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./57)

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 **Computer Applications (B.A/B.Sc.)** 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
Computer Applications (B.A/B.Sc.)		
	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/23/6297-6307
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)

10/7/23 10/7/23

B. A. / B. Sc. Honours
IN
COMPUTER APPLICATIONS

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 YearUG 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)	

UNIVERSITY OF JAMMU, JAMMU

Syllabus of B.A/B.Sc. Honours in Computer Applications

(Four Year Undergraduate Programme)

For the students to be admitted in the year 2022-23, 2023-24 and 2024-25

The B.A/B.Sc. Honours programme in Computer Application is a four-year undergraduate programme based on Semester System and consists of **eight** semesters. The student will opt Major and Minor courses from the same discipline. For minor course, any subject other than major available in the college shall be chosen from within same discipline. However, Multidisciplinary foundation courses are to be chosen from the disciplines other than that of Major and Minor courses.

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	UMJCAT101	Computer Fundamentals and Office Tools	4(3L+1P)	15	60	10	15	100
2	Minor	UMICAT102	Computer Fundamentals and Office Tools	4(3L+1P)	15	60	10	15	100
3	MD	UMDCAT103	Understanding Computers	3	15	60	NA	NA	75
4	SEC	USECAT104	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	UMJCAT201	Fundamentals of Internet	4(3L+1P)	15	60	10	15	100
2	Minor	UMICAT202	Fundamentals of Internet	4(3L+1P)	15	60	10	15	100
3	MD	UMDCAT203	Understandin g Internet	3	15	60	NA	NA	75
4	SEC	USECAT204	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	UMJCAT301	C Programming	4(3L+1P)	15	60	10	15	100
2	Major	UMJCAT302	PC Assembly and Installations	4(3L+1P)	15	60	10	15	100
3	Minor	UMICAT303	PC Assembly and Installations	4(3L+1T)	15	60	10	15	100
4	MD	UMDCAT304	Understanding Computers	3	15	60	NA	NA	75
5	SEC	USECAT305	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	UMJCAT401	Data Structures using C	4(3L+1P)	15	60	10	15	100
2	Major	UMJCAT402	Operating System	4(3L+1T)	15	60	10	15	100
3	Major	UMJCAT403	Computer Networks	4(3L+1T)	15	60	10	15	100
4	Major	UMJCAT404	Mathematical Foundation of Computer Science	4(3L+1T)	15	60	10	15	100
5	Minor	UMICAT405	Computer Networks	4(3L+1T)	15	60	10	15	100

B. A. / B. Sc. Honours
IN
COMPUTER APPLICATIONS

Semester wise Course details

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

CA (Arts and Science) - THIRD SEMESTER

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

Course Title: C Programming
Course Code: UMJCAT301
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

Algorithm, Flowcharts, Flowchart Symbols, Flowchart Rules, Assemblers, Compilers and Interpreters, Pseudo Code, Introduction to C programming, Character Set, C Tokens, Keywords and Identifiers, Constants, Variables, Data Types, Format of C program, Arithmetic, Relational & Logical Operators, Assignment Operators, Increment & Decrement Operators, Operator Precedence & Associativity. 15 Hours

UNIT – II

Formatted Input, Formatted Output, escape sequences, Conditional Statements: if Statement, if..... else Statement, Nested if....else Statements, Switch Statement, conditional Operator, Goto Statement, loops- for loop, while loop, do-while loop, break and continue statement. 15 Hours

UNIT – III

Qualifiers, Storage classes, Pointers definition, Declaring Pointer Variables, using pointer variable, Arrays: One, Two and Multi Dimension Arrays, Initialization of one and two dimensional Arrays, Declaring and Initializing String Variables, String Handling Functions. 15 Hours

UNIT – IV

Preprocessor directives, Function Definition, Function Calls (call by value & call by address method) Returning Value, Types of Functions, Recursion, Passing Arrays to Functions, Macros, Defining Structure, Declaring and Accessing Structure Variables, Structures and Unions,Basics of File Handling and operations like open, close, read, write etc. Enumerations.

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.
6. Shubhnandan S. Jamwal, Programming in C, Pearson Publications.
7. H.M. Deitel and P.J. Deitel, C How to Program, PHI.

