NOTIFICATION
(24 /April/Adp./09)

It is hereby notified for the information of all concerned that the Vice-Chancellor, in anticipation of the approval of the Academic Council, is pleased to authorize the adoption of the revised Syllabi and Courses of Study of the subject of Master Degree Programme in **Information Technology** for semesters Ist to IVth under the **Choice Based Credit System** for the **failure** and **Reappear** Candidates for the examinations to be held in the years indicated against each semester as under:-

Subject	Semester	For the examinations to be held in the year
M.Sc. IT	Semester-I	December 2024, 2025 and 2026
	Semester-II	May 2025, 2026 and 2027
	Semester-III	December 2025, 2026 and 2027
	Semester-IV	May 2026, 2027 and 2028

Sd/-
DEAN ACADEMIC AFFAIRS

No. F.Acd/II/24/ 851-58
Dated: 22/4/24

Copy to:

1. Dean, Faculty of Mathematical Science
2. HOD/Convener, Board of Studies in **Computer Science & IT**
3. Programmer, Computer Section, Examination Wing
4. Incharge, University Website for Uploading of the notification

Deputy Registrar (Academic)

SYLLABUS

Of

M.Sc. (IT) Programme

UNDER

CHOICE BASED CREDIT SYSTEM (CBCS)

for the students to be admitted in the sessions

2024-25, 2025-26, 2026-27

DEPARTMENT OF COMPUTER SCIENCE & IT

University of Jammu

DEPARTMENT OF COMPUTER SCIENCE & IT,
UNIVERSITY OF JAMMU, JAMMU

M.Sc.-IT COURSE STRUCTURE

SEMESTER WISE COURSE DISTRIBUTION AND PAPERWISE OUTLINE OF MASTERS DEGREE PROGRAMME IN INFORMATION TECHNOLOGY PROGRAMME [M.Sc.-IT]

TOTAL CREDITS: 96

Semester – I

Course No.	Course Title	Credits	Contact hours per week L-T-P
PSITTC-102	Problem Solving Using C-Language	4	4-0-0
PSITTC-103	Logical Organization of Computers	4	4-0-0
PSITTC-104	Discrete Mathematics	4	4-0-0
PSITTC-105	Operating Systems	4	4-0-0
PSITLC-150	Practical based on abovecourses	6	0-0-10
	Total	22	16-0-10

Semester – II

Course No.	Course Title	Credits	Contact hours per week L-T-P
PSITTC-201	Data and File Structures	4	4-0-0
PSITTC-202	Data Communication andNetworks	4	4-0-0
PSITTC-204	Data Base Management System	4	4-0-0
PSITTC-206	Algorithm Design and Analysis	4	4-0-0
PSITTC-207	Object Oriented Programming in Java	4	4-0-0
PSITLC-250	Practical based on above courses	6	0-0-10
	Total	26	20-0-10

Syllabus of MSc-IT under Choice Based Credit System for the students to be admitted in the year 2024-25, 2025-26, 2026-27.

Semester – III

Course No.	Course Title	Credits	Contact hours per week L-T-P
PSITTC-301	Web Technologies	4	4-0-0
PSITTC-303	Artificial Intelligence	4	4-0-0
PSITTC-304	Compiler Design	4	4-0-0
	*Open Course-I	4	4-0-0
PSITLC-350	Practical based on abovecourses	6	0-0-10
	Total	22	16-0-10

* All the students must mandatorily complete on or before completion of 3rd semester, one PG MOOC course of four credits from SWAYAM UGC portal as per the existing guidelines and requirements of University of Jammu regarding SWAYAM course.

Semester – IV

Course No.	Course Title	Credits	Contact hours per week L-T-P
PSITTC-401	Software Engineering	4	4-0-0
PSITTC-402	Computer Graphics	4	4-0-0
PSITTC-404	Android Programming	4	4-0-0
Elective-I PSITTE-405 PSITTE-406 PSITTE-407	(any one of the following) Programming in VB.NET Python Cyber Security	4	4-0-0
	*Open Course-II	4	4-0-0
PSITLC-450	Practical based on above courses(Mini Project along with regular assignments)	6	0-0-10
	Total	26	20-0-10

* All the students must register and successfully complete one open course of four credits from other Departments in the offsite campus. The same can be also done through online mode from the main as well as other campuses of University of Jammu.
In case of Non-availability of open course in the offsite as well as all other campuses of University of Jammu, the student can register for 4 credits course at SWAYAM/MOOCS portal or follow the guidelines as notified from time to time by the University.

EXAMINATION SCHEME

There shall be three tests in each semester and the student shall be continuously evaluated during the conduct of each course on the basis of their performance as follows:

THEORY	Syllabus to be covered in the examination	Time allotted for the exam.	Weightage (Marks)
Minor test I (after one month)	Upto 25%	1½ hours	20%
Minor test II (after two months)	Upto 50%	1½ hours	20%
Major test * (after end of semester)	Upto 100%	3 hours	60%

*
(i) *80% weightage in Major Test shall be given to those units which have not been covered in the two Minor Tests.*
(ii) *Certain questions may be framed in such a way which may require knowledge of more than one unit or one question may have multiple parts either subjective and/or objective from one or more units i.e., certain questions may be from across units.*
(iii) *Candidates who have appeared in Minor Tests and failed to get the minimum required marks i.e. 14 out of 40 will not be allowed to take Major test. Such candidates shall re-appear in the Minor Test/s only once in which he/she has failed to be conducted at least fifteen days before the Major Test.*

Total					100
PRACTICAL					
Daily evaluation of Practical records/Viva voce etc. (Internal Evaluation)	1	Viva voce 1	15	35	75
	2	Viva voce 2	15		
	3	Practical File	5		
	4	Internal exam + Viva voce	25+15	40	
Final Practical performance and viva voce (External Evaluation)	Internal exam + Viva voce (**100% syllabus**)				75
Total					150

SCHEME FOR PAPER SETTING OF MAJOR EXAMINATION

The question paper shall be divided into two sections (A & B). No question shall be repeated in the question paper.

Section A

There shall be 5 short answer type questions and shall carry 3 marks each. In this section, questions shall be covered from each unit and the candidates are required to answer all the questions. (3 x 5 = 15 marks)

Section B

There shall be 3 long answer type questions each set from Unit –III, IV and V with internal choice. Each question shall carry 15 marks. (3 x 15 = 45 marks)

ATTENDANCE

Each course (theory, practical etc.) shall be treated as an independent unit for the purpose of attendance. A student shall be required to attend a minimum of 75% of the total instruction hours in a course including tutorials and seminars in each semester. A student who fails to secure 75% attendance in a course shall not be eligible to appear in the semester examination in that course and shall be required to repeat that course.

PASSING CRITERIA

To qualify in a semester/programme, candidate has to obtain qualifying grade/marks in the minor tests and major test separately.

CRITERIA FOR PROMOTION OF A STUDENT TO NEXT HIGHER SEMESTER

A student shall be promoted from 2nd semester to 3rd semester if he/she has earned 50% credits in Theory/Practical Courses cumulatively in earlier semesters of the programme.

ABSOLUTE GRADE SYSTEM

MARKS	Grade	Grade Points	Description of performance
≥ 90	O	10	Outstanding
≥ 75 and < 90	A+	9	Excellent
≥ 65 and < 75	A	8	Very Good
≥ 55 and < 65	B+	7	Good
≥ 50 and < 55	B	6	Above Average
≥ 40 and < 50	C+	5	Average
≥ 36 and < 40	C	4	Pass/Below Average
> 20 and < 36	D	2	Fail/Poor
≤ 20	E	0	Very Poor

'D' and 'E' grades refer to unsatisfactory performance. The student shall have to repeat all compulsory courses where the D/E grade is obtained. The weights of 'D' and 'E' grades shall not be counted in SGPA or CGPA. Other grades would include:

GRADES	DESCRIPTION
J	Incomplete
W	Withdrawal
X	Continued Project
S	Satisfactory Completion
Z	Non-Completion

CONVERSION FROM CGPA TO PERCENTAGE

The conversion of SGPA or CGPA to Percent score will be carried out by multiplication of respective SGPA or CGPA by a factor of 9. A CGPA of 6.75 shall be considered equivalent to 60% marks.

REQUIREMENTS FOR EARNING THE M.Sc. (IT) DEGREE

The total credits required for the M.Sc(IT) programme are 96. The credits are distributed over two categories:

CATEGORIES	DESCRIPTION	CREDITS
Post-graduate Semester Core Courses (PSCC)	Core Departmental Courses	88
Post-graduate Semester Open Category Courses (PSOCC)	Other Department Courses/MOOC Courses	8
	TOTAL CREDITS	96

Course credits assignment

Lectures and Tutorials: One lecture or tutorial hour per week per semester is assigned one credit.

Practical/Laboratory: One and half laboratory hour per week per semester is assigned one credit.

