examples, and Case Studies", The MIT Press, First Edition, 2012
2. Kevin P. Murphy, "Machine Learning: A Probabilistic Perspective", MIT Press, 2012
3. Stephen Marsland, "Machine Learning - An Algorithmic Perspective", Chapman and Hall/CRC Press, SecondEdition, 2014.

E-LEARNING RESOURCES:

1. https://www.geeksforgeeks.org/machine-learning/
2. https://www.ibm.com/topics/machine-learning

GUIDELINES TO THE QUESTION PAPER SETTERS

QUESTION PAPER PATTERN

Section	Question Component	Numbers	Marks	Total
A	***Definition / Principles*** *Answer any 10 out of 12 questions*	*1 – 12*	*3*	***30***
B	***Short Answer*** *Answer any 5 out of 7 questions*	*13–19*	*6*	***30***
C	***Essay*** *Answer any 4 out of 6 questions*	*20– 25*	*10*	***40***
TOTAL MARKS				**100**

BREAK UP OF QUESTIONS

UNITS	SECTION A	SECTION B	SECTION C
I	3	2	2
II	3	1	1
III	2	1	1
IV	2	2	1
V	2	1	1
TOTAL			
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	3	3	3
CO 3	3	3	3	3	3
CO 4	3	3	3	3	3
CO 5	3	3	3	3	3
AVG	**3**	**3**	**3**	**2.8**	**3**

PSO-CO-question paper mapping

CO No:	COURSE OUTCOME	PSOs ADDRESSED	COGNITIVE LEVEL (K1 to K6)
CO1	Describe the foundational knowledge in machine learning concepts and practices.	PSO 1, PSO 5	K1
CO2	Understand supervised learning, classification, and ranking.	PSO 1, PSO 5	K2
CO3	Apply various learning models, including trees, rules, linear models, and probabilistic models.	PSO 1, PSO 5	K3
CO4	Analyze advanced techniques in feature engineering and model ensembles.	PSO 1, PSO 5	K4
CO5	Explain the process of model evaluation and experimentation in real-world applications.	PSO 1, PSO 5	K5

PROGRAMME: For other Programmes except BSc. IT	**BATCH: 2024-27**
PART: III	**COURSE COMPONENT: IDE**
COURSE NAME: DATA VISUALIZATION USING EXCEL	**COURSE CODE:**
SEMESTER: V	**MARKS:100**
CREDITS: 5	**TOTAL HOURS: 75**

COURSE OBJECTIVE

To learn basics of Microsoft Excel and understand data visualization techniques

.

COURSE OUTCOMES:

1. Describe the basic mechanics and navigation of an Excel spreadsheet.
2. Understand the formatting techniques and presentation styles.
3. Apply the use and utility of functions and formulas on excel spreadsheet.
4. Analyze formulas, creating charts and graphs that can easily explain information or data.
5. Explain data using Pivot Tables and Pivot Charts.

Unit 1: **(15 Hours)**

Introduction: Cell Editing, Usage of Formulae, File Manipulations, Worksheet Preparation, Drawing Graphs, Usage of Auto Formatting. Inserting Clip arts and Pictures, Frame movements, Insertion of new slides

Unit 2: **(15 Hours)**

Functions- Built-in Functions, Logical Functions, Text Functions, Date and Time Functions, Aggregate functions. Conditional Formatting.

Unit 3: (15 Hours)

Uses of Advanced Excel Formulas -VLOOKUP, HLOOKUP, SUMIF, SUMIFS, SUMPRODUCT, DSUM, COUNTIF, COUNTIFS, IF, IFERROR, ISERROR, SEARCH, INDEX.

Unit 4: (15 Hours)

Data Analysis: What-IF Analysis, Sorting, Filtering Data, AutoFilter, Pivot tables, Totals and Subtotals Various Methods of Filter.

Unit 5: (15 Hours)

Creating Worksheet Charts: Creating Charts- Selecting Charts and Chart Elements - Moving and Resizing Charts- Chart Type, Inserting Objects into a Chart- Changing Chart Labels- Applying WordArt Styles to Chart Elements - Saving Custom Chart Templates

PRESCRIBED BOOKS:

1. Kumar Bittu, Microsoft Office 2017
2. Frag Curtis , Step by Step Microsoft Excel 2013
3. John Walkenbach, 101 Excel 2013 Tips , Tricks and Time severs.
4. Salkind Neil J.Statistics for people who (Think They) Hate Statistics, Using MS- Excel 2021
5. Jordan Goldmeler, "Advanced Excel Essentials" ,APress, 2015 edition.

