



UNIVERSITY OF JAMMU

(NAAC ACCREDITED 'A' GRADE' UNIVERSITY)
Baba Sahib Ambedkar Road, Jammu-180006 (J&K)

Academic Section

Email: academicsectionju14@gmail.com

NOTIFICATION (23/July/Adp./58)

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 Syllabi and Courses of Studies in the subject of **Information Technology** of Semester **IIIrd** and **IVth** for **Four Year Under Graduate Programme (FYUGP)** under the **Choice Based Credit System** as per **NEP-2020** (as given in the annexure) for the examinations to be held in the years as per the details given below:

Subject	Semester	For the examinations to be held in the year
Information Technology	Semester- III	Dec. 2023, 2024 and 2025
	Semester-IV	May 2024, 2025 and 2026

The Syllabi of the courses is also available on the University website: www.jammuuniversity.ac.in.

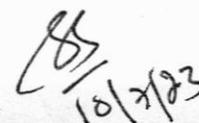
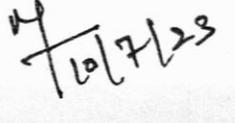
Sd/-
DEAN ACADEMIC AFFAIRS

No. F. Acd/II/23/6308-6318
Dated: 11-7-2023.

Copy for information and necessary action to:

- 1 Dean, Faculty of Mathematical Sciences
- 2 HOD/Convener, Board of Studies in **Computer Science & IT**
- 3 Sr. P.A.to the Controller of Examinations
- 4 All members of the Board of Studies
- 5 Confidential Assistant to the Controller of Examinations
- 6 I/C Director, Computer Centre, University of Jammu
- 7 Deputy Registrar/Asst. Registrar (Conf. /Exams. UG)
- 8 Incharge, University Website for Uploading of the notification.


Deputy Registrar (Academic)

B. A. / B. Sc. Honours
IN
INFORMATION TECHNOLOGY

SYLLABUS

Four Year Undergraduate Programme

As per NEP 2020 guidelines

Under Choice based Credit System

FOR THE STUDENTS TO BE ADMITTED IN THE SESSIONS
2022-23, 2023-24, 2024-25

Course Details for Four Year UG Programme

S. NO.	COURSES	DISCIPLINES
1	Computer Applications (CA)- Arts & Science	Natural Science and Arts & Humanities
2	Information Technology (IT)- Arts & Science	Natural Science and Arts & Humanities
3	Bachelor of Computer Applications (BCA)	Computer Applications (for BCA degree)
	BCA (Web Technology)	
	BCA (Data Science)	
	BCA (Software Development)	

COURSES OF STUDY**Semester - I**

S. No.	Course Type	Course No.	Course Title	Credits	Marks				Total Marks
					Theory		Practical/Tutorial		
					Mid Semester	End Exam	Assessment	Exam	
1	Major	UMJITT101	Fundamentals of IT	4(3L+1P)	15	60	10	15	100
2	Minor	UMIITT102	Basics of Computation	4(3L+1T)	15	60	10	15	100
3	MD	UMDITT103	IT : Basics and Application	3	15	60	NA	NA	75
4	SEC	USEITT104	Office Tools	2	10	40	NA	NA	50

Semester - II

S. No.	Course Type	Course No.	Course Title	Credits	Marks				Total Marks
					Theory		Practical/Tutorial		
					Mid Semester	End Exam	Assessment	Exam	
1	Major	UMJITT201	Internet and Web Designing using HTML	4(3L+1P)	15	60	10	15	100
2	Minor	UMIITT202	Programming Concepts and Paradigms	4(3L+1P)	15	60	10	15	100
3	MD	UMDITT203	Technical Communication	3	15	60	NA	NA	75
4	SEC	USEITT204	Understanding e-Services	2	10	40	NA	NA	50

Semester-III

S. No.	Course Type	Course No.	Course Title	Credits	Marks				Total Marks
					Theory		Practical/Tutorial		
					Mid Semester	End Exam	Assessment	Exam	
1	Major	UMJITT301	Programming in C	4(3L+1P)	15	60	10	15	100
2	Major	UMJITT302	Data communication and Networking	4(3L+1P)	15	60	10	15	100
3	Minor	UMIITT303	Digital Electronics	4(3L+1T)	15	60	10	15	100
4	MD	UMDITT304	E-commerce	3	15	60	NA	NA	75
5	SEC	USEITT305	Cyber Security	2	10	40	NA	NA	50

Semester-IV

S. No.	Course Type	Course No.	Course Title	Credits	Marks				Total Marks
					Theory		Practical/Tutorial		
					Mid Semester	End Exam	Assessment	Exam	
1	Major	UMJITT401	Database Management System & SQL	4(3L+1P)	15	60	10	15	100
2	Major	UMJITT402	Data Structure using C Language	4(3L+1T)	15	60	10	15	100
3	Major	UMJITT403	Software Engineering	4(3L+1T)	15	60	10	15	100
4	Major	UMJITT404	Fundamentals of Operating System	4(3L+1T)	15	60	10	15	100
5	Minor	UMIITT405	Operating System	4(3L+1T)	15	60	10	15	100


 HEAD
 Deptt. of Computer Sc. & IT
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 Jammu-180006

IT (Arts and Science) - THIRD SEMESTER

Course: Major
Course Credits: (L-P-T)
(3-1-0)
Total marks: 100

Course Title: Programming in C
Course Code: UMJITT301
Mid Semester assessment: 15 Marks of 1.5 hours duration
End Semester assessment: 60 Marks of 3.0 hours duration
Practical: 25 Marks

For examinations to be held in Dec 2023, 2024 and 2025

Course objectives & learning outcomes:

1. To learn the fundamentals of programming language.
2. To understand the concept of different control structures.
3. To learn about different data structures
4. To understand the concept of procedural programming.