CA (Arts and Science) - THIRD SEMESTER

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

Course Title: C Programming
Course Code: UMJCAT301
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 consists 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 consists 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.

Practicla/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	15Marks

Pattern for external tutorial examination

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

CA (Arts and Science) - THIRD SEMESTER

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

Course Title: PC Assembly and Installations
Course Code: UMJCAT302
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 have basic knowledge of PC Assembly and Installation.
2. To learn about Computer Maintenance and system tools.
3. To gain knowledge of OSS and open source data recovery tools

Unit-1

Peripheral Devices: Input and output devices, UPS (Online/Offline).

PC Tools: Connectors, Types of connectors - DIN Connector, Centronic connector, RS-232 Connector, RCA Connector, e-SATA, RJ 45 Connector, Computer ports: Serial port and Parallel port, PS/2 Port, USB Port, VGA Port, HDMI Port, Power Connector, Ethernet/LAN Port, Motherboard, its components, Types of motherboard, SMPS, Types of SMPS, RAM, ROM and its types.
Controller cards: USB controller card, Graphics and Video controller card, Network controller card, TV Tuner controller card, Sound controller card
Display cards, Sound card, FAX/Modem cards, LAN cards, Ethernet cards.

15 Hours

Unit-2

Assembling the system: Major components of computer system and mandatory steps for assembling the computer system, POST, BIOS and its types, BIOS settings, Formatting /Partitioning of Hard disk, Operating system and its functions, Features of UNIX/ Windows, Installation of Operating system. 15 Hours

Unit-3

Computer Maintenance and system tools: Windows file repairing -System file checker(SFC) and Deployment image servicing and management (DISM), Disk Defragmentation, Disk Cleanup, ScanDisk, Open Source Software (OSS) and its features, use of some common Open Source Data Recovery tools : Recuva Disk Drill, Pandora Recovery, EaseUS Data Recovery, Restoration, Booting process ,Types of booting. 15 Hours

Unit-4

Control Panel: Control panel and its components, Adding and removing a printer, installing/uninstalling programs.
Using system restore features, Creating recovery disk, Antivirus and its features, installing/uninstalling Antivirus, Device manager and its features.
Creating Operating system image and installing OS from image file.
Modem and its types, installation of MODEM, setting up Broadband connection.

15 Hours

Suggested Readings/Refrences:

1. P.K. Sinha and Priti Sinha, " Computer Fundamentals", BPB Publications.
2. R.K. Taxali ,"PC Software for Windows Made Simple", Tata McGraw Hill.
3. Wikibooks contributors, "How to Assemble a Desktop PC", Platypus Global Media.
4. Jacob Beckerman," How to build a computer ,"A step by step guide", Kindle Edition.

CA (Arts and Science) - THIRD SEMESTER

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

Course Title: PC Assembly and Installations
Course Code: UMJCAT302
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 consists 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 consists 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.

Practicla/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	15Marks

Pattern for external tutorial examination

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

CA (Arts and Science) – THIRD SEMESTER

Course: Minor
Course Credits: 4(L-P-T)
(3-0-1)
Total marks: 100

Course Title: PC Assembly and Installations
Course Code: UMICAT303
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 have basic knowledge of PC Assembly and Installation.
2. To learn about Computer Maintenance and system tools.
3. To gain knowledge of OSS and open source data recovery tools

Unit-1

Peripheral Devices: Input and output devices, UPS (Online/Offline).

PC Tools: Connectors, Types of connectors - DIN Connector, Centronic connector, RS-232 Connector, RCA Connector, e-SATA, RJ 45 Connector, Computer ports: Serial port and Parallel port, PS/2 Port, USB Port, VGA Port, HDMI Port, Power Connector, Ethernet/LAN Port, Motherboard, its components, Types of motherboards, SMPS, Types of SMPS, RAM, ROM and its types.

Controller cards: USB controller card, Graphics and Video controller card, Network controller card, TV Tuner controller card Sound controller card.