REFERENCE BOOKS:

1. John Walkenbach , "Microsoft Excel 365 Bible" ,Wiley Publications ,2022

E-LEARNING RESOURCES:

1. https://www.datacamp.com/tutorial/visualizing-data-in-excel
2. https://policyviz.com/wp-content/uploads/woocommerce_uploads/2017/07/A-Guide-to-Advanced-Data-Visualization-in-Excel-2016-Final.pdf

GUIDELINES TO THE QUESTION PAPER SETTERS

QUESTION PAPER PATTERN

Section	Question Component	Numbers	Marks	Total
A	***Definition / Principles*** *Answer any 10 out of 12 questions*	*1 – 12*	*3*	***30***
B	***Short Answer*** *Answer any 5 out of 7 questions*	*13–19*	*6*	***30***
C	***Essay*** *Answer any 4 out of 6 questions*	*20– 25*	*10*	***40***
TOTAL MARKS				**100**

BREAK UP OF QUESTIONS

UNITS	SECTION A	SECTION B	SECTION C
I	3	2	2
II	3	1	1
III	2	1	1
IV	2	2	1
V	2	1	1
TOTAL			
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	3	3
CO 4	3	3	3	3	3
CO 5	3	3	3	3	3
AVG	**3**	**3**	**3**	**3**	**3**

PSO-CO-question paper mapping

CO No:	**COURSE OUTCOME**	**PSOs ADDRESSED**	**COGNITIVE LEVEL (K1 to K6)**
CO1	Describe the basic mechanics and navigation of an Excel spreadsheet.	PSO 1, PSO 5	K1
CO2	Understand the formatting techniques and presentation styles.	PSO 1, PSO 5	K2
CO3	Apply the use and utility of functions and formulas on excel spreadsheet.	PSO 1, PSO 5	K3
CO4	Analyze formulas, creating charts and graphs that can easily explain information or data.	PSO 1, PSO 5	K4
CO5	Explain data using Pivot Tables and Pivot Charts.	PSO 1, PSO 5	K5

SEMESTER - VI

PROGRAMME: B.Sc. IT	**BATCH: 2024-27**
PART: III	**COURSE COMPONENT: CORE-XVI**
COURSE NAME: MINI PROJECT	**COURSE CODE:**
SEMESTER: VI	**MARKS:100**
CREDITS: 3	**TOTAL HOURS: 90**

COURSE OBJECTIVE:

To Enable Students with knowledge to develop a Project within the chosen area of technology.

COURSE OUTCOMES:

1. Recognize the area to develop a Project within the chosen area of technology.
2. Identify, discuss and justify the technical aspects of the chosen project with a comprehensive and systematic approach.
3. Apply the testing techniques in Project development
4. Analyze the key stages in development of the project
5. Generate and use the idea in mini project to develop higher end projects.

A mini-project should be done by the students based on concepts they have already learnt in thefirst two years of the programme. It may be based on database concepts, object oriented concepts, image processing, data Science, optimization tools, Big Data, etc.

Objectives of the mini project : Working on Mini project is to get used to the larger project, which will be handled in Industry. The project work constitutes an important component of the B.Sc(IT) programme and it is to be carried out with due care and should be executed with seriousness by the students. The objective of this mini project is to help the student develop the ability to apply theoretical and practical tools/ techniques to solve real life problems related to industry, academic institutions and research laboratories.

Guidelines: A student is expected to devote about 3 months in planning, analyzing, designing and implementing the project. The initiation of project should be with the project proposal that is to be treated as an assignment:

Mini-project evaluation: The evaluation of the mini-project will be based on the project reports submitted by the student, a presentation and a demonstration.

PSO – CO mapping

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
AVG	**3**	**3**	**3**	**3**	**3**

PSO-CO-Question Paper Mapping

CO No:	COURSE OUTCOME	PSOs ADDRESSED	COGNITIVE LEVEL (K1 to K6)
CO1	Recognize the area to develop a Project within the chosen area of technology.	PSO1, PSO3	K1
CO2	Identify, discuss and justify the technical aspects of the chosen project with a comprehensive and systematic approach.	PSO1, PSO2	K2
CO3	Apply the testing techniques in Project development	PSO1, PSO4	K3
CO4	Analyze the key stages in development of the project	PSO1, PSO2	K4
CO5	Generate and use the idea in mini project to develop higher end projects.	PSO1, PSO5	K5

PROGRAMME: B.Sc. IT	**BATCH: 2024-27**
PART: III	**COURSE COMPONENT: CORE-XVII**
COURSE NAME: INTERNET OF THINGS	**COURSE CODE:**
SEMESTER: VI	**MARKS:100**
CREDITS: 4	**TOTAL HOURS: 90**

COURSE OBJECTIVE

To understand IoT Fundamentals, Protocols, Design, Data Analytics, and Case Studies.

COURSE OUTCOMES:

1. Describe the fundamentals about IoT
2. Understand about IoT Access technologies
3. Use the design methodology and understand different IoT hardware platforms.
4. Examine the basics of IoT Data Analytics and supporting services.
5. Explain the various IoT case studies and industrial applications.

UNIT I: FUNDAMENTALS OF IoT (18 hours)

Evolution of Internet of Things, Enabling Technologies, M2M Communication, IoT World Forum (IoTWF) standardized architecture, Simplified IoT Architecture, Core IoT Functional Stack, Fog, Edge and Cloud in IoT, Functional blocks of an IoT ecosystem, Sensors, Actuators, Smart Objects and Connecting Smart Objects.

