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MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous Institute Affiliated to RGPV Bhopal)

DEPARTMENT OF COMPUTER APPLICATIONS

MINUES OF MEETING of BOARD OF STUDIES

As per the schedule the meeting of Board of Studies of Computer Applications is held on 07.04.2018 in Department of Computer Applications, MITS Gwalior. Following members attended the meeting:

1. Dr. R.S. Jadon, Prof. & Head, Department of Computer Applications, MITS.
2. Dr. D.N. Goswami, Professor, Computer Applications, S.O.S., J. U., Gwalior
3. Dr. Anshu Chaturvedi, Asso. Prof., Dept. of Comp. Appl., MITS
4. Prof. Prabhakar Sharma, Assistant Prof. (Sl. Grade), MCA, MITS Gwalior
5. Shri S.K. Lokras, Director Technical, Smart Control Systems, Gwalior
6. Prof. Parul Saxena, Assistant Prof., Dept. of Comp. Appl., MITS

The Committee confirmed the minutes of previous meeting. Further the Committee reviewed the existing scheme and suggestions of students and recommends continuing the same scheme with addition of **Programming In Python** as optional subject in Fifth Semester. The recommended scheme and syllabus as applicable to MCA Programme for the year 2018-19 is enclosed herewith. The coding of Subjects is incorporated as per the Institute norms.

The meeting ended with vote of thanks to the chair.

(Prof.Parul Saxena)
Department Member

(Prof. P. Sharma)
Department Member

(Shri S.K. Lokras)
Industry Expert

(Dr. Anshu Chaturvedi)
Department Member

(Dr. D.N. Goswami)
External Expert

(Dr. R.S. Jadon)
Chairman, BOS

(Dr. M. Pandit)
Dean Academics

Scheme of Examination

First Semester- Master of Computer Applications

S. No.	Subject Code	Subject Name	Periods per week			Credits	Maximum Marks (Theory Slot)			Maximum Marks (Practical Slot)		Total Marks
			L	T	P		End Sem. Exam	Tests (Two)	Assignments /Quiz	End Sem. Practical/ Viva	Practical Record / Assignment/ Quiz/Presentation	
1.	680101	SAD and Software Engineering	3	1	-	4	70	20	10		-	100
2.	680102	Mathematical Foundation of Computer Science	3	1	-	4	70	20	10	-	-	100
3.	680103	Programming and Problem Solving in C	3	1	-	4	70	20	10	-	-	100
4.	680104	Computer Organization and Assembly Language Programming	3	1	-	4	70	20	10	-	-	100
5.	680105	Communication Skills	3	1	-	4	70	20	10	-	-	100
6.	680106	Programming Laboratory in C	-	-	8	8	-	-	-	120	80	200
7.	680107	Assembly Language Programming Laboratory	-	-	2	2	-	-	-	30	20	50
		Total	15	5	10	30	350	100	50	150	100	750

L: Lecture - T: Tutorial - P: Practical

w.e.f. July-2018

Scheme of Examination

Second Semester- Master of Computer Applications

S. No.	Subject Code	Subject Name	Periods per week			Credits	Maximum Marks (Theory Slot)			Maximum Marks (Practical Slot)		Total Marks
			L	T	P		End Sem. Exam.	Tests (Two)	Assign ments /Quiz	End Sem. Practical/ Viva	Practical Record/As signment/ Quiz/Pres entation	
1.	680201	Multimedia Systems	3	1	-	4	70	20	10	-	-	100
2.	680202	Computer Graphics	3	1	-	4	70	20	10	-	-	100
3.	680203	Data Structures	3	1	-	4	70	20	10	-	-	100
4.	680204	Computer Oriented Numerical & Statistical Methods	3	1	-	4	70	20	10	-	-	100
5.	680205	Accounting & Management Control	3	1	-	4	70	20	10	-	-	100
6.	680206	Data Structures Programming Laboratory	-	-	8	8	-	-	-	120	80	200
7.	680207	Programming Laboratory In Computer Graphics	-	-	2	2	-	-	-	30	20	50
		Total	15	5	10	30	350	100	50	150	100	750

L: Lecture - T: Tutorial - P: Practical

w.e.f. July-2018

Scheme of Examination

Third Semester- Master of Computer Applications

S. No.	Subject Code	Subject Name	Periods per week			Credits	Maximum Marks (Theory Slot)			Maximum Marks (Practical Slot)		Total Marks
			L	T	P		End Sem. Exam.	Tests (Two)	Assign ments /Quiz	End Sem. Practical/ Viva	Practical Record/As signment/ Quiz/Pres entation	
1.	680301	Computer Oriented Optimization	3	1	-	4	70	20	10	-	-	100
2.	680302	Operating System	3	1	-	4	70	20	10	-	-	100
3.	680303	Object Oriented Methodology & C++	3	1	-	4	70	20	10	-	-	100
4.	680304	Database Mgmt. System	3	1	-	4	70	20	10	-	-	100
5.	680305	Managerial Economics	3	1	-	4	70	20	10	-	-	100
6.	680306	Minor Project-I (VB+MySql)	-	-	8	8	-	-	-	120	80	200
7.	680307	C++ Programming Laboratory	-	-	2	2	-	-	-	30	20	50
		Total	15	5	10	30	350	100	50	150	100	750

L: Lecture - T: Tutorial - P: Practical

w.e.f. July-2018

Scheme of Examination

Fourth Semester- Master of Computer Applications

S. No.	Subject Code	Subject Name	Periods per week			Credits	Maximum Marks (Theory Slot)			Maximum Marks (Practical Slot)		Total Marks
			L	T	P		End Sem. Exam.	Tests (Two)	Assignments /Quiz	End Sem. Practical/ Viva	Practical Record/Assignment/ Quiz/Presentation	
1.	680401	Theory of Computation	3	1	-	4	70	20	10	-	-	100
2.	680402	Artificial Intelligence and Machine Learning	3	1	-	4	70	20	10	-	-	100
3.	680403	Unix and Shell Programming (Elective - I)	3	1	-	4	70	20	10	-	-	100
4.	680404	Java Programming and Technologies	3	1	-	4	70	20	10	-	-	100
5.	680405	Computer Networks and Communication	3	1	-	4	70	20	10	-	-	100
6.	680406	Minor Project-II (Java and My-SQL)	-	-	8	8	-	-	-	120	80	200
7.	680407	Programming Laboratory in Unix and Shell Programming	-	-	2	2	-	-	-	30	20	50
		Total	15	5	10	30	350	100	50	150	100	750

L: Lecture - T: Tutorial - P: Practical

w.e.f. July-2018

Scheme of Examination

Fifth Semester- Master of Computer Applications

S. No.	Subject Code	Subject Name	Periods per week			Credits	Maximum Marks (Theory Slot)			Maximum Marks (Practical Slot)		Total Marks
			L	T	P		End Sem. Exam.	Tests (Two)	Assignments /Quiz	End Sem. Practical/ Viva	Practical Record/Assignment/ Quiz/Presentation	
1.	680501	Analysis and Design of Algorithms	3	1	-	4	70	20	10	-	-	100
2.	680502	Network and Cyber Security	3	1	-	4	70	20	10	-	-	100
3.	680503	Web Technologies and Cloud Computing	3	1	-	4	70	20	10	-	-	100
4.	680504	Elective-I (.NET Technologies and C#)	3	1	-	4	70	20	10	-	-	100
5.	680505	Elective –II (Data Warehousing and Mining)	3	1	-	4	70	20	10	-	-	100
6.	680506	Minor Project-III Web Based Application Using .NET	-	-	8	8	-	-	-	120	80	200
7.	680507	Programming Laboratory in PHP and Web Technologies	-	-	2	2	-	-	-	30	20	50
		Total	15	5	10	30	350	100	50	150	100	750