M.Sc. IT - FIRST SEMESTER

COURSE NO: PSITTC-102	**Minor Test 1:20 Marks of 1.5 hours duration**
COURSE TITLE: PROBLEM SOLVING USING C – LANGUAGE	**Minor Test 2:20 Marks of 1.5 hours duration**
No. of credits: 04	**Major Test :60 Marks of 3.0 hours duration**

For examinations to be held in Dec- 2024, 2025, and 2026

UNIT-I
Steps for Problem Solving, Algorithm and its features. Computational Complexity of an Algorithm, Flowcharts and their design. Pseudocode, Decision tables, Classification of programming languages.

12 HOURS

UNIT-II
History of C – Language, Characteristics and Application Areas of C- languageGeneral Structure of C – program, Compiling and executing a program.
Character set of C – language, identifiers, keywords, data types, variables, constants, expressions and operators in C - language. Standard Input/Output.Control statements – decision making statements, loops and iterations.

12 HOURS

UNIT-III
Modular programming, Functions, Recursive functions, Command lineArguments, Storage classes in C - language
Arrays – One dimensional Arrays, Multidimensional Arrays, Strings, StringInput/Output, String manipulation functions, Array of Strings.
C–preprocessor directives, Macros, Macros vs functions

12 HOURS

UNIT-IV
Structure Declaration, assessing & initializing structures, structures as functionarguments, structures and Arrays.
Unions, Initializing and accessing the members of a union, Enumerated Data types.Syntax, Semantic, Linker, Logical and Runtime errors.

12 HOURS

UNIT-V
Pointers and their characteristics, Pointer arithmetic, Passing pointers tofunctions, Arrays and pointers, Pointers and strings.
Files: Files handling in C. Open and close a file in C, Input and output using filepointers, Sequential and random access files

12 HOURS

COURSE NO: PSITTC-102	Minor Test 1:20 Marks of 1.5 hours duration
COURSE TITLE: PROBLEM SOLVING USING C – LANGUAGE	Minor Test 2:20 Marks of 1.5 hours duration
No. of credits: 04	Major Test :60 Marks of 3.0 hours duration

SUGGESTED READINGS:

1. E. Balguruswamy, "Programming in ANSI C", 4th edition, 2007, McGraw-Hill Publication, New Delhi.
2. B.W. Kernighan and D.M. Ritchie, The C Programming Language, PHI.
3. B.S. Gottfried, Schaum's Outline of Theory and Problems of Programmingwith C, McGraw-Hill.
4. H. Schildt, C Made Easy, Osborne McGraw-Hill.
5. Yashwant Kanetkar, "Let us C" Seventh Edition, BPB publication, 2007
6. Cooper H. & Mullish H. : The Sprit of C, Jaico Publication House, New Delhi

SCHEME FOR PAPER SETTING

The question paper shall be divided into sections A & B as below. No question shall be repeated in the question paper.

Section A - There shall be FIVE short answer type questions of THREE mark each. In this section, questions shall be covered from each unit and the candidates shall be required to answer all the questions.

(3 x 5 = 15 marks)

Section B - There shall be THREE long answer type questions each set from Unit –III, IV and V with internal choice. Each question shall carry FIFTEEN marks.

(3 x 15 = 45 marks)

-X-

M.Sc. IT - FIRST SEMESTER

COURSE NO: PSITTC-103	Minor Test 1:20 Marks of 1.5 hours duration
COURSE TITLE: Logical Organization of Computers	Minor Test 2:20 Marks of 1.5 hours duration
No. of credits: 04	MajorTest :60 Marks of 3.0 hours duration

For examinations to be held in Dec- 2024, 2025, and 2026

UNIT - I
Introduction & Data Representation
Overview of computers, Integer & floating point representation using IEEE FORMAT, Rules of Floating point Arithmetic, parity, Error detection and correction methods using Hamming technique, ASCII code representation, Number systems & their inter - conversion rules, Rules of addition/subtractionfor r's, (r - 1)'s complements, BCD, excess - 3 respectively and their circuits.

12 HOURS

UNIT - II
Logic Gates & Boolean Algebra
Logic gates, And, OR, NOT, NAND, XOR, NOR, XNOR Gates & their design. Boolean Algebra: Binary arithmetic, Boolean Expressions, Laws of BooleanAlgebra, De – Morgan laws, K - map, simplification of Boolean Expressionsusing SOP, POS, K – map techniques.

12 HOURS

UNIT – III
Memory & Register Organization
Memory: Basic memory cell, Static RAM, Static and Dynamic Memory, Types of ROM, associative memory, interleaved memory, Virtual memory,
Cache memory Random access, Sequential access, Direct access, virtual memory.Register transfer Language and Architecture:
Register transfer language, micro-operation, I/O processor, CPU busArchitecture.
Modes of I/O transfer like DMA, programmed control, interrupts technique.Interrupt & instruction: Interrupt, its types & its life cycle.

12 HOURS

UNIT - IV
Microprocessor & Control Design
  Stack organisation, types of addressing modes, Instruction formats (one, two,three addressetc.)Microprocessor   8086:   Microcomputer   structure,
Architecture of 8086, Instruction set, Instruction format of 8086, Bit Slices, I/O interface adapter (Serial and Parallel), Memory read, Memory write, Memory map and I/O map, Interrupts like Serial, Polling and vector methods. Features   and comparison   of higher microprocessors,   bus bandwidth Processor, Hardwired & Micro-programmed control unit.

12 HOURS

UNIT – V
Parallel processing
Classification of parallel machines, pipeline processing, Vector processing,multiprocessor system architecture-multiport memory, crossbar switch, timeshared common-bus, dual-bus, Bus arbitration.

12 HOURS

COURSE NO: PSITTC-103	Minor Test 1:20 Marks of 1.5 hours duration
COURSE TITLE: Logical Organization of Computers	Minor Test 2:20 Marks of 1.5 hours duration
No. of credits: 04	MajorTest :60 Marks of 3.0 hours duration

SUGGESTED READINGS:

1. MALVINO, A.P., LEACH, D.P.: Digital Principles and Applications,Tata McGraw-Hill, 3rd Edn. 1985
2. MILLMAN and HALKIAS: Integrated Electronics, McGraw-Hill.
3. STRANGIO, C.E.: Digital Electronics – Fundamental Concepts and sons, 1985
4. KHAMBATA, J.: Microprocessor and Microcomputer, John Wiley and Applications, PHI, 1984.
5. LIU, Y.GIBSON, G.A.: Microcomputer Systems: The 8086/808,Family, Prentice-Hall 2nd Edn, 1986.
6. ALEXANDRIDIS NIKITAS, A.: Microprocessor System Design Concepts, Galgotia Publications, 1984.
7. STONE, S.: Introduction to Computer Architecture, Galgotia Publications,2nd Edn, 1986.
8. MANO, M.M.: Computer System Architecture, Prentice-Hall, 1976.
9. BAER, J.L.: Computer System Architecture, Computer Science Press, 1980.

SCHEME FOR PAPER SETTING

The question paper shall be divided into sections A & B as below. No question shall be repeated in the question paper.

Section A -   There shall be FIVE short answer type questions of THREE mark each. In this section, questions shall be covered from each unit and the candidates shall be required to answer all the questions.
(3 x 5 = 15 marks)

Section B -   There shall be THREE long answer type questions each set from Unit –III, IV and V with internal choice. Each question shall carry FIFTEEN marks.   *(3 x 15 = 45 marks)*

-X-

M.Sc. IT - FIRST SEMESTER

COURSE NO: PSITTC-104	Minor Test 1:20 Marks of 1.5 hours duration
COURSE TITLE: Discrete Mathematics	Minor Test 2:20 Marks of 1.5 hoursduration
No. of credits: 04	MajorTest :60 Marks of 3.0 hours duration

For examinations to be held in Dec- 2024, 2025, and 2026

UNIT - I
Counting techniques:
Basics of counting pigeon hole principles, permutation and combination, Recurrence Relations & their solution (Homogeneous & non-homogenous),Decision trees, Divide & Conquer Relations function, Decision trees   12 HOURS

UNIT - II
Logic & Fuzzy sets:
Logic operators like AND, OR etc., Truth tables; theory of inference
and deductions, Mathematical Induction, predicate calculus, predicate and quantifiers.
Introduction to fuzzy systems, fuzzy sets, equality of fuzzy sets, normal fuzzy sets, containment, support of a fuzzy set. Alpha-level sets. Basic operation of Fuzzy sets.
                                                                           12 HOURS

UNIT - III
Graph:
Introduction to Graphs; Incidence and degree; Handshaking Lemma; Isomorphism; Subgraphs and Union of graphs; connectedness; Walks, Paths and Circuits; Components; Connectedness Algorithm, shortest path Algorithms, Eulerian graph; Fleury's algorithms, Hamiltonian graph - Necessary conditions and sufficient conditions; Travelling saleman problem;
Bipartite graphs; Directed Graphs, Binary relations, connectedness in directedGraph.
Matrix representations of graph: Incidence; Adjacency matrices and theirproperties.
                                                                           12 HOURS

UNIT -IV
Trees:
Properties of trees; Pendant vertices in a tree: Center of a tree; Rooted an binary trees;Spanning Trees – spanning tree algorithms;
Fundamental circuits; Spanning trees of a weighted graph, cutsets and cut –Vertices; Fundamental cutsets; connectivity and separativity;

UNIT - V
Planar graphs & colouring:
Combinatorial and geometric dual; Kuratowski's graphs: Detection of planarity;Thickness and crossings.
Colorings: Vertex coloring, Chromatic number; Chromatic polynomial, The fourcolour problem, edge coloring.