UNIT II: IoT PROTOCOLS (18 hours)

IoT Access Technologies: Physical and MAC layers, topology and Security of IEEE 802.15.4, 802.11ah and Lora WAN, Network Layer: IP versions, Constrained Nodes and Constrained Networks, 6LoWPAN, Application Transport Methods: SCADA, Application Layer Protocols: CoAP and MQTT.

UNIT III: DESIGN AND DEVELOPMENT (18 hours)

Design Methodology, Embedded computing logic, Microcontroller, System on Chips, IoT system building blocks- IoT Platform overview: Overview of IoT supported Hardware platforms such as: Raspberry pi, Arduino Board details

UNIT IV: DATA ANALYTICS AND SUPPORTING SERVICES (18 hours)

Data Analytics: Introduction, Structured Versus Unstructured Data, Data in Motion versus Data at Rest, IoT Data Analytics Challenges, Data Acquiring, Organizing in IoT/M2M, *Supporting Services*: Computing Using a Cloud Platform for IoT/M2M Applications/Services, Everything as a service and Cloud Service Models.

UNIT V: CASE STUDIES/INDUSTRIAL APPLICATIONS (18 hours)

IoT applications in home, infrastructures, buildings, security, Industries, Home appliances, other IoT electronic equipment, Industry 4.0 concepts.

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 Madisetti, Universities Press, 2015

REFERENCE BOOKS:

1. The Internet of Things – Key applications and Protocols, Olivier Hersent, David Boswarthick, Omar Elloumi and Wiley, 2012 (for Unit2).

2. "From Machine-to-Machine to the Internet of Things – Introduction to a New Age of Intelligence",Jan Ho¨ ller, VlasiosTsiatsis, Catherine Mulligan, Stamatis, Karnouskos, Stefan Avesand. David Boyle and Elsevier, 2014.

3. Architecting the Internet of Things, Dieter Uckelmann, Mark Harrison, Michahelles and Florian (Eds), Springer,2011.

4. Recipes to Begin, Expand, and Enhance Your Projects, 2nd Edition,Michael Margolis,Arduino Cookbook and O"Reilly Media,2011.

E-LEARNING RESOURCES:

1. https://www.geeksforgeeks.org/introduction-to-internet-of-things-iot-set-1/
2. https://www.ibm.com/topics/internet-of-things

GUIDELINES TO THE QUESTION PAPER SETTERS

QUESTION PAPER PATTERN

Section	Question Component	Numbers	Marks	Total
A	***Definition / Principles*** *Answer any 10 out of 12 questions*	*1 – 12*	*3*	***30***
B	***Short Answer*** *Answer any 5 out of 7 questions*	*13–19*	*6*	***30***
C	***Essay*** *Answer any 4 out of 6 questions*	*20– 25*	*10*	***40***
TOTAL MARKS				**100**

BREAK UP OF QUESTIONS

UNITS	SECTION A	SECTION B	SECTION C
I	3	2	2
II	3	1	1
III	2	1	1
IV	2	2	1
V	2	1	1
TOTAL			
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	3	3
CO 4	3	3	3	3	3
CO 5	3	3	3	3	3
AVG	**3**	**3**	**3**	**3**	**3**

PSO-CO-question paper mapping

CO No:	COURSE OUTCOME	PSOs ADDRESSED	COGNITIVE LEVEL (K1 to K6)
CO1	Describe the fundamentals about IoT	PSO 1, PSO 5	K1
CO2	Understand about IoT Access technologies	PSO 1, PSO 5	K2
CO3	Use the design methodology and understand different IoT hardware platforms.	PSO 1, PSO 5	K3
CO4	Examine the basics of IoT Data Analytics and supporting services.	PSO 1, PSO 5	K4
CO5	Explain the various IoT case studies and industrial applications.	PSO 1, PSO 5	K5

PROGRAMME: B.Sc. IT	**BATCH: 2024-27**
PART: III	**COURSE COMPONENT: CORE– XVIII**
COURSE NAME: R PROGRAMMING FOR DATA SCIENCE	**COURSE CODE:**
SEMESTER: VI	**MARKS:100**
CREDITS: 4	**TOTAL HOURS: 90**

COURSE OBJECTIVE

To understand R Programming Environment and to explore Mathematical and Statistical Functions.

COURSE OUTCOMES:

1. Describe the basics of R and the different types of data structures.
2. Understand the R programming structures to develop programs.
3. Apply Mathematical and statistical functions in R
4. Analyze graphical usage in R for data analysis.
5. Explain advanced statistical functions in R for data analysis.

Unit -1 **(18 HOURS)**

Introduction to R: What is R? – Why R? – Advantages of R over Other Programming Languages - R Studio: R command Prompt, R script file, comments – Handling Packages in R: Installing a R Package, Few commands to get started: installedpackages(), packageDescription(), help(), find.package(), library() - Input and Output – Entering Data from keyboard – Printing fewer digits or more digits – Special Values functions: NA, Inf.