L: Lecture - T: Tutorial - P: Practical

w.e.f. July-2018

Scheme of Examination

Sixth Semester- Master of Computer Application

S. No.	Subject Code	Subject Name	Periods per week			Credits	Maximum Marks (SESSIONAL)			Maximum Marks (Practical Slot)		Total Marks
			L	T	P		.		Sessional	Project viva	Project Seminar	
1.	680601	System Development Project	-	-	-	20	-	-	200	200	100	500
		Total	-	-	-	20	-	-	200	200	100	500

L: Lecture - T: Tutorial - P: Practical

w.e.f. July-2018

MASTER OF COMPUTER APPLICATIONS
THE SYLLABUS (Effective from July 2018)

FIRST SEMESTER
680101 System Analysis and Design & Software Engineering

S. No.	Subject Code	Subject Name	Periods per week			Credits	Maximum Marks (Theory Slot)			Maximum Marks (Practical Slot)		Tot Marl
			L	T	P		End Sem. Exam	Tests (Two)	Assign ments /Quiz	End Sem. Practical/ Viva	Practical Record / Assignment/ Quiz/Present ation	
1.	680101	SAD and Software Engineering	3	1	-	4	70	20	10	-	-	10(

Objectives:

1. To understand the basic concepts of logical process modeling
2. To describe key concepts, issues, and operational terminology
3. To identify and discuss current issues in education
4. To identify the symbols used in designing
5. To develop utilities without risk in project
6. To explain why we use SDLC and the typical activities and deliverables associated with each
7. To learn and understand how to apply testing
8. To understand the software process models
9. To improve software quality
10. To draw DFDs using specific rules and components to depict logical process models

UNIT-I

System concepts and Information system environment: The system concept, characteristics of system, elements of system, The System Development Life Cycle, The Role of System Analyst.

UNIT-II

Software Process, Product and Project: Software, Software Myths, Software Engineering - A Layered Technology, Software Process Models, The Linear Sequential Model, The Prototyping Model, The RAD Model, Evolutionary Software Process Models, Component – Based Development, Fourth Generation Techniques, Software process and Project Metrics : Software measurement

UNIT-III

Software Project Planning and Design: Software Project Planning: Project planning objectives, Decomposition Techniques, Empirical estimation models, The Make/Buy Decision., Risk analysis.

Software Design: Design Principles, Cohesion & Coupling, Design notation and specification, structure design methodology.

UNIT-IV

Software Quality Assurance and Testing: Software Quality Assurance : Quality Concepts, The Quality Movement, Software Quality Assurance, Software Reviews, Formal

Technical Reviews, Formal Approaches to SQA, Statistical Software Quality Assurance, Software Reliability, Mistake Proofing for Software, Introduction to ISO standard.
Testing Strategies: A strategic approach of software testing strategic issues, unit testing, integration testing, validation testing, system testing, The art of debugging.

UNIT-V

Advanced Topics: MIS & DSS: Introduction to MIS, long range planning, development and implementation of an MIS, applications of MIS in manufacturing sector and in service sector.
Decision Support System, types of DSS.
Object Oriented Software Engineering: Object Oriented Concepts, Identifying the Elements of an Object Model, Management of Object Oriented Software Projects.
CASE tools, Re-engineering

References:

1. R. S. Pressman, "Software Engineering – A practitioner's approach", 3rd ed., McGraw Hill Int. Ed., 1992.
2. Ian Sommerville : Software Engineering 6/e (Addison-Wesley)
3. Richard Fairley : Software Engineering Concepts (TMH)
4. Elis Awad, "System Analysis & Design", Galgotia publications
5. Pankaj Jalote's, "Software Engineering – A Precise Approach".
6. W.S. Jawadekar: Management Information Systems, TMH Publication, India

Outcomes:

Student would be able to

CO1: **Select** the most suitable process model best fit for solving a given software problem.
CO2: **Discover** what the business is trying to do to reach its objectives by addressing specific problems or opportunities
CO3: **Apply** testing to improve software quality.
CO4: **Detect** risks related with projects.
CO5: **Identify** the role of the maintenance task in the system development life cycle
CO6: **Closing** the gap between the current performance of an organization and its desired performance, as expressed in its mission, objectives and goals, and the strategy to achieve them.

680102: Mathematical Foundation of Computer Science

S. No.	Subject Code	Subject Name	Periods per week			Credits	Maximum Marks (Theory Slot)			Maximum Marks (Practical Slot)		Tot Mar
			L	T	P		End Sem Exam	Tests (Two)	Assign ments /Quiz	End Sem Practical/ Viva	Practical Record / Assignment/ Quiz/Present ation	
1.	680102	Mathematical Foundation of Computer Science	3	1	-	4	70	20	10	-	-	10

UNIT-I

Sets Relations and Functions: Sets, Subsets, Power-Sets, Complement, Union and intersection. Demorgan's law Cartesian, products, Relations: relational Matrices, properties of relations, equivalence relation Functions: Injection, Surjection, Bijection, Composition of Functions, Permutations. Cardinality, the characteristic functions and Mathematical induction..

UNIT-II

Lattices :Partial order set, Hasse diagrams, upper bounds, lower bounds, Maximal and minimal element, first and last element ,Lattices, sub lattices , Isotonicity, distributive inequality lattice homomorphism, lattice isomorphism, complete lattice, complemented lattice distribution lattice,

UNIT-III

Groups and Fields: Groups: Group axioms-permutation groups; Subgroups, Co-sets, Normal Subgroups, semi groups; Lagrange theorem, fields, minimal polynomials, reducible polynomials, primitive polynomial roots, applications.

UNIT-IV

Graphs: Finite graphs; incidence and degree, isomorphism, subgraphs and union of graphs; Connectedness; Walks paths and circuits Eulerian graphs. Trees properties of trees; pendant vertices in a tree, Center of tree Spanning trees and Cutvertices; Binary tree Matrix representation of graph, Incidence, Adjacency matrices and their properties. Applications of graphs in Computer Science.

UNIT-V

Discrete Numeric function and Recurrence relation: Introduction to discrete numeric functions and generating functions introduction to recurrence relations and recursive algorithms. Linear recurrence relations with constant coefficients, homogeneous solutions, particular solutions and total solutions

Books:

- J.P.Trembley & R.P.Manohar. "Discrete Mathematical Structure with applications to Computer Science"
- Nersingh Deo: Graph Theory. :: C.L. Liu Discrete Mathematics.
- C.L. Liu: Discrete Mathematics
- D.K. Jain: Discrete Structures

680103 Programming and Problem Solving in C

S. No.	Subject Code	Subject Name	Periods per week			Credits	Maximum Marks (Theory Slot)			Maximum Marks (Practical Slot)		To Ma
			L	T	P		End Sem. Exam	Tests (Two)	Assignments /Quiz	End Sem. Practical/ Viva	Practical Record / Assignment/ Quiz/Presentation	
1.	680103	Programming and Problem Solving in C	3	1	-	4	70	20	10	-	-	10

Objectives:

1. To apply knowledge of mathematics and programming
2. To design and conduct experiments, as well as to analyze and interpret data.
3. To design a flowchart, algorithm, to meet desired needs within realistic constraints
4. To prepare programs for multidisciplinary fields.
5. To identify, formulate and solve various mathematical, commercial and engineering problems.
6. To understand professional and ethical responsibility.
7. To communicate and design problem statement effectively.
8. To use programming for commercial and social interest
9. To motivate students not only learn C language, but also encourage them lifelong learning
10. To provide knowledge of contemporary techniques, terminology being used in programming
11. To use the techniques, skills and modern tools like new GUI etc necessary for program development

UNIT-I

An overview: Problem identification, analysis, design, coding, testing & debugging, implementation, modification & maintenance; algorithms & flowcharts; Characteristics of a good program- accuracy, simplicity, robustness, portability, minimum resource & time requirement, modularization; Rules/conventions of coding, documentation, naming variables; Top down design; Bottom- up design.