UNIT - I

Problem solving, Algorithms, Flowcharts, History of C language, Structure of C program, Basic input/output statement, compiling and running a C program, Errors: syntax, linker, runtime and logical errors.

Character set of C language, identifiers, keywords, data types, variables, constants.

15 Hours

UNIT - II

Preprocessor directives, Operators: Unary, Binary: Mathematical, Relational and Logical operators, ternary operator, Operator precedence and associativity, selection statements- if statement, if-else statement, nested if, ladder if statement, switch statement.

15 Hours

UNIT - III

Iterative statements-while loop, do while, for loop, Nested loops, infinite loops, goto statement, break and continue statement.

Functions-prototype of a function: parameter list, return type, function call, passing arguments to a function: call by address, call by value, recursive function, user defined and library functions- mathematical and string functions.

15 Hours

UNIT - IV

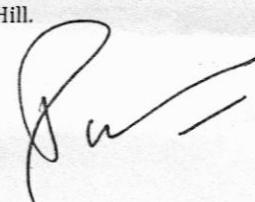
Storage classes in C. Arrays (Single and double dimensional): Definition, Declaration. Passing array to function.

Pointers: Understanding Pointers, Accessing the address of variable, declaring pointer Variables, Initialization, accessing a variable through pointer.

15 Hours

Suggested readings/ references:

1. E. Balaguruswami, Programming in C, PHI
2. Gottfried. B, Theory and problems of Programming with C Language, Tata Mc Graw Hill.
3. Kenneth. A, C Problem Solving and Programming, PHI.
4. Dan Gookin, C Programming, Wiley Dreamtech.
5. Y. P. Kanetkar, Understanding Pointers In C, BPB Publications.



IT (Arts and Science) - THIRD SEMESTER

Course: Major
 Course Credits: (L-P-T)
 (3-1-0)
 Total marks: 100

Course Title: Programming in C
 Course Code: UMJITT301
 Mid Semester assessment: 15 Marks of 1.5 hours duration
 End Semester assessment: 60 Marks of 3.0 hours duration
 Practical: 25 Marks

For examinations to be held in Dec 2023, 2024 and 2025

NOTE FOR PAPER SETTERS FOR EXAMINATIONS -

The question paper will be divided into the following two sections. No question will be repeated in the question paper.

Section A shall consist Four (4) short answer questions having one question from each unit. The students are required to attempt all questions. Each question shall be of 3 Marks.

(4 x 3 = 12 marks)

Section B shall consist Eight (8) long answer questions having two questions from each unit. The students are required to attempt one question from each unit. Each question shall be of 12 Marks.

(4 x 12 = 48 marks)

Note: -The paper setter shall ensure that the questions are uniformly distributed over entire syllabus.

Practical/ tutorial Evaluation

Daily evaluation of practical's/tutorials/Viva voce/Records etc.

10 marks

Final Examination

15 Marks

Pattern for external practical examination

Practical file	5 Marks
Written examination	5 Marks
Viva-Voce	5 Marks
Total	15 Marks

Pattern for external tutorial examination

Assignment file	10 Marks
Viva-Voce	5 Marks
Total	15 Marks

IT (Arts and Science) – THIRD SEMESTER

Course: Major
 Course Credits: (L-P-T)
 (3-1-0)
 Total marks: 100

Course Title: Data Communication and Networking
 Course Code: UMJITT302
 Mid Semester assessment: 15 Marks of 1.5 hours duration
 End Semester assessment: 60 Marks of 3.0 hours duration
 Practical: 25 Marks

For examinations to be held in Dec 2023, 2024 and 2025

Course objectives & learning outcomes:

1. To study the basic taxonomy and terminology of the computer networking and enumerate the layers of OSI model and TCP/IP model.
2. To study the fundamentals of Physical layer, and explain the types of transmission media with real time applications.
3. To study data link layer concepts, design issues, and protocols.
4. To gain core knowledge of Network layer routing protocols and IP addressing.
5. To explore the basic knowledge of cryptography and network security

UNIT-I Fundamentals of Communication and Network Topologies

Basics of Communication: Analog and Digital, Data and Signal, Point to Point and Multi-Point Connections

Network Topologies, Transmission Modes, Inter-networking, LAN Technologies and Protocols, Modulation and its type, Overview of switching techniques

15 Hours

UNIT-II IP Addresses and Protocols

IP Addresses and Types (IPv4 and IPv6), Classes of IP Addresses, OSI Reference Model, TCP/IP Model, Routing Information Protocols: Unicast and Multicast, Socket Programming Concepts (TCP,UDP)

15 Hours

UNIT-III Network Protocols and Security

Client-Server Architecture, HTTPs, DNS, SMTP, FTP Protocols, Network Security: Threats, Attacks, and Firewalls
Cryptographic Algorithms: DES, AES, RSA, Key Exchange Methods, Digital Signatures

15 Hours

UNIT-IV Introduction to Scripting Languages

Server-side and Client-side Scripting Languages Concepts, Introduction to JavaScript, Data Types, Variables

Conditional and Loop Control Statements, Functions, String Manipulation, Mathematical Functions