Display cards, Sound card, FAX/Modem cards, LAN cards, Ethernet cards. 15 Hours

Unit-2

Assembling the system: Major components of computer system and mandatory steps for assembling the computer system, POST, BIOS and its types, BIOS settings, Formatting /Partitioning of Hard disk, Operating system and its functions, Features of UNIX/ Windows, Installation of Operating system. 15 Hours

Unit-3

Computer Maintenance and system tools: Windows file repairing -System file checker (SFC) and Deployment image servicing and management (DISM), Disk Defragmentation, Disk Cleanup, ScanDisk, Open Source Software (OSS) and its features, use of some common Open Source Data Recovery tools : Recuva Disk Drill, Pandora Recovery, EaseUS Data Recovery, Restoration, Booting process ,Types of booting. 15 Hours

Unit-4

Control Panel: Control panel and its components, Adding and removing a printer, installing/uninstalling programs.

Using system restore features, Creating recovery disk, Antivirus and its features, installing/uninstalling Antivirus, Device manager and its features.

Creating Operating system image and installing OS from image file .

Modem and its types, installation of MODEM, setting up Broadband connection. 15 Hours

Suggested Readings/Refrences:

P.K. Sinha and Priti Sinha, " Computer Fundamentals", BPB Publications.
R.K. Taxali ,"PC Software for Windows Made Simple", Tata McGraw Hill.
Wikibooks contributors, "How to Assemble a Desktop PC", Platypus Global Media.
Jacob Beckerman," How to build a computer ,"A step by step guide", Kindle Edition

CA (Arts and Science) - THIRD SEMESTER

Course: Minor
Course Credits: 4(L-P-T)
(3-0-1)
Total marks: 100

Course Title: PC Assembly and Installation
Course Code: UMICAT303
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 consists 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 consists 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.

Practiclal/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	15Marks

Pattern for external tutorial examination

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

CA (Arts and Science) - THIRD SEMESTER

Course: Multidisciplinary Foundation Course (MD)
Course Credits: (L-P-T)
(3-0-0)
Total marks: 75

Course Title: Understanding Computers
Course Code: UMDCAT304
Mid Semester assessment: 15 Marks of 1.5 hours duration
End Semester assessment: 60 Marks of 3.0 hours duration

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

Course objectives & learning outcomes:

1. To learn the basics of Computer Fundamentals.
2. To understand hardware and software.
3. To gain knowledge of operating system.
4. To brief the students about number system.

UNIT – I

Introduction to Computer, History of Computer, Features of Computer, Uses of Computers, Generations of Computer, Digital, Analog, Hybrid Computer, Computer Memory and its Types, Primary memory (RAM, ROM,PROM,EEPROM), Storage Units(Bit,Byte,KB,MB, GB,TB), Secondary Storage Devices: Hard Disks, Optical Disks, Compact Disks, Zip Drive, Flash Drives, Input Devices (Keyboard, Mouse, Joystick, Scanner), and Output Devices Monitor, Plotter. Printer and its Types. 10 Hours

UNIT - II

Software and Hardware, Type of Software (System Software, Application Software, Firmware Software), Computer Languages and its Types (Machine Language, Assembly Language, High Level Language: Advantages and Disadvantages of Computer Languages), Translators: Interpreter, Compiler, Linker, Loader, Computer Viruses (Trojan, Malware, Spyware etc.), Antivirus Software. 10 Hours

UNIT – III

Anatomy of Window: Title Bar, Menu Bar, Tool Bar, Scroll Bars, Document Area, and Status Bar.
Desktop Elements: Icons, My Computer, Recycle Bin, Taskbar, My Documents, Anatomy of Window: Title Bar, Menu Bar, Tool Bar, Scroll Bars, Document Area, and Status Bar.
Control panel ,DiskDefragmentation, DOS,Evolution of DOS,Internal Commands : CLS, Ver, COPY, Volume, Date, Time, MD, CD, RD, Copy, Del, Ren, Move, Path External Commands : CHKDSK,FORMAT,Xcopy,Attrib, Defrag etc. 10 Hours

UNIT – IV

Computer Number System: Decimal Number, Binary Number, Octal Number, Hexadecimal Number, Arithmetic Operations(Addition, Subtraction, Multiplication) on Binary Number, Conversion of one Number System to another. r's Complement and r-1' Complement, Data Representation. 10 Hours

Suggested readings/ references:

1. P.K Sinha & Priti Sinha, "Computer Fundamentals", BPB Publications.
2. Alexix Leon, Mathewes Leon, "Fundamentals of Information Technology",Leon Press.
3. Suresh K. Basandra, "Computer Systems Today", Galgotia Publications.
4. V. Rajaraman, "Fundamentals of Computers", PHI Learning Pvt. Ltd.
5. Peter Nortan, "Introduction to Computers", Tata Mcgraw Hill.
6. Joyce Coax , Joan Preppernau,,Steve Lambert and Curtis Frye, "Microsoft Office System step by step", Microsoft Press, 2007.
7. R.K. Taxali, "PC Software for Windows", McGraw Hill.