History of C; Structure of a C Program; Data Types; Constant & Variable; Operators & expressions. Priority & associatively of operators.

UNIT-II

Fundamentals of C Programming:; Control Constructs- if-else, for while, do-while; Case statement; Arrays; Formatted & unformatted I/O; Type modifiers & storage classes; Ternary operator; Type conversion & type casting; Special constructs-Break, continue, exit (), goto & labels;

UNIT-III

Modular Programming: Functions; Arguments; Return Value; Parameter passing- call by value, call by reference; Return statement; Scope, visibility and life-time rules for various types of variable, static variable; Calling a function; Recursion – basics, comparison with iteration, tail recursion, when to avoid recursion, examples.

UNIT-IV

Advanced Programming Techniques: Pointers-and *operators, pointer expression, pointer arithmetic, dynamic memory management functions like malloc (), calloc (), free(); String; Pointer v/s array; Pointer to pointer; Array of pointer & its limitation; Function returning pointers;; Structure-basic, declaration, membership operator, pointer to structure, referential operator, self referential structures, structure within structure, array in structure, array of structures; Union-basic, declaration; Enumerated data type; Typedef; command line arguments.

UNIT-V

Miscellaneous Features: File handling and related functions; prints & scanf family; C preprocessor- basics, #include, #define, #undef, conditional compilation directive like #if, #else, #elif, #endif, #ifdef and #ifndef; Variable argument list functions, Pointer to function, Function as parameter

Books:

1.Kerninghan & Ritchie: the C programming language, PHI.
2.Cooper Mullish: the spirit of C, Jaico Publishing House, Delhi
3.Kanetkar Y.:Let us C
4.Kanetkar Y.:Pointers in C

Outcomes:

Student would be able to

CO1: **Apply** knowledge of mathematics and programming
CO2: **Design** and conduct experiments, as well as to analyze and interpret data.
CO3: **Design** a flowchart, algorithm, to meet desired needs within realistic constraints
CO4: **Prepare** programs for multidisciplinary fields.
CO5: **Identify** various mathematical, commercial and engineering problems.
CO6: **Use** the techniques, skills and modern tools like new GUI etc necessary for program development

680104: Computer Organization and Assembly Language Programming

S. No.	Subject Code	Subject Name	Periods per week			Credits	Maximum Marks (Theory Slot)			Maximum Marks (Practical Slot)		To Ma
			L	T	P		End Sem. Exam	Tests (Two)	Assignments /Quiz	End Sem. Practical/ Viva	Practical Record / Assignment/ Quiz/Presentation	
1.	680104	Computer Organization and Assembly Language Programming	3	1	-	4	70	20	10	-	-	10

Objectives:

1. To introduce basic concepts of computer organization.
2. To understand the architecture of modern computer.
3. To understand different instruction types.
4. To illustrate the computer organization concepts by Assembly Language programming.
5. To teach Assembly language programming.
6. To understand how a computer performs arithmetic operation of positive and negative numbers.
7. To understand how computer stores floating point numbers in IEEE 754 standard.
8. To understand how cache mapping occurs in computer.

UNIT-I

Representation of Information: Number, integer and floating-point representation, character codes (ASCII, EBCDIC), Error detection and correction codes. Basic Building Blocks: Boolean Algebra, combinational blocks: gates, multiplexers, decoders etc, Sequential building blocks: flip-flops,, registers, counters, ALU, Random access memory etc.

UNIT-II

Register Transfer Language and Micro-operations: concept of bus, data movement among registers, language to represent conditional data transfer, data movement from/to memory, arithmetic and logical operations along with register transfer, timing in register transfer.

UNIT-III

Architecture of a simple processor: A simple computer organization and instruction set, instruction formats, addressing modes, instruction execution in terms of microinstructions, concepts of interrupt and simple I/O organization, implementation of processor using the building blocks.

UNIT-IV

Assembly Language programming: detailed study of 8086/8088 assembly language instruction set, loops and comparisons, conditions and procedures, arithmetic operations in assembly language, illustrations using typical programs like: table search, subroutines, symbolic and numerical manipulations and I/O.

UNIT-V

Memory organization: basic cell of static and dynamic RAM, Building large memories using chips, associative memory, cache memory organization, virtual memory organization.

Books:

1.M. Morris Mano, "Computer System Architecture",PHI,3rd edition, 1993
2.Liu and Gibson, "8086/8088 Microprocessor Assembly Language".
3.Bartee, "Digital Computer Fundamentals".
4.Malvino, "Digital Computer Electronics".

Outcomes:

Student would be able to

CO1: **Analyze** computer hardware at abstract level.
CO2: **Design** the Instruction execution stages.
CO3: **Differentiate** between High level languages and machine language.
CO4: **Depict** storage of positive and negative number at hardware level.
CO5: **Design** Assembly language programs.
CO6: **Solve** various problems related to secondary storage organization and utilization of cache memory

680105: Communication Skills

S. No	Subject Code	Subject Name	Periods per week			Credits	Maximum Marks (Theory Slot)			Maximum Marks (Practical Slot)		Total Marks
			L	T	P		End Sem. Exam	Tests (Two)	Assignments /Quiz	End Sem Practical/ Viva	Practical Record / Assignment/ Quiz/Presentation	
1.	680105	Communication Skills	3	1	-	4	70	20	10	-	-	100

UNIT-I

Communication: Meaning, Nature, Process, Medium and Media, and Elements of Communication. Importance of Effective Communication, Communication Situation, Barriers to Communication, Communication Window, Objectives of Communication. Types of Communication: Verbal and Non-Verbal, Oral and Written, merits and demerits of Oral and written Communication, Horizontal and Vertical Communication, Formal and informal communication, Grapevine Communication. Negotiation: Utility and Styles, Creativity.

UNIT-II

Communication Skills: Listen, Speak Read and Write, improving Communication Skills. Speaking: Presentation: Conducting, Use of Aids – Visual and Audio-visual. Group Discussion, Meetings, Interview, Telephonic Conversations, Seminar, Debates, Speech, Body Language.

UNIT-III

Writing: Mechanics of Writing. Paragraph Writing. Letters: Essentials of Writing Letters, Types of Official Letters, Letters of complaints enquiry, order, and Informative. Applications: Job Applications, Drafting Bio Data. Précis writing.

UNIT-IV

Writing Reports: Mechanics of Report Writing, Types of Report, Technical Report, Organising a report Precise Writing, Advertisement and Comprehension.