15 Hours

Suggested readings/ references:

1. Andrew S. Tanenbaum, "Computer Networks", 5 e, 2013, Pearson Education Asia.
2. Behrouz A. Forouzan, "Data Communications and Networking", 4e, 2004, Tata McGraw Hills.
3. William Stallings. "Data and Computer Communication", 7e, 2016, Pearson Education Asia.
4. Prakash C. Gupta, "Data Communications and Computer Networks", PHI
5. Michael A. Miller, "Data and Network Communications", 2e, Delmar Thomson Learning.
6. James F. Kurose and Keith W. Ross, "Computer Networking", 3e, Pearson Education.
7. William A. Shay, "Understanding Data Communications and Networks", 2e, Thomson Asia Pvt. Ltd.
8. Peter Norton and Dave Kearns, "Complete Guide to Networking", 1e, Techmedia India Ltd.
9. Douglas E. Comer, "Internet networking with TCP/IP Vol I & II", 3e, PHI.

IT (Arts and Science) – THIRD SEMESTER

Course: Major
 Credits: (L-P-T)
 (3-1-0)
 Total marks: 100

Course Title: Data Communication and Networking
 Course Code: UMJITT302
 Mid Semester assessment: 15 Marks of 1.5 hours duration
 End Semester assessment: 60 Marks of 3.0 hours duration
 Practical: 25 Marks

For examinations to be held in Dec 2023, 2024 and 2025

NOTE FOR PAPER SETTERS FOR EXAMINATIONS -

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Section A shall consist Four (4) short answer questions having one question from each unit. The students are required to attempt all questions. Each question shall be of 3 Marks. (4 x 3 = 12 marks)

Section B shall consist Eight (8) long answer questions having two questions from each unit. The students are required to attempt one question from each unit. Each question shall be of 12 Marks. (4 x 12 = 48 marks)

Note: -The paper setter shall ensure that the questions are uniformly distributed over entire syllabus.

Practical/ tutorial Evaluation

Daily evaluation of practical's/tutorials/Viva voce/Records etc.

10 marks

Final Examination

15 Marks

Pattern for external practical examination

Practical file	5 Marks
Written examination	5 Marks
Viva-Voce	5 Marks
Total	15 Marks

Pattern for external tutorial examination

Assignment file	10 Marks
Viva-Voce	5 Marks
Total	15 Marks



IT (Arts and Science) – THIRD SEMESTER

Course: Minor
 Course Credits: (L-P-T)
 (3-0-1)
 Total marks: 100

Course Title: Digital Electronics
 Course Code: UMIITT303
 Mid Semester assessment: 15 Marks of 1.5 hours duration
 End Semester assessment: 60 Marks of 3.0 hours duration
 Practical/Tutorial: 25 Marks

For examinations to be held in Dec 2023, 2024 and 2025

Course objectives & learning outcomes:

1. To familiarize students with the components of digital electronics, logical organization and the hardware and corresponding algorithms for computer arithmetics.
2. To study memory organization and the functions of each element of a memory hierarchy.
3. To understand processor performance at different levels of processing.
4. To familiarize students with the design of a Hardware descriptive language.
5. To help the students in understanding and analyzing different hardware designs. mathematical

UNIT-I

Data and Information: Features of Digital Systems, Number Systems: Decimal, Binary, Octal, Hexadecimal & their inter conversions, Representation of Data: Signed Magnitude, r's complement & r-1's complement, Binary Arithmetic, Fixed point representation and Floating-point representation of numbers.

Codes: BCD, Excess-3, Gray code, hamming code, alphanumeric codes (ASCII, EBCDIC, UNICODE), code conversions.

10 Hours

UNIT-II

Boolean Algebra: Basic gates (AND, OR, NOT gates), Universal gates (NAND and NOR gates), Implementing all gates using Universal gates, other gates (XOR, XNOR gates). Boolean identities, Boolean Theorems, Multi level NAND & NOR gates, De Morgan Laws. Karnaugh maps: SOP and POS forms,

10Hours

UNIT-III

Combinational Circuits: Half adder, full adder, code converters, combinational circuit design, Multiplexers and demultiplexers, encoders, decoders, Combinational design using mux and demux.

Sequential Circuit Design: Flip flops (RS, Clocked RS, D, JK, JK Master Slave, T, Counters, Shift registers and their types, Counters: Synchronous and Asynchronous counters.

10Hours

UNIT-IV

Computers: Basic Organization, Memory: ROM, RAM, Static and Dynamic RAM, DRAM Refreshing, PROM, EPROM, EEPROM, Secondary Memory: Hard Disk & optical Disk, Cache Memory, I/O devices, Memory Hierarchy, Solid State Disk.

15 Hours

Suggested readings/ references:

1. Jiawei Han & Micheline Kamber, "Data Mining - Concepts and Techniques - 3rd Edition", Elsevier.
2. Margaret H Dunham, "Data Mining Introductory and Advanced Topics" PEA.
3. Ian H. Witten and Eibe Frank, "Data Mining: Practical Machine Learning Tools and Techniques" Morgan Kaufmann.
4. Modern Digital Electronics by R. P. Jain, 3rd Edition, McGraw Hill
5. Digital Design and Computer Organisation by Dr. N. S. Gill and J. B. Dixit, University S
6. M. Morris Mano, "Digital Design" 3rd Edition, PHI, New Delhi.
7. Digital Electronics By D.A. Godse, A.P. Godse, Technical Publications
8. Digital Electronics And Micro - Computers by R. K. Gaur, Dhanpat Rai Publications
9. Floyd, T.L. and Jain, R. P., Digital Fundamentals, Pearson Education.