Unit -2 : **(18 HOURS)**

R - Variables: Variable assignment, Data types of Variable, Finding Variable ls(), Deleting Variables - R Operators: Arithmetic Operators, Relational Operators, Logical Operator, Assignment Operators, Miscellaneous Operators - R Decision Making: if statement, if – else statement, if– else if statement, switch statement – R Loops: repeat loop, while loop, for loop - Loop control statement: break statement, next statement.

Unit-3: **(18 HOURS)**

R Data Types: Vectors, Lists, Matrices, Arrays, Factors, Data Frame – R-Function : function definition, Built in functions, user-defined function, calling a function, calling a function without an argument,calling a function with argument values

Unit-4 : **(18 HOURS)**

R-Strings – Manipulating Text in Data: substr(), strsplit(), paste(), grep(), toupper(), tolower()-Dates and Times -Dates in R -Times in R -Operations on Dates and Times-Managing Data Frames with the dplyr package -Data Frames -The dplyr Package -dplyr Grammar-Installing the dplyr package - select() -filter() -arrange()-rename() -mutate()-group_by()

Unit -5: **(18 HOURS)**

Descriptive Statistics: Data Range, Frequencies, Mode, Mean and Median: Mean Applying Trim Option, Applying NA Option, Median - Mode - Standard Deviation – Correlation - Spotting Problems in Data with Visualization: visually Checking Distributions for a single Variable - R –Pie

Charts: Pie Chart title and Colors – Slice Percentages and Chart Legend, 3D Pie Chart – R Histograms – Density Plot - R – Bar Charts: Bar Chart Labels, Title and Colors.

PRESCRIBED BOOKS:

1. R in Action, Rob Kabacoff, Manning 3rd edition 2022.
2. The Art of R Programming, Norman Matloff, Cengage Learning 2011.

REFERENCE BOOK

1. R for Data Science by Hadley Wickham, Garrett Grolemund Released December 2016, O'Reilly Media, Inc. ISBN: 9781491910344

GUIDELINES TO THE QUESTION PAPER SETTERS

QUESTION PAPER PATTERN

Section	Question Component	Numbers	Marks	Total
A	***Definition / Principles*** *Answer any 10 out of 12 questions*	*1 – 12*	*3*	***30***
B	***Short Answer*** *Answer any 5 out of 7 questions*	*13–19*	*6*	***30***
C	***Essay*** *Answer any 4 out of 6 questions*	*20– 25*	*10*	***40***
TOTAL MARKS				**100**

BREAK UP OF QUESTIONS

UNITS	SECTION A	SECTION B	SECTION C
I	3	2	2
II	3	1	1
III	2	1	1
IV	2	2	1
V	2	1	1
TOTAL			
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	3	3
CO 4	3	3	3	3	3
CO 5	3	3	3	3	3
AVG	**3**	**3**	**3**	**3**	**3**

PSO-CO-question paper mapping

CO No:	**COURSE OUTCOME**	**PSOs ADDRESSED**	**COGNITIVE LEVEL (K1 to K6)**
CO1	Describe the basics of R and the different types of data structures.	PSO 1, PSO 4, PSO 5	K1
CO2	Understand the R programming structures to develop programs.	PSO 1, PSO 4, PSO 5	K2
CO3	Apply Mathematical and statistical functions in R	PSO 1, PSO 4, PSO 5	K3
CO4	Analyze graphical usage in R for data analysis.	PSO 1, PSO 4, PSO 5	K4
CO5	Explain advanced statistical functions in R for data analysis.	PSO 1, PSO 4, PSO 5	K5

PROGRAMME: B.Sc. IT	**BATCH: 2024-27**
PART: III	**COURSE COMPONENT: CORE – XIX**
COURSE NAME: PRACTICAL – VI: R PROGRAMMING FOR DATA CIENCE	**COURSE CODE:**
SEMESTER: VI	**MARKS:100**
CREDITS: 4	**TOTAL HOURS: 90**

COURSE OBJECTIVE

To understand and apply the basics in R Programming from Statistical Perspective

COURSE OUTCOMES:

1. Implement basic programs in R using sequential programming.
2. Implement programs using control structures.
3. Develop programs using R data structures.
4. Develop the mathematical and statistical functions in R.
5. Develop data visualizations with packages.