UNIT-V

Stories

1. R K Narayan	*The Lawley Road*
2. Saki	*Dusk*
3. O' Henry	*The Ransom of Red Chief*
4. Anton Chekhov	*Vanka (Little Jack)*
5. Rabindra Nath Tagore	*The Home-coming*

Non-detailed Study (Sessional) of any one of the following novel:

1. Animal Farm	*George Orwell*
2. The Old Man and the Sea	*Ernest Hemingway*
3. Lord of the Flies	*William Golding*
4. A Tiger for Malgudi	*R K Narayan*

Reference Books:

- *Communication Skills for Engineers – Pearson Education.*
- *Technical Communication – Oxford University Press*
- *Effective Business communication – Tata McGraw Hill*

- *Business Communication – OUP, Tata McGraw.*
- *Practical English Grammar by Thomson Martinet – Oxford University Press.*
- *Study Listening, Speaking Reading, Writing a series by Cambridge University Press.*
- *Communication Skills for Technical Students Farhathullah, T.M Orient Longman*
- *English for Engineers & Technologists (Combined Vol.1 and Vol.2) Orient Longman*

SECOND SEMESTER

680201 Multimedia Systems

S. No.	Subject Code	Subject Name	Periods per week			Credits	Maximum Marks (Theory Slot)			Maximum Marks (Practical Slot)		Total Marks
			L	T	P		End Sem. Exam	Tests (Two)	Assignments /Quiz	End Sem. Practical/ Viva	Practical Record / Assignment/ Quiz/Presentation	
1.	680201	Multimedia Systems	3	1	-	4	70	20	10	-	-	100

Objectives:

1. To understand the concept of multimedia for computing.
2. To develop the concept of media types.
3. To understand various media file formats.
4. To understand the intrinsic properties of representation of operation on various media types
5. To learn and analyse the compression schemes.
6. To develop multimedia application.

UNIT-I

Introduction to multimedia: Introduction to multimedia, multimedia and hypermedia, Multimedia hardware, analog media devices, digital media devices, MIDI, RAID, CD-ROM standards, Multimedia software: Multimedia operating systems, multimedia databases, multimedia software tools.

UNIT-II

Graphics and Images: Graphics representation and operations, image representation and operations, popular file formats, color models in images and graphics: RGB, CMY, CMYK, HIS, Image compression standards: Lossless and Lossy image compression algorithms, JPEG and JPEG 2000 image compression schemes.

UNIT-III

Video Data: Video representation and operations on video data type, YUV, YIQ and YCbCr Color models, analog to digital video conversion, Basic video compression schemes, H.261 Video, H.263, MPEG-1 and MPEG-2 Video compression standards.

UNIT-IV

Sound and Audio: Digitization of sound, Signal-to-Noise Ration(SNR), Linear and non linear quantization, audio filtering. MIDI: Hardware aspects, structure of MIDI, MIDI to wav conversion, Quantization and transformation of audio: Pulse code modulation, differential coding, DPCM, DM and ADPCM, audio formats.

UNIT-V

Multimedia Authoring and tools: Multimedia authoring Metaphors, multimedia production, Multimedia presentation, Multimedia tools: Adobe premiere, Macromedia Director, Macromedia Flash, Dreamweaver, VRML Overview and Specifics, multimedia authoring systems, hypermedia application design considerations, user interface design.

Books:

1. Fundamentals of Multimedia: Ze-Nian, Mark S. Drew, Peaeson Education
2. Multimedia Computing, communications and applications: Ralf Steinmetz and Klara Nahrstedt, Pearson Education.
3. Multimedia Systems Design: Prabhat K. Andleigh and Kiran Thakrar, PHI.
4. Multimedia Systems: John F.K. Buford, Pearson Education.

Outcomes:

Student would be able to

CO1: **Incorporate** and operate various multimedia object and technology.
CO2: **Utilize** various multimedia hardware in application development.
CO3: **Analyze** various compression schemes.
CO4: **Design** animations and digital videos.
CO5: **Analyze** various audio formats.
CO6: **Develop** multimedia virtual reality application using some author-ware.

680202 Computer Graphics

S. No.	Subject Code	Subject Name	Periods per week			Credits	Maximum Marks (Theory Slot)			Maximum Marks (Practical Slot)		Total Marks
			L	T	P		End Sem. Exam	Tests (Two)	Assign ments /Quiz	End Sem. Practical/ Viva	Practical Record / Assignment/ Quiz/Present ation	
1.	680202	Computer Graphics	3	1	-	4	70	20	10	-	-	100

Objectives:

1. To identify and explain the core concepts of computer graphics.
2. To apply graphics programming techniques to design, and create computer graphics scenes.
3. To create effective OpenGL programs to solve graphics programming issues, including 3D transformation, objects modeling, colour modeling, lighting, textures, and ray tracing.
4. To know and be able to describe the general software architecture of programs that use 3D computer graphics.
5. To know and be able to discuss hardware system architecture for computer graphics.
6. To know and be able to use a current 3D graphics API (e.g., OpenGL or DirectX).
7. To know and be able to use the underlying algorithms, mathematical concepts, supporting computer graphics. These include but are not limited to:
    a. Composite 3D homogeneous matrices for translation, rotation, and scaling transformations.
    b. Plane, surface normals, cross and dot products.
    c. Hidden surface detection / removal.
    d. Scene graphs, display lists.
8. To know and be able to select among models for lighting/shading: Color, ambient light; distant and light with sources; Phong reflection model; and shading (flat, smooth, Gouraud, Phong).

UNIT-I

Introduction: Computer graphics, definition, classification & applications, development of hardware & Software for computer graphics.

Output primitives: DDA along with, Bresenhan's line drawing algorithm, antialiasion, circle generation: Midpoint algorithms, ellipse, other curves, character generation, area filling scan line algorithm, boundary fill flood fill algorithm, attributes of output primitives line attributes, area fill attributes, character attributes.

UNIT-II

Two-dimensional Transformations: Translation scaling rotation reflection sheer, matrix representation and homogeneous coordinate's composite transformation commands.

UNIT-III

Windowing and Clipping: Viewing coordinates window, view port, clipping, window to view transformation line clipping Cohan Sutherland algorithm polygon clipping: Sutherland-hodgeman algorithm.

Three-dimensional concepts: Three dimensional viewing, three dimensional object presentation : polygons, cured line & surfaces quadrate (sphere, ellipsoid), surfaces, design of curves & surfaces, bezier's methods, Bspling methods; three dimensional transformation: Translation, scaling composite transformation, rotation, about arbitrary axis, projection: parallel, perspective.

UNIT-IV

Visible surface detection: Classification of visible-surface, detection algorithms, back face detection, depth buffer methods, A- buffer method, scan line method, depth sorting method.

Illumination and shading: Light sources, diffuse reflection, specular reflection, reflected light, texture, shadows, light intensity intensity levels. Surface shading, constant intensity, Gouraud shading, phong shading.

UNIT-V

Graphics system: Refresh Cathode ray tubes, Random and raster scan devices, DVST, plasma panel display, LED and LCD monitors, laser devices, printers, plotters, display processors, raster and random scan system.

Interactive Input Device: Logical classification, Keyboards, touch panels, light pens, joysticks, mouse trackball digitizers, tablets.

Books:

1. D.Heam and M.P. Baker Computer Graphics (2nd ed), PHI.
2. S.Harrington–Computer Graphics–a Programming approach (2nd ed) McGrawhill.
3. New Mann & Sprout – Principles of interactive computer graphics (2nd ed) McGrawhill.
4. Roger S. David Procedural Elements for Computer, McGraw Hill.
5. Roger S. David Mathematical Elements for Computer Graphic, Mc Graw Hill.
6. Foley & Vandan : Computer Graphics : Principles & Practice in "C" Addision Wesly.

Outcomes:

Student would be able to

CO1: **Analyze** the structure of an interactive computer graphics system.
CO2: **Apply** geometrical transformations, interaction techniques and 2D viewing.
CO3: **Demonstrate** their ability to use modern 3D computer graphics techniques, models, and algorithms to solve graphics problems.
CO4: **Design** interactive graphics applications.
CO5: **Design** and implement models of surfaces, lights, sounds, and textures (with texture transformations) using a 3D graphics AP.
CO6: **Discuss** the application of computer graphics concepts in the development of computer games, information visualization, and business applications.