IT (Arts and Science) – THIRD SEMESTER

Course: Minor
 Course Credits: (L-P-T)
 (3-0-1)
 Total marks: 100

Course Title: Digital Electronics
 Course Code: UMIITT303
 Mid Semester assessment: 15 Marks of 1.5 hours duration
 End Semester assessment: 60 Marks of 3.0 hours duration
 Practical/Tutorial: 25 Marks

For examinations to be held in Dec 2023, 2024 and 2025

NOTE FOR PAPER SETTERS FOR EXAMINATIONS -

The question paper will be divided into the following two sections. No question will be repeated in the question paper.

Section A shall consist Four (4) short answer questions having one question from each unit. The students are required to attempt all questions. Each question shall be of 3 Marks.

(4 x 3 = 12 marks)

Section B shall consist Eight (8) long answer questions having two questions from each unit. The students are required to attempt one question from each unit. Each question shall be of 12 Marks.

(4 x 12 = 48 marks)

Note: -The paper setter shall ensure that the questions are uniformly distributed over entire syllabus.

Practical/ tutorial Evaluation

Daily evaluation of practical's/tutorials/Viva voce/Records etc.

10 marks

Final Examination

15 Marks

Pattern for external practical examination

Practical file	5 Marks
Written examination	5 Marks
Viva-Voce	5 Marks
Total	15 Marks

Pattern for external tutorial examination

Assignment file	10 Marks
Viva-Voce	5 Marks
Total	15 Marks

IT (Arts and Science) – THIRD SEMESTER

Course: Multi-disciplinary (MD)
 Course Credits: (L-P-T)
 (3-0-0)
 Total marks: 75

Course Title: E-Commerce
 Course Code: UMDITT304
 Mid Semester assessment: 15 Marks of 1.5 hours duration
 End Semester assessment: 60 Marks of 2.5 hours duration

For examinations to be held in Dec 2023, 2024 and 2025

Course objectives & learning outcomes:

1. Understand the basic concepts and technologies used in the field of management information systems;
2. Have the knowledge of the different types of management information systems;
3. Understand the processes of developing and implementing information systems;
4. Be aware of the ethical, social, and security issues of information system

UNIT -I

Overview of developments in Information Technology and Defining E-Commerce: Introduction to e-Commerce, Scope of electronic commerce, definition, e-Commerce and Trade Cycle, Benefits and limitations of E-Commerce, E- Markets, Internet E-Commerce in perspective. Value chain, Supply chain, Electronic Market, Electronic Data Interchange, Internet Commerce, Architectural framework of Electronic Commerce, Web based E Commerce Architecture.

10 Hours

UNIT -II

Consumer Oriented E Commerce E-Retailing: Traditional retailing and e retailing, Benefits of e retailing, Key success factors, Models of e retailing, Features of e retailing. E services: Categories of e-services, Web-enabled services, matchmaking services, Information-selling on the web, e entertainment, Auctions and other specialized services. Business to Business-Electronic Commerce

10 Hours

UNIT-III

Digital Marketing: Digital Marketing, Online Advertisement, Ad Targeting, Search Engine Marketing, Keyword Advertising, Search Engine Optimization, Display Ad Marketing, Interstitial Ad, Video Ad, Advertising Exchanges, Programmatic Advertising, Real-Time Bidding, E-mail Marketing, Affiliate Marketing, Social Marketing, Mobile Marketing, Local Marketing, Online Marketing Metrics, Pricing Models for Online Advertisements, Case Studies: Facebook Marketing Tools, Twitter Marketing Tools, Pinterest Marketing Tools, Location Based Marketing Tools: Google AdSense

10 Hours

UNIT-IV

Electronic Data Interchange: Benefits of EDI, EDI technology, EDI standards, EDI communications, EDI Implementation, EDI Agreements, EDI Security. Electronic Payment Systems, Need of Electronic Payment System: Study and examine the use of Electronic Payment system and the protocols used, Study Electronic Fund Transfer and secure electronic transaction protocol for credit card payment. Digital economy: Identify the methods of payments on the net – Electronic Cash, cheques and credit cards on the Internet.

10 Hours

Suggested readings/ references:

1. Commerce, Strategy, Technologies and Applications By: David Whiteley Tata McGraw-Hill Edition.
2. Elias. M. Awad, " Electronic Commerce", Prentice-Hall of India Pvt Ltd.
3. RaviKalakota, Andrew B. Whinston, "Electronic Commerce-A Manager's guide", Addison-Wesley.
4. Efraim Turban, Jae Lee, David King, H.Michael Chung, "Electronic Commerce–A ManagerialPerspective", Addison-Wesley.
5. Elias M Award, "Electronic Commerce from Vision to Fulfilment", 3rd Edition, PHI, Judy Strauss, Adel El-Ansary, Raymond Frost, "E-Marketing", 3RDEdition, Pearson Education.

IT (Arts and Science) - THIRD SEMESTER

Course: Multi-disciplinary (MD)
Course Credits: (L-P-T)
(3-0-0)
Total marks: 75

Course Title: E-Commerce
Course Code: UMDITT304
Mid Semester assessment: 15 Marks of 1.5 hours duration
End Semester assessment: 60 Marks of 2.5 hours duration

For examinations to be held in Dec 2023, 2024, and 2025

NOTE FOR PAPER SETTERS FOR EXAMINATIONS -

The question paper will be divided into the following two sections. No question will be repeated in the question paper.