Lab Exercises

1. Write an R program that prompts the user to enter their Name, Roll No, Marks(5 Subjects) and then calculate the total and average, then print a summary message using the input.
2. Using a for loop, print all the even numbers between 1 and 50 in ascending and descending order.
3. Create an R script that checks the number(1-7) and prints the day of the week(Mon-Sun) using if-else statements and provides an appropriate message.
4. Write a R Program to create a simple calculator and perform the necessary mathematical calculations using the appropriate operators.
5. Create a matrix in R with dimensions 3x3. Perform matrix addition, subtraction, multiplication and division.
6. Create a vector of values and perform the necessary vector operations.
7. Write a user-defined function in R that calculates the factorial and the Fibonacci series of a given integer. Test the function with an argument value of 5 and display the result.
8. Perform the necessary string functions on the following text-“ Event: Halloween Party Date: 2023-10-31 Time: 19:00 Location: Haunted Mansion Theme: Spooky” and provide the required results expected in the following questions:
    - Extract and display the name of the event, which is "Halloween Party."
    - Extract and display the event date, and format it as "31st October, 2023."
    - Retrieve and print the event time in the format "07:00 PM."
    - Extract and display the event location, which is "Haunted Mansion."
    - Find and print the theme of the event.
    - Create a new string that contains the event information in reverse order, i.e., "Theme: Spooky Location: Haunted Mansion Time: 07:00 PM Date: 31st October, 2023 Event: Halloween Party."
9. Install and load the "dplyr" package. Create a data frame containing information about employees (Name, Age, Salary). Use the "filter ()" function to filter and display employee with salary greater than 35000.

10. Given a vector of exam scores, calculate and print the range, max, min, mean, and median of the scores. Then, create a summary report with these statistics.
11. You have two vectors representing the scores of two different subjects for a group of students. Calculate the standard deviation for each subject's scores and then find the correlation between these two subjects' scores.
12. Create a pie chart to represent the distribution of expenses (e.g., rent, food, entertainment) in a monthly budget. Include a title, customize the colors, and display slice percentages and a chart legend.
13. Create a bar chart to compare the sales figures of different products in a store. Add labels, a title, and customize the colors to make the chart informative and visually appealing.
14. Customize a histogram for the number of books read by a group of readers, including appropriate bin selection, labels, colors, and a legend.
15. Customize a density plot to visualize the distribution of monthly expenses for two different departments in a company. Include labels, titles, and distinctive colors for each department.

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	3
CO 4	3	3	3	3	3
CO 5	3	3	3	3	3
AVG	**3**	**3**	**3**	**3**	**3**

PSO-CO-question paper mapping

CO No:	**COURSE OUTCOME**	**PSOs ADDRESSED**	**COGNITIVE LEVEL (K1 to K6)**
CO1	Implement basic programs in R using sequential programming.	PSO 1, PSO 4, PSO 5	K3
CO2	Implement programs using control structures.	PSO 1, PSO 4, PSO 5	K3
CO3	Develop programs using R data structures.	PSO 1, PSO 2, PSO 4, PSO 5	K5
CO4	Develop the mathematical and statistical functions in R.	PSO 1, PSO 4, PSO 5	K5
CO5	Develop data visualizations with packages.	PSO 1, PSO 2, PSO 4, PSO 5	K5

PROGRAMME: B.Sc. IT	**BATCH: 2024-27**
PART: III	**COURSE COMPONENT: ELECTIVE – III**
COURSE NAME: CLOUD COMPUTING	**COURSE CODE:**
SEMESTER: VI	**MARKS:100**
CREDITS: 5	**TOTAL HOURS: 90**

COURSE OBJECTIVE:

To enable students to understand the Cloud Computing concepts andservices.

COURSE OUTCOMES:

1. Describe the Cloud computing setup with its vulnerabilities and applications using different architectures
2. Understand different workflows according to requirements and apply map reduce programming model.
3. Apply and design suitable Virtualization concept, Cloud Resource Management and design scheduling algorithms.
4. Analyze combinatorial auctions for cloud resources and design scheduling algorithms for computing clouds
5. Explain cloud Storage systems and Cloud security, the risks involved, its impact and develop cloud application.

Unit-1: (18 Hours)

Understanding Cloud Computing: Cloud Computing –History of Cloud Computing – Cloud Architecture –Cloud Storage –Why Cloud Computing Matters –Advantages of Cloud Computing – Disadvantages of Cloud Computing –Companies in the Cloud Today – Cloud Services.

Unit-2: (18 Hours)

Developing Cloud Services: Web-Based Application –Pros and Cons of Cloud Service Development –Types of Cloud Service Development –Software as a Service –Platform as a Service-Infrastructure as a service –Web Services –On-Demand Computing –Discovering Cloud Services Development Services and Tools –Amazon Ec2 –Google App Engine –IBM Clouds.

Unit-3: (18 Hours)

Cloud Computing For Everyone: Centralizing Email Communications –Collaborating onSchedules –Collaborating on To-Do Lists –Collaborating Contact Lists –Cloud Computing for the Community– Collaborating on Group Projects and Events –Cloud Computing for the Corporation.

Unit-4: (18 Hours)

Using Cloud Services: Collaborating on Calendars, Schedules and Task Management – Exploring Online Scheduling Applications –Exploring Online Planning and Task Management–Collaborating on Event Management –Collaborating on Contact Management –Collaborating on Project Management–Collaborating on Word Processing -Collaborating on Databases –Storing and Sharing Files.