680203 Data Structures

S. No.	Subject Code	Subject Name	Periods per week			Credits	Maximum Marks (Theory Slot)			Maximum Marks (Practical Slot)		Total Marks
			L	T	P		End Sem. Exam	Tests (Two)	Assign ments /Quiz	End Sem. Practical/ Viva	Practical Record / Assignment/ Quiz/Presentation	
1.	680203	Data Structures	3	1	-	4	70	20	10	-	-	100

Objective:

1 To understand the abstract data types stack, queue, deque, and list.
2 To be able to implement the ADTs stack, queue, and deque using Python lists.
3 To understand the performance of the implementations of basic linear data structures.
4 To understand prefix, infix, and postfix expression formats.
5 To use stacks to evaluate postfix expressions.
6 To use stacks to convert expressions from infix to postfix.
7 To use queues for basic timing simulations.
8 To be able to recognize problem properties where stacks, queues, and deques are appropriate data structures.
9 To be able to implement the abstract data type list as a linked list using the node and reference pattern.
10 To be able to compare the performance of our linked list implementation with Python's list implementation.

UNIT-I

Prerequisites: Array, Structure, pointers, pointer to structure, functions, parameter passing, recursion.

Stack and Queue: contiguous implementations of stack, various operations on stack, various polish notations-infix, prefix, postfix, conversion from one to another-using stack; evaluation of post and prefix expressions. Contiguous implementation of queue: Linear queue, its drawback; circular queue; various operations on queue; linked implementation of stack and queue- operations

UNIT-II

General List: list and it's contiguous implementation, it's drawback; singly linked list-operations on it; doubly linked list-operations on it; circular linked list; linked list using arrays.

Trees: definitions-height, depth, order, degree, parent and children relationship etc;
Binary Trees- various theorems, complete binary tree, almost complete binary tree;
Tree traversals-preorder, inorder and post order traversals, their recursive and non recursive implementations; expression tree- evaluation; linked representation of binary tree-operations. Threaded binary trees; forests, conversion of forest into tree. Heap-definition.

UNIT-III

Searching, Hashing and Sorting: requirements of a search algorithm; sequential search, binary search, indexed sequential search, interpolation search; hashing-basics, methods, collision, resolution of collision, chaning; Internal sorting- Bubble sort, selection sort, insertion sort, quick sort, merge sort on linked and contiguous list, shell sort, heap sort, tree sort.

UNIT-IV

Graphs: related definitions: graph representations- adjacency matrix, adjacency lists, adjacency multilist; traversal schemes- depth first search, breadth first search; Minimum spanning tree; shortest path algorithm; kruskal & dijkstra algorithm.

UNIT-V

Trees: Miscellaneous features Basic idea of AVL tree- definition, insertion & deletion operations; basic idea of B-tree- definition, order, degree, insertion & deletion operations; B-tree- definitions, comparison with B-tree; basic idea of string processing.

Books:

1.Kruse R.L. Data Structures and Program Design in C; PHI
2.TennenBaum A.M. & others: Data Structures using C & C++; PHI
3.Horowitz & Sawhaney: Fundamentals of Data Structures, Galgotia Publishers.

Outcomes:

Student would be able to

CO1: **Describe** the stack, queue, link list.

CO2: **Analyze** worst-case running times of algorithms using asymptotic analysis.

CO3: **Synthesize** familiar with advanced data structures such as balanced search trees, hash tables, priority queues, tree traversal techniques.

CO4: **Describe** several sorting algorithms including quick sort, merge sort and heap sort.

CO5: **Organize** some graph algorithms such as shortest path and minimum spanning tree

CO6: **Evaluate** different data structures technique and pick an appropriate data structure for a design situation.

680204 Computer Oriented Numerical and Statistical Methods

S. No.	Subject Code	Subject Name	Periods per week			Credits	Maximum Marks (Theory Slot)			Maximum Marks (Practical Slot)		Total Marks
			L	T	P		End Sem. Exam	Tests (Two)	Assignments /Quiz	End Sem Practical/ Viva	Practical Record / Assignment/ Quiz/Presentation	
1.	680204	Computer Oriented Numerical & Statistical Methods	3	1	-	4	70	20	10	-	-	100

Objective:

1 To develop an understanding of the standard techniques of random variables.
2 To explore to the concept of Numerical Method.
3 To familiarize with MATLAB programming.

UNIT-I

Random Variable and Theory of Probability: Concept of Random Variable, One Dimensional Random Variable, Two Dimensional Random Variable, Distribution Function, Probability Density Function (p.d.f.), Joint p.d.f., Marginal p.d.f., Cummulative p.d.f., Basic Concepts of Probability, Conditional Probability, Baye's Theorem, Moment Generation Function, some special distribution.

UNIT-II

Interpolation: Finite Difference, Difference Operators, and Relation between operators, Interpolation: Hermite, Piecewise and spline & Bivariate Interpolations, Approximation: Gram-Schmidt Orthogonalizing Process, Legendre Polynomials, Chebyshev Polynomials.

UNIT-III

Numerical Solution of Integration: Numerical Integration by Trapezoidal, Simpson's (1/3) rule, Simpson's (3/8) and weddle's rule.

UNIT-IV

Ordinary Differential Equation & Partial Differential Equation: Solution of Ordinary Differential Equation by Picard's Methods, Taylor's Series Methods, Euler's and Modified Euler's Methods, Forth order Runge Kutta Method and Milne's Predictor Corrector Method. Classification of partial Differential Equations and it's applications. (Parabolic, Hyperbolic and Elliptic Equations), Finite Difference method.

UNIT-V

Matlab

Introduction, Functions String, Array, Operator, Entering Matrices, Control Flow, M-File, Script, Function Files, Graphics, Two Dimension , Three Dimension Graph, Mesh, Surface, Contour Plot, Graphics of Polar System, Applications of MATLAB in Numerical Techniques: Numerical Differential and Integration, Curve fitting, Polynomial.

Reference Books:

R.G.Stanou : Numerical Methods for Science and Engineering.

B.S. Grewal: Numerical Methods in Engineering and Science.
M.K. Jain Et Al : Numerical Analysis for Scientists and Engineers.
Stephen J. Chapman : Matlab Programming for Engineers.
M.Herniter : Programming in Matlab.

Outcomes:

Student would be able to

CO1: **Interpreting** the basic concept of random process and numerical techniques
CO2: **List** of formula of random process and numerical methods
CO3: **Develop** the analytical and computational skill to interpret the random process and various Numerical Techniques for computer application
CO4: **Making** MATLAB programming to examine the course content.
CO5: **Analyzing** the one and two dimensional random variable and numerical methods to examine the real world problem.
CO6: **Applying** the concepts of the studied topics to the suitable technique for relevant industries and contribution to the society

680205 Accounting and Management Control:

S. No.	Subject Code	Subject Name	Periods per Week			Credits	Maximum Marks (Theory Slot)			Maximum Marks (Practical Slot)		Total Marks
			L	T	P		End Sem. Exam	Tests (Two)	Assignments /Quiz	End Sem. Practical/ Viva	Practical Record / Assignment/ Quiz/Presentation	
1.	680205	Accounting & Management Control	3	1	-	4	70	20	10	-	-	100

UNIT-I

Meaning and objects of accounting, accounting concepts and conventions, accounting equations, rules of Journalizing.

UNIT-II

Cash-book, Ledger posting, preparation of trial balance, Trading and profit and loss account and balance sheet with simple adjustments relating to closing stock , outstanding expenses, prepaid expenses , accrued income depreciation, bad debts, provision for bad debts, provision fro discount on debtors and creditors , provision for tax, inventory pricing , FIFO and LIFO methods

UNIT-III

Simple problems of funds flow statement, cost-volume-profit analysis, standard costing, computation of material and labour variances,

UNIT-IV

Management control and its characteristics, budgetary control, preparation of cash budget and flexible, budget. goals and strategies, structure and control.