Section A shall consist Four (4) short answer questions having one question from each unit. The students are required to attempt all questions. Each question shall be of 3 Marks.

(4 x 3 = 12 marks)

Section B shall consist Eight (8) long answer questions having two questions from each unit. The students are required to attempt one question from each unit. Each question shall be of 12 Marks.

(4 x 12 = 48 marks)

Note: -The paper setter shall ensure that the questions are uniformly distributed over entire syllabus.



CA (Arts and Science) - THIRD SEMESTER

Course:	Skill Enhancement Course (SEC)	Course Title: Cyber Security
Course Credits:	(L-P-T) (2-0-0)	Course Code: USEITT305
Total marks:	50	Mid Semester assessment: 10Marks of 1.5 hours duration End Semester assessment: 40 Marks of 2.5 hours duration

Course objectives & learning outcomes:

1. To provide the basic knowledge of cyber crimes.
2. To impart the knowledge of security threats.
3. To learn the fundamentals of safeguarding against cyber crimes.

For examinations to be held in Dec 2023, 2024 and 2025

UNIT-I

Cyber Crime and its types, Cyber security, Components of Cyber Security, Need of data privacy and security, Computer Security Concepts (Confidentiality, Integrity and Authentication).

Security Threats/Attacks - DoS, DDoS, Spoofing, virus, worms, Trojans, Backdoor, phishing, and spam, Vulnerabilities – Network, Operating System, Process, Human Protection from cyber-attacks.

UNIT - II

Web attacks (Browser attacks, Web attacks targeting users, Obtaining user's or website data, email attacks), Digital payments and its security(Online banking security, Mobile banking security, Security of debit/credit card), Cyber Security of digital devices, Tools and technology for cyber security (Encryption, Anti-virus, Firewalls, Cyber security best practices, Platform to report cybercrime, Security controls (Management, Operational, Physical), Digital Forensics, Ethical hacking, Database Security, Social Engineering, Careers in cyber security.

UNIT – III

Introduction to cryptography, Encryption and Decryption, Characteristics of Good Encryption Technique, Plain text and Cipher text, Substitution techniques–Caesar Cipher, Monoalphabetic Cipher, Polygram Substitution and Play Fair. Types of Encryption Systems, Cryptanalysis, Symmetric and asymmetric cryptography, Authentication (Password-Based, Address-Based and Certificate-Based Authentication)

Suggested Readings:

1. Principles of Information Security – M. E. Whitman and H. J. Mattord, Cengage Learning.
2. Network Security Essentials: Applications and Standards - William Stallings, Pearson.
3. Cryptography and Network Security – Atul Kahate, McGraw Hill Professional Publication.
4. Information Security: The complete reference – Mark Rhodes-Ousley, McGraw Hill Professional Publication.
5. Information Security: Principles and Practices – Mark S. Merkow and Jim Breithaupt, Pearson.
6. Network Security: Private communication in a Private world – C. Kaufman, R. Perlman, M. Speciner, Pearson.


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IT (Arts and Science) – THIRD SEMESTER

Course: Skill enhancement Course (SEC)
Course Credits: (L-P-T)
(2-0-0)
Total marks: 50

Course Title: Cyber Security
Course Code: USEITT305
Mid Semester assessment: 10Marks of 1.5 hours duration
End Semester assessment: 40 Marks of 2.5 hours duration

For examinations to be held in Dec 2023, 2024 and 2025

NOTE FOR PAPER SETTERS FOR EXAMINATIONS -

The question paper will be divided into the following two sections. No question shall be repeated in the question paper.

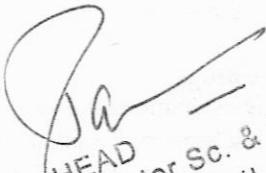
Section A shall consist Four (4) short answer questions (at least one from each unit). The students are required to attempt all questions. Each question shall be of 2½ Marks.

(4 x 2½ = 10 marks)

Section B shall consist Six (6) long answer questions (two from each unit). The students are required to attempt three questions. Each question shall be of 10 Marks.

(3 x 10 = 30 marks)

Note: The paper setter shall ensure that the questions are uniformly distributed over entire syllabus.


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IT (Arts and Science) - FOURTH SEMESTER

Course: Major
 Course Credits: (L-P-T)
 (3-1-0)
 Total marks: 100

Course Title: Database Management System & SQL
 Course Code: UMJITT401
 Mid Semester assessment: 15 Marks of 1.5 hours duration
 End Semester assessment: 60 Marks of 3.0 hours duration
 Practical: 25 Marks

For examinations to be held in May 2024, 2025 and 2026

Course objectives & learning outcomes:

1. To present an introduction to database management systems, with an emphasis on how to organize, maintain and retrieve efficiently, and effectively information from a DBMS.
2. Design ER-models to represent simple database application scenarios and convert them into relational tables
3. Demonstrate an understanding of normalization theory and apply such knowledge to the normalization of a database.
4. To familiarize students with the basic issues of transaction processing and concurrency control.
5. Construct simple and moderately advanced database queries using Structured Query Language (SQL).