Unit-5: (18 Hours)

Other Ways To Collaborate Online: Collaborating via Web-Based Communication Tools –Evaluating Web Mail Services –Evaluating Web Conference Tools –Collaborating via Social Networks and Groupware –Collaborating via Blogs and Wikis.

PRESCRIBED BOOKS

1. MichaelMiller, Cloud Computing: Web-BasedApplicationsThatChange the WayYou Workand Collaborate Online, QuePublishing, August 2008.
2. KumarSaurabh, "CloudComputing–Insights into New EraInfrastructure",Wiley IndianEdition, 2011.

REFERENCE BOOK

1. HaleyBeard, Cloud Computing Best Practices for Managing and Measuring Processes for On-demand Computing, Applications and Data Centers in the Cloud with SLAs, Emereo PtyLimited, July 2009.

E-LEARNING RESOURCES

i. https://www.techtarget.com/searchcloudcomputing/definition/cloud-computing

GUIDELINES TO THE QUESTION PAPER SETTERS

QUESTION PAPER PATTERN

Section	Question Component	Numbers	Marks	Total
A	***Definition / Principles*** *Answer any 10 out of 12 questions*	*1 – 12*	*3*	***30***
B	***Short Answer*** *Answer any 5 out of 7 questions*	*13–19*	*6*	***30***
C	***Essay*** *Answer any 4 out of 6 questions*	*20– 25*	*10*	***40***
TOTAL MARKS				**100**

BREAK UP OF QUESTIONS

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

PSO – CO Mapping

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	2	3	3
AVG	**3**	**3**	**2.8**	**3**	**3**

PSO-CO-Question Paper Mapping

CO No:	**COURSE OUTCOME**	**PSOs ADDRESSED**	**COGNITIVE LEVEL (K1 to K6)**
CO1	Describe the Cloud computing setup with its vulnerabilities and applications using different architectures	PSO1, PSO3	K1
CO2	Understand different workflows according to requirements and apply map reduceprogramming model.	PSO1, PSO2	K2
CO3	Apply and design suitable Virtualization concept, Cloud Resource Managementand design scheduling algorithms.	PSO1, PSO5	K3
CO4	Analyze combinatorial auctions for cloud resources and design scheduling algorithms for computing clouds	PSO1, PSO4	K4
CO5	Explain cloud Storage systems and Cloud security, the risks involved, its impact and develop cloud application.	PSO1, PSO3	K5

PROGRAMME: B.Sc. IT	**BATCH: 2024-27**
PART: III	**COURSE COMPONENT: ELECTIVE – III**
COURSE NAME: MOBILE COMPUTING	**COURSE CODE:**
SEMESTER: VI	**MARKS:100**
CREDITS: 5	**TOTAL HOURS: 90**

COURSE OBJECTIVE

To Understand Working of Wireless devices and interconnectivity

COURSE OUTCOMES:

1. Describe the concepts of Mobile Communication
2. Understand the next-generation Mobile Communication Systems
3. Apply the concepts of wireless LAN in Bluetooth and security management
4. Analyze various protocols of all layers for mobile and ad hoc wireless communication networks.
5. Explain IP and TCP layers of Mobile Communication

Unit-1: (18 Hours)

Introduction - Mobile and Wireless Devices – Simplified Reference Model – Need for Mobile Computing –Wireless Transmissions –Multiplexing – Spread Spectrum and Cellular Systems-Medium Access Control – Comparisons.

Unit-2: (18 Hours)

Telecommunication Systems – GSM – Architecture – Sessions – Protocols – Hand Over andSecurity – UMTS and IMT – 2000 – Satellite Systems.

Unit-3: (18 Hours)

Wireless Lan - IEEE S02.11 – Hiper LAN – Bluetooth – Security and Link Management.

Unit-4: (18 Hours)

Mobile network layer - Mobile IP – Goals – Packet Delivery – Strategies – Registration –Tunneling and Reverse Tunneling – Adhoc Networks – Routing Strategies.

Unit-5: (18 Hours)

Mobile transport layer - Congestion Control – Implication of TCP Improvement – Mobility –Indirect – Snooping – Mobile – Transaction oriented TCP - TCP over wireless – Performance.

PRESCRIBED BOOK

1. J.Schiller, 2003, Mobile Communications,2ndedition, Pearson Education,Delhi.

REFERENCE BOOKS

1. Hansmann, Merk, Nicklous, Stober, 2004, Principles of Mobile Computing, 2nd Edition,Springer (India).
2. Pahlavan, Krishnamurthy, 2003(2002), Principle of wireless Networks: A unified Approach, Pearson Education, Delhi.
3. MartynMallick, 2004, Mobile and Wireless Design Essentials, Wiley Dreamtech India Pvt. Ltd., NewDelhi.
4. W.Stallings, 2004, Wireless Communications and Networks, 2nd Edition, Pearson Education, Delhi.