                                                                           12 HOURS

COURSE NO: PSITTC-104	**Minor Test 1:20 Marks of 1.5 hours duration**
COURSE TITLE: Discrete Mathematics	**Minor Test 2:20 Marks of 1.5 hoursduration**
No. of credits: 04	**MajorTest :60 Marks of 3.0 hours duration**

SUGGESTED READINGS:

1. Harry, F.: Graph Theory: Addison - Wesley Publ. Camp.
2. Trembly, J.P. and Manohar, R.P.: Discrete Mathematical Structures with Applications to Computer Science, McGraw – Hill.
3. Deo, N.: Graph Theory with Applications to Engineering andComputer Science, Prentice-Hall Inc.
4. Krishnamurthy, V.: Combinatorics: Theory and Applications,Affiliated East-West Press Pvt. Ltd.
5. Doerr, A. and Levasseur, K.: Applied Discrete Structures ofComputer Science, Galgotia Publications Ptv. Ltd.

SCHEME FOR PAPER SETTING

The question paper shall be divided into sections A & B as below. No question shall be repeated in the question paper.

Section A -   There shall be FIVE short answer type questions of THREE mark each. In this section, questions shall be covered from each unit and the candidates shall be required to answer all the questions.   *(3 x 5 = 15 marks)*

Section B -   There shall be THREE long answer type questions each set from Unit –III, IV and V with internal choice. Each question shall carry FIFTEEN marks.   *(3 x 15 = 45 marks)*

M.Sc. IT - FIRST SEMESTER

COURSE NO: PSITTC-105	Minor Test 1:20 Marks of 1.5 hours duration
COURSE TITLE: Operating Systems	Minor Test 2:20 Marks of 1.5 hoursduration
No. of credits: 04	MajorTest :60 Marks of 3.0 hours duration

For examinations to be held in Dec- 2024, 2025, and 2026

UNIT – I
Introduction:

Evolution of operating systems, operating systems concepts, types of operatingsystems, different views of the operating system, operating system structure.

12 HOURS

UNIT – II
Processes:

Concept, Operating system's view of processes, Interprocess communication,mutual exclusion, Interprocess synchronization, semaphores, Monitors, Message passing, process scheduling and performance criteria, scheduling algorithms, deadlocks, deadlock handling strategies.

12 HOURS

UNIT – III
Memory Management:

Basic memory management, swapping, relocation & protection, virtual memory, paging, page replacement algorithms, Design issues for pagingsystems, segmentation.

12 HOURS

UNIT – IV
File & I/O Management:

Files, directories, disk organization, disk space management, disk scheduling,Protection Mechanisms, I/O devices, I/O buffering, device controllers.

12 HOURS

UNIT –V
Multiprocessors, Distributed OS:

Multiprocessors: Advantages, classification, Interconnection, types ofmultiprocessor OS
Distributed system & Network Operating Systems: Introduction, benefits, algorithms for distributed processing, Network OS; Remote Login; remote filetransfer

12 HOURS

COURSE NO: PSITTC-105	Minor Test 1:20 Marks of 1.5 hours duration
COURSE TITLE: Operating Systems	Minor Test 2:20 Marks of 1.5 hoursduration
No. of credits: 04	MajorTest :60 Marks of 3.0 hours duration

SUGGESTED READINGS:

1) Andrew. S. Tanenbaum : Modern operating systems, pearson prentice hall.
2) A. S. Tanenbaum , A. S. Woodhull : Operating systems-design andimplementation, Prentice hall of India pvt. ltd.
3) Milenkovic   M   : Operating   system-concepts   and   design, McGrawhillinternatinal editions.
4) Silberschartz, Galvin, Gagne : Operating system Principles , WSE wiley.
5) A S Godbole : Operating systems, tata McGraw hill.
6) Bach M. : Design of the UNIX Operating Systems.
7) Deitel H. M. : An Introduction to operating system, addison- wesley publications.8) Madnick & Donovan: Operating systems, mcgraw-hill book co.
9) Understanding Operating Systems – Flynn – Thomson Learning

SCHEME FOR PAPER SETTING

The question paper shall be divided into sections A & B as below. No question shall be repeated in the question paper.

Section A -   There shall be FIVE short answer type questions of THREE mark each. In this section, questions shall be covered from each unit and the candidates shall be required to answer all the questions.   *(3 x 5 = 15 marks)*

Section B -   There shall be THREE long answer type questions each set from Unit –III, IV and V with internal choice. Each question shall carry FIFTEEN marks.   *(3 x 15 = 45 marks)*

-x-

M.Sc. IT - FIRST SEMESTER

COURSE NO: PSITLC-150	Internal Evaluation:75 Marks
COURSE TITLE: Practical based on above courses	External Evaluation:75 Marks
No. of credits: 06	

Practical in this course shall be based on all above courses with special emphasis to C-Language.

-X-

M.Sc. IT - SECOND SEMESTER

COURSE NO: PSITTC-201	Minor Test 1:20 Marks of 1.5 hours duration
COURSE TITLE: Data and File Structures	Minor Test 2:20 Marks of 1.5 hoursduration
No. of credits: 04	MajorTest :60 Marks of 3.0 hours duration

For examinations to be held in May- 2025, 2026, and 2027

UNIT - I
Fundamental Notations:
Primitive and composite data types, Time and space complexity of algorithms.Storage structures for arrays & matrices, sparse matrices, strings, pattern matching.

12 HOURS

UNIT - II
Linear Data Structures:
Arrays and Linked Lists, Singly linked lists, Doubly linked list, Circular linked list, Doubly circular linked lists, Dynamic Storage Management. Applications oflinked lists
Stacks and Queues: representation and Applications. Deque, Priority queues

12 HOURS

UNIT - III
Non-Linear Data Structures:
Trees, Binary Trees, Traversing binary trees, Threaded binary trees, Binary search trees - representation and Applications, Heaps - representation and Applications.
Graphs - representation and Applications, Path matrix, Graph traversal- DFS and BFS

12 HOURS

UNIT - IV
File Structures:
Concepts of fields & records, Classification of files, File operations,
File organizations, Variable length records and text files. Indexing structures like B – trees, ISAM. Hashing techniques for Direct Files.

12 HOURS

UNIT - V
Sorting:
Internal and External Sorts, Bubble sort, Insertion sort, Selection Sort,
heap sort & Quick sort, Searching techniques- linear search & binary search , Merging algorithms.

12 HOURS

COURSE NO: PSITTC-201

COURSE TITLE: Data and File Structures

No. of credits: 04

Minor Test 1:20 Marks of 1.5 hours duration
Minor Test 2:20 Marks of 1.5 hours duration
MajorTest :60 Marks of 3.0 hours duration

SUGGESTED READINGS:

1. Seymour Lipschutz : Theory and Problems of Data StructuresSt. Sehaum's Outline Series in Computers
   Publisher: Tata McGraw-Hill

2. Richard Gilberg, Behrouz A. Forouzan, "Data Structures: A pseudo codeapproach with C", Second Edition, 2007, CENGAGE India Pvt. Ltd., New Delhi.

3. Horowitz, E., and Sahni, S.: Fundamentals of data StructuresComputer Science Press.

4. Aho, A.V., Hopcraft, and Ullman, J.E.; Data Structures and Algorithms,Addison Weseley.

5. Tanhenbaum, A.M., and Augenstein, M.J.: Data Structures with C,Prentice- Hall, and International.

6. Bhagat Singh and Naps Thompson : Introduction to Data Structures usingPascal Publisher: Galgotia

SCHEME FOR PAPER SETTING

The question paper shall be divided into sections A & B as below. No question shall be repeated in the question paper.