UNIT-V

Responsibility centers and control centers: concepts of Responsibility centers, revenue centers, profit centers and investment centers, transfer pricing, Responsibility reporting.

Books:

1. Bhattacharya S.K. and Deardan John "Accounting for Management" PHI
2. Chadwick "The essence of financial accounting" PHI
3. Chadwick "The essence of Management accounting" PHI
4. Grewal "Introduction to Book – keeping"
5. Subhash Sharma "Management control systems" TMH

THIRD SEMESTER

680301 Computer Oriented Optimization:

S. No.	Subject Code	Subject Name	Periods per week			Credits	Maximum Marks (Theory Slot)			Maximum Marks (Practical Slot)		Total Marks
			L	T	P		End Sem. Exam	Tests (Two)	Assignments /Quiz	End Sem. Practical/ Viva	Practical Record / Assignment/ Quiz/Presentation	
1.	680301	Computer Oriented Optimization	3	1	-	4	70	20	10	-	-	100

UNIT-I

Introduction to OR & Linear Programming: Historical development, models and modeling, classification, general methods for solving OR models and their computer software. LP formulation, Graphical methods for solving LPP with 2 variables, simplex method, duality theory in linear programming and applications dual simplex method transportation problem, assignment problem.

UNIT-II

Non Linear & Dynamics Programming: Non Linear Programming Problem (NLPP) Introduction of NLPP, constrained problems of maxima and minima, constrained in the form of equations (Lagrangian methods), constraints in the form of inequalities (Kuhn-Tucker conditions). Dynamics Programming: Basic concepts, Bellman's optimality principles, aynamics Programming approach in decision making problems, optimal subdivision problem, LPP Solution by dynamic programming problems.

UNIT-III

Project Management: Pert and CPM: Project management origin and use of PERT, origin and use of CPM, project network, diagram representation, Critical Path calculation by linear program, Critical Path calculation, (CPM), determination of floats, construction of time charts and resource labeling. Project cost curve and crashing in project management, project evaluation and review techniques (PERT).

UNIT-IV

Queuing models: Essential features of Queuing systems, operating characteristics of queuing systems, probability distribution in queuing system, classification of queuing models, solution of queuing /∞ FCPS, M/M/1 :/FCPS, M/E/1:/∞FCPS M/M/1, N/FCPS, M/M/S,/ ∞M/M/1, FCPS, /FCFS, Modds

UNIT-V

Inventory Models: introduction to inventory problems, deterministic models, the classical EOQ (Economic Order Quantity) models, inventory models with deterministic demands (No shortage and shortage allowed), inventory models with probabilistic demand, Multi item deterministic models. Price break models

Books:

- Gillet B.E: Introduction to Operation Research, Computer oriented algorithmic approach.
- J.K.Sharma Operation Research Theory and Application, McMilan
- S.D. Shrama: Operations Research
- Kantiswroop: Operations Research

680302 Operating System:

S. No.	Subject Code	Subject Name	Periods per Week			Credits	Maximum Marks (Theory Slot)			Maximum Marks (Practical Slot)		Total Marks
			L	T	P		End Sem. Exam	Tests (Two)	Assign ments /Quiz	End Sem. Practical/ Viva	Practical Record / Assignment/ Quiz/Present ation	
1.	680302	Operating System	3	1	-	4	70	20	10	-	-	100

Objectives:

1. To learn the fundamentals of Operating Systems
2. To understand the services provided by and the design of an operating system.
3. To understand the structure and organization of the file system.
4. To understand what a process is and how processes are synchronized and scheduled.
5. To understand different approaches to memory management.
6. To gain knowledge on Distributed operating system concepts that includes architecture, Mutual exclusion algorithms, Deadlock detection algorithms and agreement protocols
7. To gain insight on to the distributed resource management components viz. the algorithms for implementation of distributed shared memory, recovery and commit protocols
8. To know the components and management aspects of Real time, Mobile operating systems.

UNIT-I

Introduction: Evolution of operating systems, Types of operating systems, Different views of operating system, operating system concepts and structure.

Processes: The process concept, systems programmer's view of processes, operating system services for processes management, scheduling algorithms, Performance evaluation.

UNIT-II

Memory Management: Memory management without swapping or paging , swapping , virtual memory, page replacement algorithms, modeling paging algorithms, design issues for paging system, segmentation.

UNIT-III

Interprocess communication and synchronization: The need for interprocess synchronization, mutual exclusion, semaphores, hardware support for mutual exclusion, queuing implementation of semaphores, classical problems in concurrent programming, critical region and conditional critical region, monitors messages.

UNIT-IV

Deadlocks: Deadlock prevention, deadlock avoidance.

File system: File systems, directories, file system implementation security and protection mechanism.

Input/Output: Principles of I/O Hardware: I/O devices, device controllers, direct memory access, Principles of I/O software: Goals interrupt handlers, device drivers, and device independent I/O software, User space I/O software.

UNIT-V

Disks: Disk hardware, scheduling algorithms, Error handling, track-at-a time caching RAM disk.

Clocks: clock hardware, memory mapped terminals, I/O software
Distributed file system: Design, implementation and trends.
Performance measurement: monitoring and evaluation introduction, important trends affecting performance issues, why performance monitoring and evaluation are needed, performance measures, evaluation techniques, bottlenecks and saturation, feedback loops.
Case studies: MS-DOS, MS Windows and Linux(Unix) Operating System.

Books:

1. Deitel "An introduction to operating systems". Addison Wesley Publishing Company 1984.
2. Milenkovic M. "Operating Systems – concepts and design" McGraw Hill International Edition – Computer science series 1992.
3. Peterson, Silberschatz. "Operating System Concepts". Addison Wesely Publishing Company, 1989.
4. Tanenbaum A.S. "Modern Operating System" Prentice Hall of India Pvt Ltd 1995.

Outcomes:

Student would be able to

CO1: **Evaluate** and compare different structures for operating systems
CO2: **Analyze** theory and implementation of: processes, resource control (concurrency etc.)
CO3: **Distinguish** system calls for managing processes, memory and the file system.
CO4: **Demonstrate** the Mutual exclusion, Deadlock detection and agreement protocols of Distributed operating system
CO5: **Apply** the various resource management techniques for distributed systems
CO6: **Discover** the different features of real time and mobile operating systems

680303 Object Oriented Methodology and C++:

S. No.	Subject Code	Subject Name	Periods per week			Credits	Maximum Marks (Theory Slot)			Maximum Marks (Practical Slot)		Total Marks
			L	T	P		End Sem. Exam	Tests (Two)	Assign ments /Quiz	End Sem. Practical/ Viva	Practical Record / Assignment/ Quiz/Present ation	
1.	680303	Object Oriented Methodology & C++	3	1	-	4	70	20	10	-	-	100

Objectives:

1. To Gain the basic knowledge on Object Oriented concepts.
2. To learn the characteristics of an object-oriented programming language: data abstraction and information hiding, inheritance, and dynamic binding of the messages to the methods.
3. To learn the basic principles of object-oriented design and software engineering in terms of software reuse and managing complexity.
4. To learn syntax, features of, and how to utilize the Standard Template Library.
5. To practice the use of C++ Classes and class libraries
6. To practice the concepts of Object Oriented Analysis and Design and design patterns and framework
7. To enhance problem solving and programming skills in C++ with extensive programming projects.
8. To develop applications using Object Oriented Programming Concepts.