E-LEARNING RESOURCES

https://www.techtarget.com/searchmobilecomputing/definition/nomadic-computing

GUIDELINES TO THE QUESTION PAPER SETTERS

QUESTION PAPER PATTERN

Section	Question Component	Numbers	Marks	Total
A	***Definition / Principles*** *Answer any 10 out of 12 questions*	*1 – 12*	*3*	***30***
B	***Short Answer*** *Answer any 5 out of 7 questions*	*13–19*	*6*	***30***
C	***Essay*** *Answer any 4 out of 6 questions*	*20– 25*	*10*	***40***
TOTAL MARKS				**100**

BREAK UP OF QUESTIONS

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

PSO – CO Mapping

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	2	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
AVG	**2.8**	**3**	**3**	**3**	**3**

PSO-CO-Question Paper Mapping

CO No:	COURSE OUTCOME	PSOs ADDRESSED	COGNITIVE LEVEL (K1 to K6)
CO1	Describe the concepts of Mobile Communication	PSO1, PSO3	K1
CO2	Understand the next-generation Mobile Communication Systems	PSO1, PSO2	K2
CO3	Apply the concepts of wireless LAN in Bluetooth and security management	PSO1, PSO4	K3
CO4	Analyze various protocols of all layers for mobile and ad hoc wireless communication networks.	PSO1, PSO2	K4
CO5	Explain IP and TCP layers of Mobile Communication	PSO1, PSO5	K5

PROGRAMME: B.Sc. IT	**BATCH: 2024-27**
PART: III	**COURSE COMPONENT: Elective – III**
COURSE NAME: PARALLEL COMPUTING	**COURSE CODE:**
SEMESTER: VI	**MARKS:100**
CREDITS: 5	**TOTAL HOURS: 90**

COURSE OBJECTIVE:

To learn the major concepts and ideas in parallel computing and itsapplications and to understand various models of parallelism.

COURSE OUTCOMES:

1. Describe the implicit and explicit parallel platform .
2. Understand different performance metrics for analysis of parallel algorithms .
3. Use message passing library for communication among processes running on a parallel platform.
4. Analyze parallel algorithms for shared address space platform using multithreading .
5. Develop parallel algorithms for tightly coupled and loosely coupled parallel systems for various applications.

Unit-1: (18 Hours)

Introduction To Parallel Computing- History of Parallel Computers - Problem Solving in Parallel - Performance Evaluation - Elementary Concepts -The Need of Parallel Computation –Levels of Parallel Processing - Dataflow Computing - Applications of Parallel Processing.

Unit-2: (18 Hours)

Introduction to Classification of Parallel Computers -Types of Classification - Flynn's Classification -Handler's Classification -Structural Classification - Classification Based on Grain Size.

Unit-3: (18 Hours)

Introduction to Interconnection Networks - Network Properties- Design issues of Interconnection Network- Various Interconnection Networks-Concept of Permutation Network -Performance Metrics.

Unit-4: (18 Hours)

Introduction to Parallel Computer Architecture - Pipeline Processing - Vector Processing –Array Processing - Superscalar Processors - VLIW Architecture - Multi-threaded Processors. **Introduction to Operating System For Parallel Computer** - Parallel ProgrammingEnvironment Characteristics- Synchronization Principles- Multitasking Environment.

Unit-5: (18 Hours)

Introduction Performance Evaluations - Metrics for Performance Evaluation - Factors Causing Parallel Overheads- Laws For Measuring Speedup Performance - Tools For Performance Measurement - Performance Analysis- Performance Instrumentations. **Introduction to Recent Trends In Parallel Computing**- Recent Parallel Programming Models –Parallel Virtual Machine.

PRESCRIBED BOOKS

1. Rajaraman V. and Siva Ram Murthy C. *Parallel Computers –Architectureand Programming*, Second Edition, Prentice Hall of India .
2. SelimG.Akl*Parallel Computation, Models and Methods*: Prentice Hall of India.
3. Kai Hwang: *Advanced Computer Architecture*: Parallelism, Scalability, Programmability(2001), Tata McGraw Hill, 2001.

REFERENCE BOOKS

1. Henessy J. L. and Patterson D. A. *Computer Architecture*: A Qualititative Approach, Morgan Kaufman (1990) Thomas L. Casavant, PavelTvrdik, FrantisckPlasil, *Parallel Computers: Theory and Practice*

E-LEARNING RESOURCES

https://www.geeksforgeeks.org/introduction-to-parallel-computing/

GUIDELINES TO THE QUESTION PAPER SETTERS

QUESTION PAPER PATTERN

Section	Question Component	Numbers	Marks	Total
A	***Definition / Principles*** *Answer any 10 out of 12 questions*	*1 – 12*	*3*	***30***
B	***Short Answer*** *Answer any 5 out of 7 questions*	*13–19*	*6*	***30***
C	***Essay*** *Answer any 4 out of 6 questions*	*20– 25*	*10*	***40***
TOTAL MARKS				**100**

BREAK UP OF QUESTIONS

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

PSO – CO Mapping

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	2	3	3
CO4	3	3	3	2	3
CO5	3	3	3	3	3
AVG	**3**	**3**	**2.8**	**2.8**	**3**