Section A - There shall be FIVE short answer type questions of THREE mark each. In this section, questions shall be covered from each unit and the candidates shall be required to answer all the questions. *(3 x 5 = 15 marks)*

Section B - There shall be THREE long answer type questions each set from Unit –III, IV and V with internal choice. Each question shall carry FIFTEEN marks. *(3 x 15 = 45 marks)*

-X-

M.Sc. IT - SECOND SEMESTER

COURSE NO: PSITTC-202	Minor Test 1:20 Marks of 1.5 hours duration
COURSE TITLE: Data Communication and Networks	Minor Test 2:20 Marks of 1.5 hours duration
No. of credits: 04	MajorTest :60 Marks of 3.0 hours duration

For examinations to be held in May- 2025, 2026, and 2027

Unit – I

Data Communication Concepts : Signal and Data, Transmission, Bit rate, BaudRate, Digital Data, Analog Data, Digital Signal, Analog Signal, Simplex, Half Duplex and Full Duplex Modes of Transmission, Synchronous and Asynchronous Transmission, Modulation: Amplitude Modulation, Frequency Modulation, Phase Modulation, Bandwidth concepts, channel Capacity. Introduction to Networking: Computer Network, Characteristics andadvantages of networking, Types of networking.
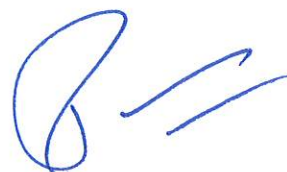
12 HOURS

Unit – II

Transmission media & Network Topologies: Guided and Unguided media, Twisted Pair Cable, Coaxial Cable, FOC(Fiber Optics Cable), Radio,VHF and Microwaves, Satellite link, Different Network Topologies, Their advantages andDisadvantages.
Multiplexing Channels and Concept of Multi Channeling and modulation, pulsecode modulation, Frequency Division Multiplexing, Time Division Multiplexing.

12 HOURS

Unit-III

Network Standards: OSI Model and different Layers, Protocols associated with different OSI layers , Functions and Responsibilities of each layer, SimpleNetwork Management Protocol(SNMP), Simple Mail Transfer Protocol (SMTP), Multipurpose Internet Mail Extension (MIME), Hyper Text Transfer Protocol(HTTP), File Transfer Protocol (FTP), Uniform Resource Locator(URL). Switching: Switching Concept, Circuit Switching , Packet Switching and Message switching.

12 HOURS

COURSE NO: PSITTC-202	Minor Test 1:20 Marks of 1.5 hours duration
COURSE TITLE: Data Communication and Networks	Minor Test 2:20 Marks of 1.5 hours duration
No. of credits: 04	MajorTest :60 Marks of 3.0 hours duration

Unit–IV

Internet: Concepts, History of Internet, TCP-IP, Applications of Internet, email, Telnet, FTP, Remote Login, WWW, Dialup broadband, ISDN:-Elements, Uses of ISDN, Broadband ISDN,Leased line, Internet Service Providers, X.25, IEEE
802.11 - Architecture- BSS, ESS, Physical layer – FHSS, DSSS, OFDM; MAClayer – DCF, PCF, Bluetooth – Architecture, Bluetooth layers – Media layer, base band layer, physical links, L2 CAP

12 HOURS

Unit–V

Internetworking: Principles of Internetworking, Connectivity Devices, Hub, Bridges, Routers, Routing with bridges, Switches, Gateways, VAST, Modems, Connectionless internetworking, Connection oriented internetworking, WirelessProtocols (WIFI, Wimax)

12 HOURS

SUGGESTED READINGS:

1. Behrouz A. Forouzan. Data Communications and Networking. McGraw Hill.

2. Achyut S. Godbole Data Communication & Networking Tata McGraw-Hill

3. Michal Miller, Introduction to Digital And Data Communications, JAICO Pub.

4. Shay, William, Understanding Data Communications and Networks,Brooks/Cole Publishing Company

5. Computer Networks, A. Tanenbaum, PHI Pub.

SCHEME FOR PAPER SETTING

The question paper shall be divided into sections A & B as below. No question shall be repeated in the question paper.

Section A -   There shall be FIVE short answer type questions of THREE mark each. In this section, questions shall be covered from each unit and the candidates shall be required to answer all the questions.   *(3 x 5 = 15 marks)*

Section B -   There shall be THREE long answer type questions each set from Unit –III, IV and V with internal choice. Each question shall carry FIFTEEN marks.   *(3 x 15 = 45 marks)*

M.Sc. IT - SECOND SEMESTER

COURSE NO: PSITTC-204	**Minor Test 1:20 Marks of 1.5 hours duration**
COURSE TITLE: Data Base Management System	**Minor Test 2:20 Marks of 1.5 hours duration**
No. of credits: 04	**MajorTest :60 Marks of 3.0 hours duration**

For examinations to be held in May- 2025, 2026, and 2027

UNIT – I
Database Management System Concepts:
File based system, Need of database Management System (DBMS), Components of DBMS, data independence, three level architectural of database, entity relationship model, conversion of ER diagrams to relational Database, conventional file organizations, inverted files, hashing and B tree.

12 HOURS

UNIT – II
Data Models:
Hierarchical, network and relational data models, relational database Design,relation concepts of joins, relational algebra and calculus.

12 HOURS

UNIT – III
Normalisation:
Functional Dependencies, multivalued dependencies, theory of normalization,normal forms.
Concurrency Control:
Data   security,   recovery   management,   recovery   techniques,   concurrency management.

12 HOURS

UNIT – IV
SQL using Oracle:
SQL query processing table creation and management, using inbuilt functions, data integrity constraints, views, joins, SET operators, privileged roles and security policies.

12 HOURS

UNIT – V
Oracle PL/SQL
Architecture,   Fundamentals,   PL/SQL   control   structure,   Exception,   Cursors, procedures and functions, packages database triggers.

12 HOURS

COURSE NO: PSITTC-204	Minor Test 1:20 Marks of 1.5 hours duration
COURSE TITLE: Data Base Management System	Minor Test 2:20 Marks of 1.5 hours duration
No. of credits: 04	MajorTest :60 Marks of 3.0 hours duration

SUGGESTED READINGS:

1. Bipin C. Desai: An Introduction to Database Systems, West-publishing company.
2. Elmasri, Navathe: Fundamentals of Database Systems, Addison Wesley, Pearson Education.
3. Date, C.J.: An Introduction to Database Systems Addison Wesley PearsonEducation.
4. R.A. Parida, Vinod Sharma: The power of Oracle 9i, Firewall Media publications.
5. V.K. Jain: Database Mgt. System, Wiley India

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M.Sc. IT - SECOND SEMESTER

COURSE NO: PSITTC-206	**Minor Test 1:20 Marks of 1.5 hours duration**
COURSE TITLE: Algorithm Design and Analysis	**Minor Test 2:20 Marks of 1.5 hours duration**
No. of credits: 04	**MajorTest :60 Marks of 3.0 hours duration**

For examinations to be held in May- 2025, 2026, and 2027

UNIT –I

Review of Algorithms and Data Structures

Algorithms, Problems and Instances, Characteristics, Basic Instructions, ControlMechanisms and Control Structures, Stacks and Queues, Trees, Graphs.

Understanding and Analyzing the Problem, Choice of Appropriate Data Structuresand Design Technology, Analyzing an Algorithm.

12 HOURS

Unit –II

Basics of Analysis

Asymptotic Bounds, Concept of Efficiency of an Algorithm, Well Known Asymptotic Functions & Notations.

Well Known Sorting & Searching Algorithms, Best-Case and Worst-Case Analyses, Average-Case Analysis. Amortized Analysis, Analysis of Sorting and Searching algorithms

12 HOURS

Unit – III

Design Techniques

Divide-and-Conquer, General Method, Binary Search, Merge Sort, Quick Sort, Strassen's Matrix multiplication, Exponentiation.

Greedy Algorithms, General Method, Knapsack problem, Job sequencing with dead lines, Minimum Cost Spanning Trees - Kruskal's Algorithm, Prim's Algorithm, Single Source Shortest Paths.

12 HOURS

UNIT – IV

Design Techniques

Dynamic Programming, General Method, Multistage Graphs, All-Pairs shortestPaths, The Principle of Optimality, The Traveling Salesperson Problem, Chained Matrix Multiplication.

Backtracking, General method, 8-queen's problem, Sum of Subsets problem. 12 HOURS

COURSE NO: PSITTC-206	Minor Test 1:20 Marks of 1.5 hours duration
COURSE TITLE: Algorithm Design and Analysis	Minor Test 2:20 Marks of 1.5 hours duration
No. of credits: 04	MajorTest :60 Marks of 3.0 hours duration

UNIT – V

Classification of Problems & Basic Traversals Techiniques
Non-Deterministic Algorithms, Introduction to NP-Completeness, Establishing NP-Completeness of Problems, NP-Completeness Proofs, NP-Hard Problems,
Basic Traversal and Search techniques: Traversing Trees, Depth-First Search,Breadth-First
Search, Best-First Search & Minimax Principle, Topological Sort.