UNIT-I

Overview of DBMS: Data, Files, Records, Advantages and disadvantages of Traditional file Approach, Introduction to Database, DBMS: Introduction, Need of DBMS, components of DBMS, advantages and disadvantages. Three level Architectural of Database, Centralized and Client Server Architecture for DBMS, Advantages and Disadvantages of DBMS.

15 Hours

UNIT-II

Relational DBMS: definition, concept of table, Concept of keys (primary, unique, candidate, foreign etc). Data models and types of [traditional, semantic, hierarchical, network, relational] E-R diagram, Notations used in E-R Model, Relationships and Relationship types, Conversion of ER Diagram to Relational Model.. Database management System Structure, Data manager, Database Administrator and Data Dictionary, Relational data models, Relational Algebra.

15 Hours

UNIT-III

Normalization: Functional dependency, Anomalies and data redundancies in Database, Properties of Normalized relations, First, Second, Third Normal Form, Boyce-Codd Normal Form (BCNF), Fourth Normal Form, Fifth Normal Form.

Overview of SQL: Categories of SQL Commands: Data Definition Language, Data Manipulation Language, Query Processing, Data types in SQL, Operators, Expressions, Create Database, Drop Database

15 Hours

UNIT-IV

SQL: Table creation, insertion, deletion, Alter, Update and Delete Query. Select Statement, Inserting Values, Constraints, and Retrieval of data from Table, Table deletion, SQL queries using conditions like WHERE Clause, AND, OR, NOT, LIKE Clause, TOP Clause, ORDER BY And GROUP BY, WILD Cards, JOINS, DISTINCT Keyword, DATE Functions and Other In-Built Functions, VIEWS.

15 ours

Suggested readings/ references:

1. Bipin C.Desai: An Introduction to Database Systems, West-publishing company.
2. Elmasri, Navathe, Somayajulu, Gupta: Fundamentals of Database Systems, Pearson Education.
3. Date, C.J.: An Introduction to Database Systems Addison Wesley Pearson Education.
4. Narayan S Umanath, Richard W Scamell : Data Modelling and Database Design, Thomson Course Technology India Edition.
5. R.A. Parida, Vinod Sharma: The power of Oracle 9i, Firewall Media Publications.
6. Bayross Ivan: SQL, PL/SQL the programming language of Oracle, BPB publications.

IT (Arts and Science) - FOURTH SEMESTER

Course: Major
 Course Credits: (L-P-T)
 (3-1-0)
 Total marks: 100

Course Title: Database Management System & SQL
 Course Code: UMJITT401
 Mid Semester assessment: 15 Marks of 1.5 hours duration
 End Semester assessment: 60 Marks of 3.0 hours duration
 Practical: 25 Marks

For examinations to be held in May 2024, 2025 and 2026

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(4 x 3 = 12 marks)

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(4 x 12 = 48 marks)

Note: -The paper setter shall ensure that the questions are uniformly distributed over entire syllabus.

Practical/ tutorial Evaluation

Daily evaluation of practical's/tutorials/Viva voce/Records etc.

10 marks

Final Examination

15 Marks

Pattern for external practical examination

Practical file	5 Marks
Written examination	5 Marks
Viva-Voce	5 Marks
Total	15 Marks

Pattern for external tutorial examination

Assignment file	10 Marks
Viva-Voce	5 Marks
Total	15 Marks

IT (Arts and Science)–FOURTH SEMESTER

Course: Major
 Course Credits: (L-P-T)
 (3-0-1)
 Total marks: 100

Course Title: Data Structure using C Language
 Course Code: UMJITT402
 Mid Semester assessment: 15 Marks of 1.5 hours duration
 End Semester assessment: 60 Marks of 3.0 hours duration
 Practical: 25 Marks

For examinations to be held in May 2024, 2025 and 2026

Course objectives & learning outcomes:

1. To learn the fundamentals of Operating Systems.
2. To learn the mechanisms of OS to handle processes and threads and their communication.
3. To learn the mechanisms involved in memory management in contemporary OS.
4. Shell programming

UNIT-I

Algorithms and Basics: Analysis on Algorithm, Complexity of Algorithm, Introduction and Classifications of Data Structures. Data Structure operations. Time and space complexity of algorithms. Rate of Growth: Big O Notation. Structures, Self- Referential Structures

15 Hours

UNIT-II

Linear Data Structures: Arrays and its representations, Representation and Operations of Singly Linked Lists, Stacks and Queues and their implementation using Arrays and Linked lists. Applications of Arrays, Linked list, Stacks and Queues.

15 Hours

UNIT-III

Non-Linear Data Structures: Trees, Binary Trees, Binary tree representation and traversals, Binary Search Trees, Complete Tree, Heap, Graph and its representations, Applications of trees and Graphs.

15 Hours

UNIT-IV

Sorting and Searching: Linear Search and Binary Search, Bubble Sort, Insertion Sort, Selection Sort, Merge Sort, Quick Sort, Heap Sort, Time and space complexity of sorting & search algorithms

15 Hours

Suggested readings/ references:

1. S. Lipschutz, "Data Structures", Tata McGraw Hill Education, 1st Edition, 2008.
2. D. Samanta, "Classic Data Structures", PHI Learning, 2nd Edition, 2004.
3. Data Structure through C by Yashwant Kanetkar, BPB Publications.
4. Data Structure through C in Depth by S.N. Srivastva BPB Publications.
5. Introduction to Data Structure in C by Ashok N Kamthane, Pearson Publications.