PSO-CO-Question Paper Mapping

CO No:	**COURSE OUTCOME**	**PSOs ADDRESSED**	**COGNITIVE LEVEL (K1 to K6)**
CO1	Describe the implicit and explicit parallel platform .	PSO1, PSO3	K1
CO2	Understand different performance metrics for analysis of parallel algorithms .	PSO1, PSO2	K2
CO3	Use message passing library for communication among processes running on a parallel platform.	PSO1, PSO4	K3
CO4	Analyze parallel algorithms for shared address space platform using multithreading .	PSO1, PSO5	K4
CO5	Develop parallel algorithms for tightly coupled and loosely coupled parallel systems for various applications.	PSO1, PSO3	K5

UG- SOFT SKILLS

SOFT SKILLS: COMMON TO ALL	**BATCH: 2024- 2025 ONWARDS**
PART: IV	**COURSE COMPONENT: Soft Skills – I**
COURSE NAME: COMMUNICATION SKILLS AND PERSONALITY DEVELOPMENT SKILLS	**COURSE CODE:**
SEMESTER: I	**MARKS:100**
CREDITS: 2	**TOTAL HOURS: 30**

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

PRESCRIBED BOOKS

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			
SECTION A - 7		**SECTION B – 6**	**SECTION C – 4**

SOFT SKILLS: COMMON TO ALL	**BATCH: 2024-25 ONWARDS**
PART: IV	**COURSE COMPONENT: Soft Skills – II**
COURSE NAME: INTERVIEW SKILLS AND RESUME WRITING	**COURSE CODE:**
SEMESTER: II	**MARKS:100**
CREDITS: 2	**TOTAL HOURS: 30**

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

PRESCRIBED BOOKS

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			
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	

Course Objective:

To impart foundations and the key skills of Adobe UX technology.

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. Analyze interactive and dynamic prototypes to simulate user interactions.
5. Create collaboration tools within Adobe XD to work efficiently in a team environment

UNIT 1 : 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 2 : 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 3 : 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 4 : 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 5 : 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.

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

PSO – CO mapping

	PSO 1	PSO 2	PSO 3	PSO 4	PSO5
CO 1	3	3	3	3	3
CO 2	3	2	3	3	3
CO 3	3	3	3	3	3
CO 4	3	3	3	3	3
CO 5	3	3	3	3	3
AVG	**3**	**2.8**	**3**	**3**	**3**

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.	PSO 1, PSO 2, PSO 5	K1
CO2	Understand the key features and functionalities of Adobe XD for designing and prototyping.	PSO 1, PSO 2, PSO 5	K2
CO3	Apply user-centered design principles to create interfaces that prioritize user needs and preferences.	PSO 1, PSO 2, PSO 5	K3
CO4	Analyze interactive and dynamic prototypes to simulate user interactions.	PSO 1, PSO 2, PSO 5	K4
CO5	Create collaboration tools within Adobe XD to work efficiently in a team environment	PSO 1, PSO 2, PSO 5	K5

PROGRAMME: ALL UG	**BATCH: 2024 – 25**
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:

To 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

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

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

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

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

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

PRESCRIBED BOOK:

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/numeral-system/#:~: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: 2024-27**
PART: III	**COURSE COMPONENT: SELF-STUDY**
COURSE NAME: INDIAN HERITAGE AND KNOWLEDGE SYSTEM	**COURSE CODE:**
SEMESTER: III	**MARKS:100**
CREDITS: 2	**TOTAL HOURS: Self Study**
QUESTION PATTERN: MCQ	
THEORY	

Course Objectives:

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 Outcomes:

1. To develop a comprehensive understanding among students of Indian heritage, its richness and diversity, and its role in shaping the nation's cultural identity.
2. 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.
3. To enhance students' cultural literacy by gaining insights into traditional practices preserved through folklore across India.
4. To acquire knowledge among students of ancient Indian sciences for holistic well-being, promoting physical, mental, and spiritual health.
5. Students will develop a deeper understanding of the interconnectedness of spiritual, medicinal, and artistic dimensions within Indian Heritage systems.

UNIT I: 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 II: 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 III: 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 IV: 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 V: 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: 2024-27**
PART: III	**COURSE COMPONENT: SELF-STUDY**
COURSE NAME: CONTEMPORARY WORLD AND SUSTAINABLE DEVELOPMENT	**COURSE CODE:**
SEMESTER: III	**MARKS:100**
CREDITS: 2	**TOTAL HOURS: Self Study**
QUESTION PATTERN: MCQ	
THEORY	

Course Objectives:

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

Course Outcomes:

1. Students will gain a comprehensive understanding of the key actors, institutions, and dynamics shaping the contemporary world order.
2. Students will acquire the ability to analyze the political, economic, and security challenges within major Asian regions, fostering informed perspectives on these critical issues.
3. 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.
4. 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.
5. 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.

UNIT I: 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 II: 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 III: 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 IV: 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 V: 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