CA (Arts and Science) - THIRD SEMESTER

Course: Multidisciplinary Foundation Course (MD)
Course Credits: (L-P-T)
(3-0-0)
Total marks: 75

Course Title: Understanding Computers.
Course Code: UMDCAT304
Mid Semester assessment: 15 Marks of 1.5 hours duration
End Semester assessment: 60 Marks of 3.0 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 Credits: (L-P-T)
(2-0-0)
Total marks: 50

Course Title: Cyber Security
Course Code: USECAT305
Mid Semester assessment: 10 Marks 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

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.

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. 10 Hours

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.
10 Hours

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)

10 Hours

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.

Network Security: Private communication in a Private world – C. Kaufman, R. Perlman, M. Speciner, Pearson

CA (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: USECAT305
Mid Semester assessment: 10 Marks 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 will be repeated in the question paper.

Section A shall consists Four (4) short answer questions having one question from each unit. The students are required to attempt all questions. Each question shall be of $2\,^{1}/_{2}$ Marks.

($4 \times 2\,^{1}/_{2} = 10$ marks)

Section B shall consists Eight (6) 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 10 Marks.
($3 \times 10 = 30$ marks)

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

CA (Arts and Science) - FOURTH SEMESTER

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

Course Title: Data Structure using C
Course Code: UMJCAT401
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 data structures.
2. To learn the programming skills.
3. To gain knowledge of software development.

Unit-1

Arrays (1D and 2D) – Declaration and Initialization. Pointers - Accessing array through pointers
Structures - Declaring, Initializing and Accessing a Structure, Array of structures, Passing Structures to functions, Accessing structure through pointers, Self Referential Structures.
Union – Initialization and Accessing members of a Union. 15 Hours

Unit-2

Introduction to Data Structures, Classification of Data Structures, Advantages and Applications of data structures, Data Structure Operations (Traversing, Inserting, deleting, Searching, Sorting). Implementation of data structure operations on array, Dynamic memory allocation (malloc(), calloc(), realloc()), Garbage Collection, Time and Space Complexity of algorithms. 15 Hours

Unit-3

Searching – Linear Search, Binary Search.
Sorting Techniques - Bubble Sort, Insertion Sort, Selection Sort.
Stacks: Introduction, Implementation of stacks, Operations on Stack (PUSH, POP).
Queues: Introduction, Implementation, Operations on Queue(Insert and Delete).
Concept of Overflow and Underflow. 15 Hours

Unit-4

Linked Lists – Definition, Types of link list (Single, Double, Circular), Representation of link list in memory, Advantages and Disadvantages of link list, Implementing a single link list, Traversing a single link list, Searching a single link list, Insertion into a single link list, Deletion from a single link list, Applications of link list.
15 Hours

Suggested Readings:

1. G. A. V. Pai, "Data Structures and Algorithms: Concepts, Techniques and Applications", Tata McGraw-Hill, July 2017.
2. Vishal Goyal, "A Simplified Approach to Data Structures", Shroff Publishers Pvt. Ltd, 2014.
3. Ellis Horowitz, Sartaj Sahni and Susan Anderson-Freed, "Fundamentals of Data Structures in C", Universities Press, 2nd Edition 2008.
4. J. P. Tremblay and P. G. Sorenson, "Introduction to Data Structures with Applications", TMH, 2007.
5. Seymour Lipschutz, "Theory and Problems of Data Structures", Sehaum's Outline Series in Computers Tata McGraw-Hill, 2006.
6. M. Tannenbaumand M.J. Augenstein and Y. Langsam, "Data Structures with C", PHI, 2006.