IT (Arts and Science)–FOURTH SEMESTER

Course: Major
 Course Credits: (L-P-T)
 (3-0-1)
 Total marks: 100

Course Title: Data Structure using C Language
 Course Code: UMJITT402
 Mid Semester assessment: 15 Marks of 1.5 hours duration
 End Semester assessment: 60 Marks of 3.0 hours duration
 Practical: 25 Marks

For examinations to be held in May 2024, 2025 and 2026

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Final Examination

15 Marks

Pattern for external practical examination

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Written examination	5 Marks
Viva-Voce	5 Marks
Total	15 Marks

Pattern for external tutorial examination

Assignment file	10 Marks
Viva-Voce	5 Marks
Total	15 Marks

IT (Arts and Science)-FOURTH SEMESTER

Course: Major
 Course Credits: (L-P-T)
 (3-0-1)
 Total marks: 100

Course Title: Software Engineering
 Course Code: UMJITT403
 Mid Semester assessment: 15 Marks of 1.5 hours duration
 End Semester assessment: 60 Marks of 3.0 hours duration
 Practical: 25 Marks

For examinations to be held in May 2024, 2025 and 2026

Course objectives & learning outcomes:

1. To gain the knowledge of how analysis, design and coding processes are conducted in a software project.
2. Demonstrate an understanding of and apply current theories, models, and techniques that provide a basis for the software lifecycle
3. Demonstrate an ability to use the basic techniques and tools necessary for software development.

UNIT - I

Software Systems Analysis and Design Life Cycle: Requirements determination, requirements specifications, feasibility analysis, final specifications, hardware and software study, Software system design, Software system implementation, Software system evaluation, Software system modification. Role of Software systems analyst, tools used in Software system analysis

Information gathering: strategies, methods, case study. Software system requirements specification: classification of requirements as strategic, tactical, operational and statutory.

15 Hours

UNIT - II

Feasibility analysis: deciding project goals, examining alternative solutions, cost-benefit analysis

Tools for systems analysts: data flow diagrams, case study for use of DFD, leveling of DFDs, leveling rules, logical and physical DFDs, software tools to create DFDs.

15 Hours

UNIT - III

Structured Software systems analysis and design: procedure specifications in structured English, examples and cases, decision tables for complex logical specifications, specification oriented design vs procedure oriented.

Data oriented Software systems design: entity relationship model, E-R diagrams, relationships, cardinality and participation, data base design.

15 Hours

UNIT - IV

Data input methods: coding techniques, requirements of coding schemes, error detection of codes, validating input data, input data controls, interactive data input

Designing outputs: output devices, designing output reports, screen design, graphical user interfaces, interactive I/O on terminals.

15 Hours

Suggested readings/ references:

1. Software Engineering by Roger S. Pressman- Tata McGraw Hill.
2. Software Project Management by Bob Hughes and Mike Cotterell- Tata McGraw Hill
3. Software Project Management by S. Kelkar- PHI.
4. Information Technology Project Management by Kathey and Schwalbe-Thomson Learning
5. An Integrated Approach to Software Engineering by P. Jalote- PHI.

IT (Arts and Science) - FOURTH SEMESTER

Course: Major
 Course Credits: (L-P-T)
 (3-0-1)
 Total marks: 100

Course Title: Software Engineering
 Course Code: UMJITT403
 Mid Semester assessment: 15 Marks of 1.5 hours duration
 End Semester assessment: 60 Marks of 3.0 hours duration
 Practical: 25 Marks

For examinations to be held in May 2024, 2025 and 2026

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Practical/ tutorial Evaluation

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10 marks

Final Examination

15 Marks

Pattern for external practical examination

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Total	15 Marks

IT (Arts and Science) - FOURTH SEMESTER

Course: Major
 Course Credits: (L-P-T)
 (3-0-1)
 Total marks: 100

Course Title: Fundamentals of Operating System
 Course Code: UMJITT404
 Mid Semester assessment: 15 Marks of 1.5 hours duration
 End Semester assessment: 60 Marks of 2.5 hours duration
 Practical: 25

For examinations to be held in May 2024, 2025 and 2026

Course objectives & learning outcomes:

1. To provide knowledge about the PC Hardware.
2. To brief about different utilities and PC settings.
3. To develop the ability to configure, setup and troubleshoot PC.

UNIT -I

Operating system overview: Definition, Evolution of Operating System, Functions of Operating System, Types of Operating systems.

Operating System Structure: Layered, Monolithic, Microkernel, Operating System services, System Calls. Introduction to Linux/Unix, Android, Concept of Virtual Machine.

10 Hours

UNIT -II

Process Management: Process Concept, Process states, Process Control Block, Types of Schedulers, Cooperating Processes, Inter-process Communication, Threads.

CPU Scheduling: Scheduling criteria, Scheduling Algorithms.

Process Synchronization: Race Condition, The Critical-Section problem, Semaphores.

Deadlock: Deadlock prevention, Deadlock avoidance, Deadlock detection, Recovery from deadlock.

10 Hours

UNIT-III

Main Memory: Multiprogramming with fixed partitions, Multiprogramming with variable partitions, Swapping, Paging, Segmentation, Segmentation with paging.

Virtual Memory: Demand Paging, Page replacement algorithms, Allocation of frames, Thrashing, Locality of reference.

Disk Scheduling: Disk Structure, Disk Scheduling Algorithms.

File System: File concept, File organization and access mechanism.

10 Hours

UNIT-IV

Linux Introduction & File System- Basic Features, Advantages, Basic Architecture of UNIX/LINUX System, Kernel, Shell.