12 HOURS

SUGGESTED READINGS:

1) Ellis Horowitz and Sartaj Sahni – Fundamentals of Computer Algortihms,Galgotia Publ.
2) Aho A V , Hopcroft J E, Ullman J D – The Design and Analysis of ComputerAlgorithms, Addison Wesley.
3) G. Brassared and P. Brately - Fundamental of Algorithmics, Prentice-Hall-ofIndia.
4) D. Harel - Algorithmics : The spirit of computing . Addison Wesley.
5) R. Neapolitian and K. Naimipour –- Foundation of Algorithms , D.C. Health-and Company
6) D. E. Knuth - Foundation Algorithms , Narosa Publishing House.

SCHEME FOR PAPER SETTING

The question paper shall be divided into sections A & B as below. No question shall be repeated in the question paper.

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M.Sc. IT - SECOND SEMESTER

COURSE NO: PSITTC-207	**Minor Test 1:20 Marks of 1.5 hours duration**
COURSE TITLE: Object Oriented Programming in Java	**Minor Test 2:20 Marks of 1.5 hours duration**
No. of credits: 04	**Major Test : 60 Marks of 3.0 hours duration**

For examinations to be held in May- 2025, 2026, and 2027

Unit -I

Java Language Basics, Object Oriented concepts, Java Virtual Machine Concepts, Primitive Data Type And Variables, Java Keywords, Java Operators, Expressions, Control Statements and Arrays.

12 HOURS

Unit –II

Class and Objects, Static methods, Final methods, Constructors, Method Overloading, Inheritance, Access Control, Method Overriding, Dynamic method dispatch, Garbage Collection, Abstract Classes, Polymorphism

12 HOURS

Unit –III

Packages, Interfaces, Nested classes and interfaces, Exceptions Handling, Typesof Exceptions, Writing Exception Subclasses, Multithreading, Synchronization in Java

12 HOURS

Unit –IV

I/O in Java, Byte Stream Classes, Character Stream Classes, Reading and Writing to Console, Reading and Writing Files, The Transient and Volatile Modifiers, The String and String Buffer Class, Network Programming in Java, TCP/IP Sockets and Datagrams.

12 HOURS

Unit –V

The Applet Class, An Applet Skeleton, Graphics and User Interfaces, AWT classes, Building User Interface with AWT, menus, Event Handling, Layouts and Layout Manager, Overview of Java Swing classes.

12 HOURS

COURSE NO: PSITTC-207	Minor Test 1:20 Marks of 1.5 hours duration
COURSE TITLE: Object Oriented Programming in Java	Minor Test 2:20 Marks of 1.5 hours duration
No. of credits: 04	MajorTest :60 Marks of 3.0 hours duration

SUGGESTED READINGS:

1) Herbert Schildt – "Java2 The Complete Reference" , Tata Mcgraw Hill.
2) E. Balagurusamy - " Programming with JAVA", Tata McGraw Hill.
3) Dietel & Dietel – "Java How to Program" , Pearson Education.
4) Steven Holzner – "Java2 Black Book" , Dreamtech Press.
5) Grant Palmer – "Java Programmer's Reference" , Wrox.
6) Jamie Jaworski – "Java2 Platform Unleashed", TechMedia.
7) Bruce Eckel – "Thinking in Java", Prentice Hall.

<u>SCHEME FOR PAPER SETTING</u>

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M.Sc. IT - SECOND SEMESTER

COURSE NO: PSITLC-250	**Internal Evaluation:75 Marks**
COURSE TITLE: Practical based on above courses	**External Evaluation:75 Marks**
No. of credits: 06	

Practical in this course shall be based on all above courses with special emphasis to SQL.

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M.Sc. IT - THIRD SEMESTER

COURSE NO: PSITTC-301	Minor Test 1:20 Marks of 1.5 hours duration
COURSE TITLE: Web Technologies	Minor Test 2:20 Marks of 1.5 hours duration
No. of credits: 04	MajorTest :60 Marks of 3.0 hours duration

For examinations to be held in Dec- 2025, 2026, and 2027

Unit-I
Web Server, Web site, Web page, URL, Setting up of a web server, Web Browserand its Working. Introduction to HTML, Text Formatting Tags, BODY Tag, HEAD Tag, META Tag,Adding Lists, Table, Frame and Form, Embedding objects.

12 HOURS

Unit II
Introduction to DHTML, Cascading Style Sheet, Defining Styles, Elements of Style, Linking a Style Sheet to an HTML Document, In-line Styles, External Style Sheets, Internal Style Sheets, Multiple Styles. JavaScript, Variables, String manipulation, Mathematical Functions, Statements, Operators, Arrays, and Functions, Data and Objects, Regular Expressions, Built- in Objects, Events, Data validation, Opening a New Window, Messages and Confirmations, The Status Bar, Writing to a Different Frame, Rollover Buttons, Moving Images.

12 HOURS

Unit III
Java Applets : Life Cycle of Applet, Creating Applets, Adding Applet to HTML File; Running the Applet, Passing Parameters to an Applet, Drawing Images on theapplet, Introduction to SWING. XML, structure of XML document, using DTD with XML, XML Entities, XML schema

12 HOURS

Unit IV
CGI, Servlets, HTTP servlet, Servlet Life Cycle, Servlet Request and Response Interface session tracking, Database connectivity, JDBC vs ODBC Inter-servlet communication.

12 HOURS

COURSE NO: PSITTC-301	**Minor Test 1:20 Marks of 1.5 hours duration**
COURSE TITLE: Web Technologies	**Minor Test 2:20 Marks of 1.5 hours duration**
No. of credits: 04	**MajorTest :60 Marks of 3.0 hours duration**

Unit V

JSP, scripting Elements, JSP Expression, JSP Declaration, Predefined variables/objects, Working with Databases Using JSP, Inserting, Updating, and Deleting Database Records.

12 HOURS

SUGGESTED READINGS:

1. Web Programming – Chris bates – Wiley Dreamtech India – 2nd Ed. 2002.
2. Internet and Web Technologies – Raj kamal – Tata McGrawHill – 2002
3. Multimedia and Web Technology, Ramesh Bangia, 2e, Firewall Media
4. The Complete Reference Java 2, Herbert Schildt and Pattrick Manghton, 3e,Tata McGraw Hill
5. Internet and Worldwide Web, H.M. Deitel, P.J. Dietel and A.B. Goldberg,3e, Pearson Education
6. Java Servlets, Karl Moss, 2e, Tata McGraw Hills
7. Mastering Javascript and Jscript, James Jaworski, 2e, BPB
8. HTML 4.0, E. Stephen Mack and Janan Platt, 1e, BPB
9. JSP The complete Reference, Phil Hana
10. Java Servlets and JSP, Bonce W. Perry,
11. ASP Developer's Guide, Greg Bnczek, 1e, McGraw Hill
12. "XML: Related Technologies and Programming with Java" PHI
13. Dynamic HTML., Jeff Rule, 1e, Dreamtech Press
14. The Complete Reference Java Script, Thomas Powell and Fritz Schneider,2e, Tata McGraw Hill
15. Java Server pages in 24 Hours, Jose Annunziato and Stephanie FeslerKaminaris 1e, Techmedia

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(3 x 15 = 45 marks)

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M.Sc. IT - THIRD SEMESTER

COURSE NO: PSITTC-303	Minor Test 1:20 Marks of 1.5 hours duration
COURSE TITLE: Artificial Intelligence	Minor Test 2:20 Marks of 1.5 hours duration
No. of credits: 04	MajorTest :60 Marks of 3.0 hours duration

For examinations to be held in Dec- 2025, 2026, and 2027

Unit-I

Introduction Artificial Intelligence:
Simulation of a So-called intelligent behaviour in different areas; Problem Solving, min-max principle, Learning, Aim-oriented (Heuristic) algorithms versus solution-guaranteed algorithms. Study of different application areas of AI.

12 HOURS

Unit-II

Understanding Natural Languages:
Parsing techniques, context free and transformational grammars, transition nets, augmented transition nets, Fillmore's grammar, grammar-free analyzers, sentence generation, translation.

12 HOURS

Unit-III

Knowledge Representation:
First-order predicate calculus; Semantic nets, partitioned nets; Frames, case- grammar theory, conceptual dependency, production rules, knowledge base.

12 HOURS

Unit-IV

Expert System Architecture:
domain exploration Meta-knowledge, expertise transfer, self-explaining system. Inference system, forward and backward deduction. Existing System (DENDRAL, MYCIN);

12 HOURS

Unit-V

Pattern Recognition Structured Description:
Visual perception, machine perception, Action, Support Vector Machine, Bayesiandecision theory, object identification, speech recognition.