CA (Arts and Science) - FOURTH SEMESTER

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

Course Title: Data Structure using C
Course Code: UMJCAT401
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

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 consists 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 consists Eight (8) long answer questions having two questions from each unit. The students are requiredto 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

Pattern for external practical examination

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

Pattern for external tutorial examination

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

CA (Arts and Science) - FOURTH SEMESTER

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

Course Title: Operating System
Course Code: UMJCAT402
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 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. 15 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. 15 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) 15 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. 15 Hours

Suggested Readings:

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.
5. Milenkovic M,"Operating system-concepts and design". McGraw Hill.

CA (Arts and Science) - FOURTH SEMESTER

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

Course Title: Operating System
Course Code: UMJCAT402
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

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 of 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	15Marks

Pattern for external tutorial examination

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

CA (Arts and Science)–FOURTH SEMESTER

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

Course Title: Computer Networks
Course Code: UMJCAT403
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 Internet.
2. To understand basic web fundamentals.
3. To gain knowledge on network protocols and their applications.
4. To brief the students about various network devices 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

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)

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

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

Suggested Readings:

1. Andrew.S. Tannenbaum, "Computer Networks", Pearson.
2. Williams Stallings, "Data and Computer Communication", Pearson.
3. Forouzan, "Data Communication and Networking", McGraw Hill Professional Publication.
4. Douglas E. Comer, "The Internet Book", Prentice Hall.

CA (Arts and Science)–FOURTH SEMESTER

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

Course Title: Computer Networks
Course Code: UMJCAT403
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	15Marks

Pattern for external tutorial examination

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

CA (Arts and Science) - FOURTH SEMESTER

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

Course Title: Mathematical Foundation of Computer Science
Course Code: UMJCAT404
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 basics of mathematics.
2. To understand and develop the sense of logic.
3. To gain knowledge of probability.

Unit-1

Mathematical Logic: Propositional Logic – Proposition, Connectives, Well formed formulas, Truth Tables, Tautology, Converse, Inverse and Contrapositive, Logical Equivalence, Implication, Normal forms.

Predicate Logic – Statement Functions, Variables and Quantifiers (Universal and Existential), Free and Bound variables, Inference Theory for Predicate Calculus.

Unit-2

Set Theory – Definition of Set, Representation of set (Roaster method, Set builder notation), Properties of set, Types of set (Empty set, Finite set, Equivalent set, Subset, Universal set, Superset, Infinite set, Equal sets, Disjoint sets, Power set, Singleton set), Basic Set Operations (Union, Intersection, Difference and Complement), Venn diagrams to represent union, intersection and complement, De Morgan's Law, Applications of set theory.

Unit-3

Relations: Definition, Domain and range of a relation, Properties of Relations, Matrix representation of relations, Closure of relations, Equivalence relations, Types of Relations (Empty, Universal, Identity, Inverse, Reflexive, Symmetric, Transitive), Operations on Relations, Binary Relations.

Functions – Definition, Representation of functions, Properties of functions, Types of functions (One-to-One function, Many to one function, Onto function, One-One correspondence function), Inverse function.

Unit-4

Probability – Definition of probability, Experiment, Sample Space, Favorable Outcome, Trial, Random variable, Random experiment, Events and its types (Independent, Disjoint), Equally Likely Events, Exhaustive Events, Mutually Exclusive Events, Probability of an event, Conditional Probability, Probability Formula, Coin Toss probability (Tossing a coin, Tossing two coins, Tossing three coins), Dice Roll Probability(Rolling one dice, Rolling two dice), Properties of Probability, Applications of probability in real life.

Suggested Readings:

1. Pure mathematics for beginners, Steve Warner
2. Donald F. Stanat and David F. McAllister, Discrete mathematics in Computer Science.
3. Sheldon M. Ross, Introduction to Probability Models, Elsevier.
4. Discrete Mathematical Structures with Applications to Computer Science, J. P. Tremblay and P. Manohar, Tata McGraw Hill.
5. Elements of Discrete Mathematics-A Computer Oriented Approach, C. L. Liu and D. P. Mohapatra, 3rdEdition, Tata McGraw Hill

CA (Arts and Science) - FOURTH SEMESTER

Course: Major
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CA (Arts and Science)–FOURTH SEMESTER

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

Course Title: Computer Networks
Course Code: UMICAT405
Mid Semester assessment: 15 Marks of 1.5 hours duration
End Semester assessment: 60 Marks of 3.0 hours duration
Practical: 25 Marks

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CA (Arts and Science)–FOURTH SEMESTER

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

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