Commands for files & Directories- cd, cp, mv, rm, mkdir, more, less, Creating and Viewing Files using cat, File View and Comparisons etc. Understanding Shell, Processes in LINUX – Process Fundamentals, Connecting Processes with Pipes, Redirecting Input Output, Batch Commands- Kill, ps, who, sleep. Printing Commands- grep, fgrep, find, sort, cal, banner. File related Commands-ws, sat, cut, grep, dd etc. 10 Hours

Suggested readings/ references:

1. Operating Systems Concepts – Silberschatz, Galvin and Gagne, Wiley Publications
2. Operating Systems: A Concept based Approach – D M Dhamdhere, 2nd Edition.
3. Sumitabha Das, "Unix concept and Programming", McGraw Hill education, 4th Edition, 2015.

IT (Arts and Science) - FOURTH SEMESTER

Course: Major
 Course Credits: (L-P-T)
 (3-0-1)
 Total marks: 100

Course Title: Fundamentals of Operating System
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Total	15 Marks

IT (Arts and Science) - FOURTH SEMESTER

Course: Minor
 Course Credits: (L-P-T)
 (3-0-1)
 Total marks: 100

Course Title: Operating System
 Course Code: UMIITT405
 Mid Semester assessment: 15 Marks of 1.5 hours
 duration
 End Semester assessment: 60 Marks of 2.5 hours
 duration
 Practical: 25

For examinations to be held in May 2024, 2025 and 2026

Course objectives & learning outcomes:

1. To have a basic understanding of the features of an Operating System.
2. To understand the services provided by the OS to users, processes and other systems.
3. To learn to work on an open-source Operating System through command mode.

UNIT -I

Operating system Definition, Generation of Operating System, Types of Operating System, Services of Operating System, OS structure: Layered, Monolithic, Microkernel. Concept of System Calls, System Programs and System Boot, Concept of Virtual Machine.

10 Hours

UNIT -II

Process Management: Definition, Process states, Process state transitions, Process control block.
 Process scheduling: Definition, Scheduling objectives, Types of Schedulers, Scheduling Criteria: CPU utilization, Throughput, Turnaround time, Waiting time, Response time, Scheduling algorithms: Preemptive and Non-preemptive, FCFS, SJF, RR.
 10 Hours

UNIT-III

Deadlock: Definition, Characteristics, Concept of Deadlock Prevention, Avoidance, Detection and Recovery.
 Memory Management: Contiguous Memory Allocation-Fixed and variable partition, Fragmentation, Paging, Demand Paging, Replacement policies: First In First Out (FIFO), Not Recently Used (NRU) and Least Recently Used (LRU), Optimal (OPT)

10 Hours

UNIT-IV

File concept: File Structure, File types, File Access Mechanism, Allocation Methods (contiguous, linked, indexed)

Linux/Unix Environment, The Login Prompt, General Features of Linux/Unix commands, command structure. Understanding of some basic commands such as cd, cp, mv, rm, mkdir, more, less, cat, grep, find, cut, wc, echo, ls, kill, ps, sort, who, date, passwd, cal, sleep etc. Combining commands, redirections, pipes, filters, Linux/Unix administrator. Root login, Super user login: su command.

10 Hours

Suggested readings/ references:

1. Abraham Silberschartz, Peter Baer Galvin and Greg Gagne, "Operating system Principles", WSE Wiley, 2006.
2. Andrew. S. Tanenbaum and Herbert Bos, "Modern Operating Systems", Pearson Prentice Hall, 2015.
3. Harvey M. Deitel, "An Introduction to Operating System", Addison-Wesley publications, 1984.
4. William Stallings, "Operating Systems Internals and Design Principles", Pearson Education. 5th Edition, 2005.

IT (Arts and Science) - FOURTH SEMESTER

Course: Minor
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 (3-0-1)
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15 Marks

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Total	15 Marks

VALUE ADDED COURSE

Course Title: Machine Learning Using Python

Course type: Certificate

Course Credits :(L-P-T) (3-0-0)

Course objectives & learning outcomes:

1. To understand the basics of Machine Learning.
2. To learn various libraries, environment and applications of python for machine learning.
3. To have the basic understanding of various supervised and unsupervised learning techniques

UNIT – I: Introduction to Machine Learning and Python

Overview of machine learning and its applications. Understanding the types of machine learning (supervised, unsupervised, and reinforcement learning). Introduction to Python and its packages for machine learning (NumPy, Pandas, Matplotlib, Scikit-learn). Setting up the environment for machine learning in Python. Data pre-processing techniques for machine learning (data cleaning, feature scaling, feature selection)

10 Hours

UNIT – II: Supervised Learning

Regression analysis (linear regression, logistic regression). Classification techniques (k-nearest neighbors, decision trees, support vector machines). Model evaluation techniques (confusion matrix, precision, recall, F1 score, ROC curve, AUC)

10 Hours

UNIT – III: Unsupervised Learning

Clustering techniques (k-means, hierarchical clustering, density-based clustering). Dimensionality reduction techniques (PCA, t-SNE). Association rule mining (Apriori algorithm). Recommender systems (collaborative filtering)

10 Hours

Suggested readings/ references:

1. Introduction to machine learning with Python: A guide for data scientist by Muller.
2. Python programming- Anurag Gupta
3. Introduction to machine learning- E. Alpaydin
4. Programming and problem solving with Python- AN Kamth