12 HOURS

COURSE NO: PSITTC-303	Minor Test 1:20 Marks of 1.5 hours duration
COURSE TITLE: Artificial Intelligence	Minor Test 2:20 Marks of 1.5 hours duration
No. of credits: 04	MajorTest :60 Marks of 3.0 hours duration

SUGGESTED READINGS:

1. Charniak, E.: Introduction of Artificial Intelligence, Narosa Publishing House.
2. Winston, P.H.: LISP, Narosa Publishing House.
3. Milner, Common LISP: A Tutorial, Prentice-Hall Inc. 1988.
4. Marcellus: Expert System Programming in TURBO PROLOG, Prentice-Hall-Inc. 1989.
5. Elaime, R.: Artificial Intelligence, 1983.
6. Hunt, E.B.: Artificial Intelligence, Academic Press, 1975.
7. Lloyd, J.: Foundation of Logic Programming Springer-Verlog, 1982.
8. Clark, K.L. & McCabe, F.G.: Micro-prolog, Prentice-Hall, India, 1987.
9. Clockskin, W.F. and Mellish, C.S.: Programming in Prolog, Narosa Publishing House.

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M.Sc. IT - THIRD SEMESTER

COURSE NO: PSITTC-304	Minor Test 1:20 Marks of 1.5 hours duration
COURSE TITLE: Compiler Design	Minor Test 2:20 Marks of 1.5 hours duration
No. of credits: 04	MajorTest :60 Marks of 3.0 hours duration

For examinations to be held in Dec- 2025, 2026, and 2027

Unit-I

Compiler Structure: Compilers and Translators, Analysis- Synthesis Model of Compilation, Various Phases of Compiler, Pass Structure, Bootstrapping & Compiler Construction Tools. Lexical Analysis: Interface with input, parser and symbol table, token, lexeme and patterns, difficulties in lexical analysis, Error Reporting, Regular definition, Transition diagrams, LEX. Capabilities of Lexical Analyzer

12 HOURS

Unit-II

Finite Automata: Nondeterministic Finite Automata, Deterministic Finite Automata, SubsetConstruction, Thompson's construction, DFA State Minimization.
The Syntactic Specification of Programming Languages: CFG, Derivation and Parse tree,Ambiguity, Capabilities of CFG.

12 HOURS

Unit-III

Basic Parsing Techniques: Top-Down parsers with backtracking, Recursive Descent Parsers, Predictive Parsers, Nonrecursive Predictive Parsers, Bottom–up Parsers, Shift- Reduce Parsing, Operator Precedence Parsers, LR parsers.
YACC, Syntax Directed Definitions, Type checking

12 HOURS

Unit-IV

Run Time Memory Management: Static and Dynamic storage allocation, stack basedmemory allocation schemes, Symbol Table management.
Error Detection and Recovery: Lexical phase errors, Syntactic phase errors, Semanticerrors.
Intermediate Code Generation: Different Intermediate forms: three address code,Quadruples & Triples.

12 HOURS

Unit-V

Sources of optimization, Local optimization, Loop optimization, Peephole optimization. Issues in the design of Code Generator, Basic Blocks and Flow Graphs, Transformationson Basic Blocks, DAG, Code Generation Algorithm, Register Allocation and Assignment.

12 HOURS

COURSE NO: PSITTC-304	Minor Test 1:20 Marks of 1.5 hours duration
COURSE TITLE: Compiler Design	Minor Test 2:20 Marks of 1.5 hours duration
No. of credits: 04	MajorTest :60 Marks of 3.0 hours duration

SUGGESTED READINGS:

1. Alfred V Aho , Jeffrey D. Ullman: "Principles of Compiler Design", Narosa Publ. House.
2. A.V. Aho, R. Sethi and J.D Ullman: "Compiler: principle, Techniques and Tools",Addison Wesley.
3. Tremblay and Sorenson: "The theory and Practice of Compiler Writing" – McGraw Hill.
4. Tremblay and Sorenson: "An Implementation Guide to Complier Writing" – McGrawHill.
5. Londan: "Compiler Construction" - Thomson Learning
6. H.C. Holub: "Compiler Design in C", Prentice Hall.
7. Apple: "Modern Computer Implementation in C: Basic Design", Cambridge press
8. Compiler Construction: Principles & Practice: Londa – Thomson Learning

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M.Sc. IT - THIRD SEMESTER

COURSE NO: PSITLC-350	Internal Evaluation:75 Marks
COURSE TITLE: Practical based on above courses	External Evaluation:75 Marks
No. of credits: 06	

Practical in this course shall be based on all above courses with specialemphasis to JAVA and Web Technologies.

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M.Sc. IT - FOURTH SEMESTER

COURSE NO: PSITTC-401	Minor Test 1:20 Marks of 1.5 hours duration
COURSE TITLE: Software Engineering	Minor Test 2:20 Marks of 1.5 hours duration
No. of credits: 04	MajorTest :60 Marks of 3.0 hours duration

For examinations to be held in May- 2026, 2027, and 2028

UNIT-I
Software Process
Introduction –S/W Engineering Paradigm , life cycle models (water fall, incremental, spiral, WINWIN spiral, evolutionary, prototyping, object orientedsystem engineering, computer based system verification, validation, life cycle process, development process, system engineering hierarchy.

12 HOURS

UNIT-II
Software Requirements
Functional and non functional user system, requirement engineering process, feasibility studies, requirements , elicitation, validation and management , software prototyping, prototyping in the software process – rapid prototyping techniques – user interface prototyping -S/W document. Analysis and modeling – data, functional and behavioral models – structured analysis and data dictionary.

12 HOURS

UNIT-III

Design Concepts and Principles
Design process and concepts – modular design – design heuristic – design model and document. Architectural design – software architecture – data design –architectural design – transform and transaction mapping – user interface design
– user interface design principles. Real time systems - Real time software design
– system design – real time executives – data acquisition system - monitoring and control system. SCM – Need for SCM – Version control – Introduction to SCM process – Software configuration items.

12 HOURS

UNIT-IV

Testing
Taxonomy of software testing – levels – test activities – types of s/w test – black box testing – testing boundary conditions – structural testing – test coverage criteria based on data flow mechanisms – regression testing – testing in the large. S/W testing strategies – strategic approach and issues - unit testing – integration testing – validation testing – system testing and debugging.

12 HOURS

COURSE NO: PSITTC-401	Minor Test 1:20 Marks of 1.5 hours duration
COURSE TITLE: Software Engineering	Minor Test 2:20 Marks of 1.5 hours duration
No. of credits: 04	MajorTest :60 Marks of 3.0 hours duration

UNIT-V

Software Project Management
Measures and measurements – S/W complexity and science measure – sizemeasure – data and logic structure measure – information flow measure. Software cost estimation – function point models – COCOMO model- Delphi method.- Defining a Task Network – Scheduling – Earned Value Analysis – Error Tracking - Software changes – program evolution dynamics – software maintenance – Architectural evolution. Taxonomy of CASE tools.

12 HOURS

SUGGESTED READINGS:

1. Roger S.Pressman, Software engineering- A practitioner's Approach, McGraw-Hill International Edition
2. Ian Sommerville, Software engineering, Pearson education Asia.
3. Pankaj Jalote- An Integrated Approach to Software Engineering, SpringerVerlag.
4. James F Peters and Witold Pedryez, "Software Engineering – An EngineeringApproach", John Wiley and Sons, New Delhi.
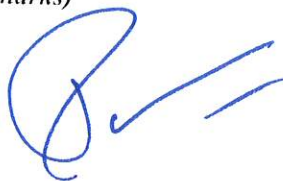
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M.Sc. IT - FOURTH SEMESTER

COURSE NO: PSITTC-402	Minor Test 1:20 Marks of 1.5 hours duration
COURSE TITLE: Computer Graphics	Minor Test 2:20 Marks of 1.5 hours duration
No. of credits: 04	MajorTest :60 Marks of 3.0 hours duration

For examinations to be held in May- 2026, 2027, and 2028

UNIT-I
Concept of Computer Graphics and its applications. Graphics input and output devices. Graphic display devices (refreshing display devices, Random scan display device, Raster scan devices.

<div align="right">12 HOURS</div>

UNIT-II
Concept of Graphic Primitives, points, lines etc., line generation algorithms (DDAand Bresemhams) Circle and its properties, generation of circle (mid point algorithms), Polygon filling,using scan line filing algorithm.
Point and Line clipping, Cohen Sutherland and Cyrus – Beck Line Clipping algorithms.

<div align="right">12 HOURS</div>

UNIT-III
Concept of 2D transformations. Basic Transformations (translation, rotation, scaling, shearing) composite transformations, transformations using homogeneous coordinate systems.
3D transformations (Translation, rotation, scaling, shearing, reflection).

<div align="right">12 HOURS</div>

UNIT-IV
Introduction, objectives of viewing transformation. Concept of projections: parallel projection, orthographic and oblique projections, isometric projections, perspective projections (concept of vanishing points, single point, perspective transformation, 2- point and 3-point perspective transformation and general perspective transformation with COP at the origin.