UNIT-I

OOP Overview and Fundamentals: Overview of object oriented programming, evolution, features, comparison with procedural languages, applications, advantages. C++ basics, data types, Operators, loops and decisions, structures and functions, references.

UNIT-II

Characteristics in Detail: Object and classes, object arrays, constructor and destructor functions, friend functions, inline functions Polymorphism: operator and function overloading,

Inheritance and it's types in detail, argument passing in case of various inheritance types.

UNIT-III

Pointers and Run Time-Polymorphism: Pointers and Run time polymorphism: Pointers, virtual base class, pointers to base and derived classes, pointers to members and member functions. generic pointers, generic functions and generic classes, virtual functions , early and late binding,

UNIT-IV

File Handling and I/Os: C++ I/O systems , formatted I/O , creating inserters and extractors, file I/O basic , creating disk file and file manipulation using seekg(), seekp(), tellg(), tellp() functions, exception handling.

UNIT-V

Object Oriented Analysis and Design: Object model, OOD, OOA, abstraction, encapsulation, modularity, hierarchy , state, behavior and relationship among objects. Object oriented design, identifying classes and objects, object diagrams.

Books:

1. Lafore R. Object oriented programming in C++ Galgotia Publications
2. Balaguruswamy Object oriented programming in C++
3. B.G.Booch Object oriented analysis and design with applications , Addsion Wesley
4. S Parate C++ programming BPB
5. M. Kumar C++ Programming Made Simple

Outcomes:

Student would be able to

CO1: **Describe** OOPs fundamental

CO2: **Explain** basic characteristics of C++ such as composition of class, objects, arrays, operator overloads, inheritance and polymorphism etc.

CO3: **Demonstrate** adeptness of object oriented programming in developing solutions to problems demonstrating usage of data abstraction, pointers, dynamic binding, templates and inheritance.

CO4: **Investigate** object oriented programming to develop solutions to problems demonstrating usage of control structures, modularity, I/O. file handling, encapsulation, and other standard language constructs.

CO5: **Evaluate** existing classes, develop C++ classes for required software applications

CO6: **Design** the solution for various problems using C++ features and the Standard Template Library, and test and evaluate the finished code.

680304 Database Management System

S. No.	Subject Code	Subject Name	Periods per week			Credits	Maximum Marks (Theory Slot)			Maximum Marks (Practical Slot)		Total Marks
			L	T	P		End Sem. Exam	Tests (Two)	Assign ments /Quiz	End Sem. Practical/ Viva	Practical Record / Assignment/ Quiz/Presentation	
1.	680304	Database Management System	3	1	-	4	70	20	10	-	-	100

Objectives:

1. To describe key concepts, issues, and operational terminology
2. To identify and discuss current issues in education
3. To identify the symbols used in ER-model
4. To develop utilities for the DBMS
5. To explain why we use DBMS
6. To understand the relationships of key components behind concepts such as hardware, networks, data storage, operating systems, and software programs.
7. To normalize any problem using 1^{st},2^{nd},3^{rd},4^{th},5^{th} normal form

UNIT-I

Introduction: Advantage of DBMS approach, various view of data, data independence, schema and sub-schema, primary concepts of data models, Database languages, transaction management, Database administrator and users, data dictionary, overall system architecture.
ER model: basic concepts, design issues, mapping constraint, keys, ER diagram, weak and strong entity sets, specialization and generalization, aggregation, inheritance, design of ER schema, reduction of ER schema to tables.

UNIT-II

Domains, Relations and Keys: domains, relations, kind of relations, relational database, various types of keys, candidate, primary, alternate and foreign keys.
Relational Algebra & SQL: The structure, relational algebra with extended with extended operations, modifications of Database, idea of relational calculus, basic structure of SQL, set operations, aggregate functions, null values, nested sub queries, derived relations, views, modification of Database, join relations, DDL in SQL.
Database Integrity: general idea. Integrity rules, domain rules, attribute rules, relation rules, Database rules, assertions, triggers, integrity and SQL.

UNIT-III

Functional Dependencies and Normalization: basic definitions, trivial and non trivial dependencies, closure set of dependencies and of attributes, irreducible set of dependencies, introduction to normalization, non loss decomposition, FD diagram, first, second, third Normal forms, dependency preservation, BCNF, multivalued dependencies and fourth normal form, Join dependency and fifth normal form.

UNIT-IV

Transaction, concurrency and Recovery: basic concepts, ACID properties, Transaction states, implementation of atomicity and durability, concurrent executions, basic idea of serializability, basic idea of concurrency control, basic idea of deadlock, failure classification, storage structure types, stable storage implementation, data access, recovery

and atomicity- log based recovery, deferred Database modification, immediate Database modification, checkpoints.

UNIT-V

Distributed Database: basic idea, distributed data storage, data replication, data fragmentation- horizontal vertical and mixed fragmentation

Emerging Fields in DBMS: object oriented Databases-basic idea and the model, object structure, object class, inheritance, multiple inheritance, object identity, data warehousing-terminology, definitions, characteristics, data mining and it's overview, Database on www, multimedia Databases-difference with conventional DBMS, issues, similarity based retrieval, continuous media data, multimedia data formats, video servers.

Storage structure and file organizations: overview of physical storage media, magnetic disks-performance and optimizations, basic idea of RAID, file organizations, organization of records in files, basic concepts of indexing, ordered indices, basic idea of B-tree and B+-tree organization

Network and hierarchical models: basic idea, data structure diagrams, DBTG model, implementations, tree structure diagram, implementation techniques, comparison of the three models.

Books:

1. Database System Concepts – A Silberschatz, H.F Korth, Sudersan, MGH Publication.
2. An introduction to Database Systems – C.J Date 6th ed.
3. Fundamentals of Database systems – L elmasri & Navathe III ed.
4. An introduction to Database systems – B.C. Desai.

Outcomes:

Student would be able to

CO1: **Differentiate** database systems from file systems by enumerating the features provided by database systems

CO2: **Define** the terminology, features, classifications, and characteristics embodied in database systems.

CO3: **Design** principles for logical design of databases, including the E-R method and normalization approach.

CO4: **Evaluate** database storage structures and access techniques

CO5: **Identify** the issues of transaction processing and concurrency control.

CO6: **Analyze** an information storage problem and derive an information model expressed in the form of an entity relation diagram and other optional analysis forms, such as a data dictionary.

680305 Managerial Economics

S. No.	Subject Code	Subject Name	Periods per Week			Credits	Maximum Marks (Theory Slot)			Maximum Marks (Practical Slot)		Total Marks
			L	T	P		End Sem. Exam	Tests (Two)	Assign ments /Quiz	End Sem. Practical/ Viva	Practical Record / Assignment/ Quiz/Present ation	
1.	680305	Managerial Economics	3	1	-	4	70	20	10	-	-	100

UNIT-I

Meaning, nature and scope of managerial economics, difference and similarities between micro-economics and macro-economics, objectives of firm, Profit maximization theory alternative theories and behavioral theories of the firm.

UNIT-II

Economic Principles, concepts of opportunity cost , marginal cost, incremental, time perspective, principles of discounting and equi-margin,

UNIT-III

Consumer behaviour-demand analysis purpose and concepts of demand, docrine of diminishing utility, elasticity of demand, price elasticity, income elasticity and cross elasticity, demand forecasting.

UNIT-IV

Product and cost analysis: short run and long run average cost curves. Law of supply, economies and diseconomies of scale, law of variable proportions. Production functions: single output isoquants.

UNIT-V

Pricing: prescriptive approach, price determination under perfect competition, monopoly, oligopoly and monopolistic competition, methods of pricing, pricing strategies
Profits: nature and measurement policy, break even analysis, case study.