<div align="right">12 HOURS</div>

COURSE NO: PSITTC-402	**Minor Test 1:20 Marks of 1.5 hours duration**
COURSE TITLE: Computer Graphics	**Minor Test 2:20 Marks of 1.5 hours duration**
No. of credits: 04	**MajorTest :60 Marks of 3.0 hours duration**

UNIT-V

Polygon representation methods (polygon surfaces, polygon tables, plain equation,polygon meshes)
Hermite and Bezier curves and their properties. Surface of revolution.
Concept of visible surface detection.Methods of visible surface detection (depthbuffer, scan line, area sub division)

12 HOURS

SUGGESTED READINGS:

1. Giloi, Wk.: Interactive Computer Graphics, Prentice-Hall.
2. Newman, W., Sproul, R.F.: Principles of Interactive Computer Graphics,McGraw-Hill.
3. Rogers, D.F.: Procedural Elements for Computer Graphics, McGraw-Hill.
4. Harrington, S.: Computer Graphics: A Programming Approach, TataMcGraw- Hill.
5. Foley, J.D., Van Dam, A.: Fundamentals of Interactive Computer Graphics,Addison Wesley.
6. Hearn, D., Baker, and P.M.: Computer Graphics, Prentice-Hall.
7. Tosijasu, L.K.: Computer Graphics, Springer Verlog.
8. Rogers, D.F. McGraw Hill: Mathematical Elements of Computer Graphics,

SCHEME FOR PAPER SETTING

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M.Sc. IT - FOURTH SEMESTER

COURSE NO: PSITTC-404	Minor Test 1:20 Marks of 1.5 hours duration
COURSE TITLE: Android Programming	Minor Test 2:20 Marks of 1.5 hours duration
No. of credits: 04	MajorTest :60 Marks of 3.0 hours duration

For examinations to be held in May- 2026, 2027, and 2028

UNIT-I
Android Fundamentals
 Introduction to Android and Eclipse, Dalvik Virtual Machine & .apk file extension, Basic Building blocks - Activities, Services, Broadcast Receivers & Content providers, UI Components - Views & notifications, Android API levels (versions & version names). Android Debug Bridge (adb) tool.

12 HOURS

UNIT-II
Building Application Framework
Using the Android Documentation, Introduction to Android Manifest File, Debugging Applications with DDMS, Working with the Android Using Other Android Tools, Designing a Typical Android Application Using the Application Context, Working with Activities, Working with Intents. Working with Dialog, Using Dialogs to Collect User Input.

12 HOURS

UNIT-III
Application Enrichment with Powerful Android Features
Adding Support for Location-Based Services, Adding Network Support, Adding More Network Support, Adding Social Features, Creating a Home Screen App Widget, Working with Files.

12 HOURS

UNIT-IV
 Adding More Features to Android Application
Internationalizing Android Application, Designing Advanced User Interfaces, Working with Multimedia, Working with 2D and 3D Graphics, Testing Android Applications, Accessing Underlying Device Hardware.

12 HOURS

COURSE NO: PSITTC-404	**Minor Test 1:20 Marks of 1.5 hours duration**
COURSE TITLE: Android Programming	**Minor Test 2:20 Marks of 1.5 hours duration**
No. of credits: 04	**MajorTest :60 Marks of 3.0 hours duration**

UNIT-V
Debugging and Publishing Android Application
Debugging the Android Application, Testing Android Application, Introduction toAndroid
Market(Google Play Store), Publishing Android Application.

<div align="right">12 HOURS</div>

SUGGESTED READINGS :

1. Android Programming for Beginners,by John Horton, Packt Publishing Limited,2015.
2. Android Application Development in 24 Hours, Sams Teach Yourself (4th Edition)byCarmen Delessio, Lauren Darcey, Shane Conder, Sams Publishing, 2015.
3. Android Programming: The Big Nerd Ranch Guide, Big Nerd Ranch Guides; 3edition, 2017.
4. Android App Development for Dummies by Michael Burton, Wiley; Thirdedition,2015.
5. Head First Android Development by Dawn Griffiths, David Griffiths, O'Reilly; 1edition, 2015.
7. Android wireless application development ,2nd edition by shane conder ,Laurendarcey –Addison - Welsey
8. Android Application Development by Rick rogers,John Lombardo – O'Reilly
9. Professional Android 2 application development by Reto Meier –Wrox

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Section B - There shall be THREE long answer type questions each set from Unit –III, IV and V with internal choice. Each question shall carry FIFTEEN marks. *(3 x 15 = 45 marks)*

-X-

M.Sc. IT - FOURTH SEMESTER

COURSE NO: PSITTE-405	**Minor Test 1:20 Marks of 1.5 hours duration**
COURSE TITLE: Programming in VB.NET	**Minor Test 2:20 Marks of 1.5 hours duration**
No. of credits: 04	**MajorTest :60 Marks of 3.0 hours duration**

For examinations to be held in May- 2026, 2027, and 2028

UNIT-I

Introduction to VB.NET, Event Driven Programming, Need for VB.NET, .NET Framework, .NET Architecture, The Just-In-Time Compiler, .NET Framework Class Library Introduction, VB.NET Development Environment, Creating VB.NET applications, Using simple components, Introduction to forms, data types, variables, type conversion, constants, operators and expressions.

12 HOURS

UNIT-II

Conditional Statements and Loops, Procedures, Argument passing mechanism, Arrays, Error Handling, Classes and objects, Properties, methods and events, Constructors and Destructors, Inheritance, Access modifiers : Public, Private, Protected, Friend, Overloading and Overriding, Interfaces, Polymorphism.

12 HOURS

UNIT-III

Windows Applications, Windows Forms, Text Boxes, Buttons, Labels, Check Boxes, and Radio Buttons, List Boxes, Combo Boxes, Picture Boxes, Scrollbars, Splitters, Timer, Menus, Built-in Dialogs, Image List, Tree Views, List Views, Toolbars, Status Bar and Progress bars.

12 HOURS

UNIT-IV

Database Connectivity, Connection Objects, Command Objects, Data Adapters, Datasets, Data Reader, Connection to database with Server Explorer, Multiple Table Connection, Data binding , Navigating Data Source, Data Grid View, Data form wizard, Data Validation.
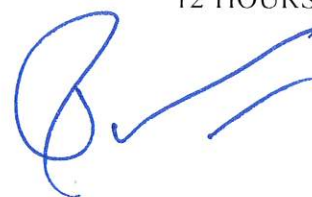
12 HOURS

UNIT-V

File handling using FileStream, StreamWriter, StreamReader, BinaryReader, BinaryWriter classes, File and Directory Classes.

Introduction to Crystal Reports, Connection to Database, Table, Queries, Building Report, Modifying Report, Working with formula fields, Parameter fields, SQL in Crystal Report.

12 HOURS

COURSE NO: PSITTE-405	Minor Test 1:20 Marks of 1.5 hours duration
COURSE TITLE: Programming in VB.NET	Minor Test 2:20 Marks of 1.5 hours duration
No. of credits: 04	MajorTest :60 Marks of 3.0 hours duration

SUGGESTED READINGS:

1) Francesco Balena, "Programming Microsoft Visual Basic.NET", MicrosoftPress.
2) Steven Holzner et al., "Visual Basic 2005 Programming – Black Book",Dreamtech Press.
3) Steven Holzner, Bob Howell, "ADO.NET Programming in Visual Basic .NET", Prentice Hall.
4) Kevin Goff , Rod Paddock, "Pro VS 2005 Reporting using SQL Serverand Crystal Reports", APress
5) George Peck, "The Complete Reference- Crystal Reports", TataMcGraw Hill

SCHEME FOR PAPER SETTING

The question paper shall be divided into sections A & B as below. No question shall be repeated in the question paper.

Section A - There shall be FIVE short answer type questions of THREE mark each. In this section, questions shall be covered from each unit and the candidates shall be required to answer all the questions.

(3 x 5 = 15 marks)

Section B - There shall be THREE long answer type questions each set from Unit –III, IV and V with internal choice. Each question shall carry FIFTEEN marks.

(3 x 15 = 45 marks)

-X-

M.Sc. IT - FOURTH SEMESTER

COURSE NO: PSITTE-406	Minor Test 1:20 Marks of 1.5 hours duration
COURSE TITLE: Python	Minor Test 2:20 Marks of 1.5 hours duration
No. of credits: 04	MajorTest :60 Marks of 3.0 hours duration

For examinations to be held in May- 2026, 2027, and 2028

UNIT - I

Introduction to Python Programming Language: Python Interpreter/Shell, Identifiers, Keywords, Statements and Expressions, Variables, Operators, Precedence and Associativity, Data types, Indentation, Comments, Reading Input, Print Output, Type Conversions, The type() function and Is operator, Dynamic and Strongly Typed Language. Control Flow Statements: The if Decision Control Flow Statement, The if…else Decision Control Flow Statement, The if…elif…else Decision Control Statement, Nested if Statement, The while Loop, The for Loop, The continue and break Statements.

<div align="right">12 HOURS</div>

UNIT - II

Functions: Types of Functions; Function Definition- Syntax, Function Calling, Passing Parameters/ arguments, the return statement; Default Parameters; Command line Arguments; Key Word Arguments. Creating and Storing Strings; Accessing String Characters; the str() function; Operations on Strings- Concatenation, Comparison, Slicing and Joining, Traversing; Format Specifiers; Escape Sequences; Raw and Unicode Strings; Python String Methods; Illustrative programs.

<div align="right">12 HOURS</div>

UNIT - III

Lists: Creating Lists, Basic List Operations, Indexing and Slicing in Lists, Built-In Functions Used on Lists, List Methods, Dictionaries: Creating Dictionary, Accessing and modifying key:value pairs in Dictionaries, Built-In Functions Used on Dictionaries, Dictionary methods, The del Statement. Tuples and Sets: Creating Tuples, Basic Tuple Operations, Indexing and Slicing in Tuples, Built-In Functions Used on Tuples, Relations between Tuples and Lists, Relations between Tuples and Dictionaries, Tuple Methods, Using zip() Function, Sets, Set Methods, Frozen set.

<div align="right">12 HOURS</div>

UNIT - IV

Files: Types of files, Creating and Reading Text Data, File Methods to Read and Write Data, Reading and Writing Binary Files,The Pickle module, Reading and writing CSV files, Object Oriented Programming: Classes and Objects, Creating Classes in Python, Creating Objects in Python, The Constructor Method, Classes with Multiple Objects, Class Attributes versus Data attributes, Encapsulation, Inheritance, The Polymorphism.

<div align="right">12 HOURS</div>

UNIT-V

Exceptions: Concept of Exceptions, Exceptions in python, Detecting and handling exceptions, Exceptions as strings, Raising Exceptions, Standard Exceptions. Multithreading: Understanding threads, Forking threads, synchronizing the threads, programming using multithreading. Database Interaction: SQL database connection using python. Creating , accessing and modifying tables through python.

<div align="right">12 HOURS</div>

COURSE NO: PSITTE-406	Minor Test 1:20 Marks of 1.5 hours duration
COURSE TITLE: Python	Minor Test 2:20 Marks of 1.5 hours duration
No. of credits: 04	MajorTest :60 Marks of 3.0 hours duration

SUGGESTED READINGS:

1) Gowrishankar S, Veena A, "Introduction to Python Programming", 1st Edition, CRC Press/Taylor & Francis, 2018. ISBN-13: 978-0815394372.

2) Mark Lutz, "Learning Python", 5th edition. Orelly Publication, 2013, ISBN 978- 1449355739.

3) R. Nageswara Rao, "Core Python Programming", Dreamtech Press, 2nd Edition, 2018.

4) Kamthane, A. N., & Kamthane, A.A. , "Programming and Problem Solving with Python", McGraw Hill Education, 2017.

5) Wesley J. Chun, "Core Python Applications Programming", 3rd Edition, Pearson Education, 2016.

6) Ljubomir Perkovic, "Introduction to Computing Using Python- An Application Development Focus", Wiley, 2012.

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Section B -. There shall be THREE long answer type questions each set from Unit –III, IV and V with internal choice. Each question shall carry FIFTEEN marks. *(3 x 15 = 45 marks)*

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M.Sc. IT - FOURTH SEMESTER

COURSE NO: PSITTE-407	Minor Test 1:20 Marks of 1.5 hours duration
COURSE TITLE: Cyber Security	Minor Test 2:20 Marks of 1.5 hours duration
No. of credits: 04	MajorTest :60 Marks of 3.0 hours duration

For examinations to be held in May- 2026, 2027, and 2028

UNIT-I
Overview of Cyber Security: Internet Governance – Challenges and Constraints, Cyber Threats: Cyber Warfare, Cyber Crime, Cyber Terrorism, Cyber Espionage. Cyber Security Vulnerabilities and Cyber Security Safeguards: Cyber Security Vulnerabilities-Overview, vulnerabilities in software, System administration, Complex Network Architectures, Open Access to Organizational Data, Weak Authentication, Unprotected Broadband communications

12 HOURS

UNIT-II
Cyber Security Safeguards: Overview, Access control, Audit, Authentication, Biometrics, Cryptography, Deception, Denial of Service Filters, Ethical Hacking, Firewalls, Intrusion Detection Systems, Response, Scanning, Security policy, Threat Management, Securing Web Application, Services and Servers. Introduction, Basic security for HTTP Applications and Services, Basic Security for SOAP Services, Identity Management and Web Services, Authorization Patterns, Security Considerations, Challenges.

12 HOURS

UNIT-III
Intrusion Detection and Prevention: Intrusion, Physical Theft, Abuse of Privileges, Unauthorized Access by Outsider, Malware infection, Intrusion detection and Prevention Techniques, Anti-Malware software, Network based Intrusion detection Systems, Network based Intrusion Prevention Systems, Host based Intrusion prevention Systems, Security Information Management, Network Session Analysis, System Integrity Validation.

12 HOURS

UNIT-IV
Cryptography and Network Security: Introduction to Cryptography, Symmetric key Cryptography, Asymmetric key Cryptography, Message Authentication, Digital Signatures, Applications of Cryptography. Overview of Firewalls- Types of Firewalls, User Management, VPN Security, Security Protocols: - security at the Application Layer- PGP and S/MIME, Security at Transport Layer- SSL and TLS, Security at Network Layer-IPsec.

12 HOURS

UNIT-V
Cyber Law and Cyber Forensics: Introduction, Cyber Security Regulations, Roles of International Law, the state and Private Sector in Cyberspace, Cyber Security Standards. The INDIAN Cyberspace, National Cyber Security Policy 2013. Cyber Forensics: Introduction to Cyber Forensics, Handling Preliminary Investigations, Controlling an Investigation, conducting disk-based analysis, Investigating Information-hiding, Scrutinizing E-mail, Validating E-mail header information, Tracing Internet access, Tracing memory in real-time.

12 HOURS

COURSE NO: PSITTE-407	Minor Test 1:20 Marks of 1.5 hours duration
COURSE TITLE: Cyber Security	Minor Test 2:20 Marks of 1.5 hours duration
No. of credits: 04	MajorTest :60 Marks of 3.0 hours duration

SUGGESTED READINGS:

1) William Stallings, "Cryptography and Network Security", PearsonEducation/PHI, 2006.
2) V.K. Jain, "Cryptography and Network Security", Khanna PublishingHouse.
3) Gupta Sarika, "Information and Cyber Security", Khanna Publishing House,Delhi.
4) Atul Kahate, "Cryptography and Network Security", McGrawHill.
5) V.K. Pachghare, "Cryptography and Information Security", PHILearning.
6) Nina Godbole, "Information System Security",Wiley.

SCHEME FOR PAPER SETTING

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(3 x 5 = 15 marks)

Section B -   There shall be THREE long answer type questions each set from Unit –III, IV and V with internal choice. Each question shall carry FIFTEEN marks.   *(3 x 15 = 45 marks)*

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M.Sc. IT - FOURTH SEMESTER

COURSE NO: PSITLC-450	Internal Evaluation:75 Marks
COURSE TITLE: Practical based on above courses	External Evaluation:75 Marks
No. of credits: 06	

Practical in this course shall be based on all above courses. A mini project shall be assigned to the students in addition to the regular assignments.

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M.Sc. IT COURSE STRUCTURE

COURSE WISE PERCENTAGE CHANGE IN THEORY COURSES

Semester	Course Code	Course Title	Percentage Change	Remarks
1	PSITTC-102	Problem Solving Using C-Language	Nil	
	PSITTC-103	Logical Organization of Computers	Nil	
	PSITTC-104	Discrete Mathematics	Nil	
	PSITTC-105	Operating Systems	Nil	
2	PSITTC-201	Data and File Structures	Nil	
	PSITTC-202	Data Communication and Networks	Nil	
	PSITTC-204	Data Base Management System	Nil	
	PSITTC-206	Algorithm Design and Analysis	Nil	
	PSITTC-207	Object Oriented Programming in Java	Nil	
3	PSITTC-301	Web Technologies	Nil	
	PSITTC-303	Artificial Intelligence	Nil	
	PSITTC-304	Compiler Design	Nil	
4	PSITTC-401	Software Engineering	Nil	
	PSITTC-402	Computer Graphics	Nil	
	PSITTC-404	Android Programming	Nil	
	Elective-1 (any one of the following)			
	PSITTE-405	Programming in VB.NET	100%	Course code changed (core to elective)
	PSITTE-406	Python	100%	New course introduced
	PSITTE-407	Cyber Security	100%	New course introduced

(Head of the Department)