Books

1. Dean J. Managerial Economics PHI, New Delhi
2. Mote V.L. et al Management Economics Concepts and Cases TMH, New Delhi

FOURTH SEMESTER

680401 Theory of Computation

S. No.	Subject Code	Subject Name	Periods per week			Credits	Maximum Marks (Theory Slot)			Maximum Marks (Practical Slot)		Total Marks
			L	T	P		End Sem. Exam	Tests (Two)	Assignments /Quiz	End Sem. Practical/ Viva	Practical Record / Assignment/ Quiz/Presentation	
1.	680401	Theory of Computation	3	1	-	4	70	20	10	-	-	100

Objectives:

1. To introduce students to the mathematical foundations of computation including automata theory; the theory of formal languages and grammars; the notions of algorithm, decidability, complexity, and computability.
2. To enhance/develop students' ability to understand and conduct mathematical proofs for computation and algorithms.
3. To define mathematical methods of computing devices, called abstract machines, namely Finite Automata, Pushdown Automata, and Turning Machines.
4. To study the capabilities of these abstract machines.
5. To classify machines by their power to recognize languages.
6. To employ finite state machines to solve problems in computing
7. To explain deterministic and non- deterministic machines.
8. To identify different formal language classes and their relationships
9. To design grammars and recognizers for different formal languages
10. To comprehend the hierarchy of problems arising in the computer sciences

UNIT-I

Review of Mathematical Preliminaries, Relations, functions, set theory, predicate & prepositional calculus, principle of mathematical induction / strong mathematical induction.

UNIT-II

Formal language, phrase structured grammer & their classification, Chomskey hierarchy, closure properties of families of families of languages, regular grammer, regular expression properties of regular sets, finites automata, DFA & 2 DFA, FSM with output, determinism & non determinism, FA minimization & related theorems.

UNIT-III

Context free grammer & its properties, derivation tree simplifying CFG, unambiguifying CFG, CNF & CNF of CFG, push down automata, 2 PDA, relation of PDA with CFG, Determinism & non determinism in PDA & related theorems.
Concept of linear Bounded Automata, context sensitive grammars & their equivalence.

UNIT-IV

Unrestricted grammars & their equivalence with TM determinism & non determinism in TM, TM as acceptor / generator/ algorithms & related theorems, Multi tape, multi head, multi track TM, automata with two push down store & related theorems.

UNIT-V

Introduction to Complexity theory. Recursively enumerable sets, recursive set, partial recursive sets, Russell's paradox, undecidabality & some non computable problems.
Petrinet modeling, Introduction to petrinets, marked petrinets, representing sequential, O.S. networking & concurrent problems through petrinets, properties of petrinets.

Books:

1.Hopcroft & Ullman : Introduction to Automata Theory, Languages & Cjomputation, Narosha Publishing House
2.James Peterson : Petrinet theory & modeling of system, prentice Hall Inc, N.J.
3.Lewish papadimutrau : Theory of Computation, Prentice Hall of India, New Delhi.
4.Liu C.L. : Elements of Discrete Methematics, Mc Graw Hill
5.Mishra & Chandrashekharam : Theory of Computer Science, Anlomata, Languages & corn Putation 2nd ed PHI, New Delhi.

Outcomes:

Student would be able to

CO1: **Learn** basic concepts in formal language theory, grammars, automata theory, computability theory, and complexity theory.
CO2: **Demonstrate** abstract models of computing, including deterministic (DFA), non-deterministic (NFA), Push Down Automata(PDA) and Turing (TM) machine models and their power to recognize the languages.
CO3: **Discuss** machine models and descriptors to compiler theory and parsing
CO4: **Identify** mathematical and formal techniques for solving problems in computer science.
CO5: **Develop** the relationship among language classes and grammars with the help of Chomsky Hierarchy.
CO6: **Demonstrate** key notions, such as algorithm, computability, decidability, and complexity through problem solving.

680402 Artificial Intelligence and Machine Learning

S. No.	Subject Code	Subject Name	Periods per week			Credits	Maximum Marks (Theory Slot)			Maximum Marks (Practical Slot)		Total Marks
			L	T	P		End Sem. Exam	Tests (Two)	Assignments /Quiz	End Sem. Practical/ Viva	Practical Record / Assignment/ Quiz/Presentation	
1.	680402	Artificial Intelligence and Machine Learning	3	1	-	4	70	20	10	-	-	100

Objectives:

1. To study the concepts of Artificial Intelligence
2. To learn Methods of solving problems using Artificial Intelligence
3. To present an overview of artificial intelligence (AI) principles and approaches.
4. To introduce the concepts of Expert Systems and machine learning.
5. To have an appreciation for and understanding of both the achievements of AI and the theory underlying those achievements.
6. To have an appreciation for the engineering issues underlying the design of AI systems.
7. To have an understanding of the basic issues of knowledge representation and blind and heuristic search, as well as an understanding of other topics such as minimax, resolution, etc. that play an important role in AI programs.
8. To have a basic understanding of some of the more advanced topics of AI such as learning, natural language processing, agents and robotics, expert systems, and planning.

UNIT-I

An Overview of AI: Definitions, Foundations of AI: Philosophy, Mathematics, Psychology, Computer Engineering, linguistics, History of AI, Applications of AI.

AI Production Systems, Search and Control Strategies:

AI Production systems and control strategies; Exploring alternatives: Finding a path: Depth first search, hill climbing, breadth first search, beam search, best first search; Finding the best Path: The British Museum search, Branch and Bound Search, A* Search, AO* Search; Game Playing: Minmax search, Alpha-beta pruning, Progressive deepning, Heuristic Pruning.

UNIT-II

Knowledge Representations:

First order predicate calculus, Clause form representation of WFFs, resolution principle & unification, inference mechanism, semantic networks, frame systems and value inheritance, scripts, conceptual dependency.

UNIT-III

Expert systems:

Introduction and applications of exert systems, Rule-based System Architecture, Non-production system architecture, Expert system shells, dealing with uncertainty: Baysian reasoning and fuzzy reasoning.

UNIT-IV

Machine Learning I:
Learning Theory, Complexity, statistical Foundations. Types of learning: Unsupervised, Supervised, Reinforcement, Semi-Supervised. Linera models for regression and Classification.

UNIT-V
Machine Learning II:
Artificial Neural networks, Kernel Methods, Support Vector Machines, Decision Trees and Random Forests, Combining Classifiers, Probabilistic Graphical Models, Machine learning for computational Finance, Large Scale Machine Learning.

Books:

1. Introduction to AI and Expert Systems: D.W. Patterson PHI.
2. Artificial Intelligence: P.H. Winston, Addison Wesley.
3. Principles of AI: N.J. Nilsson, Springer-Verlag
4. Artificial Intelligence: A Modern Approach: Stuart Russell and Peter Norvig, Pearson Education

Outcomes:
Student would be able to

CO1: **Demonstrate** knowledge of the building blocks of AI as presented in terms of intelligent agents.
CO2: **Analyze** and formalize the problem as a state space, graph, design heuristics and select amongst different search or game based techniques to solve them.
CO3: **Develop** intelligent algorithms for constraint satisfaction problems and also design intelligent systems for Game Playing.
CO4: **Attain** the capability to represent various real life problem domains using logic based techniques and use this to perform inference or planning.
CO5: **Formulate** and solve problems with uncertain information using Bayesian approaches.
CO6: **Apply** concept Natural Language processing to problems leading to understanding of cognitive computing.

680403 UNIX & Shell Programming

S. No.	Subject Code	Subject Name	Periods per week			Credits	Maximum Marks (Theory Slot)			Maximum Marks (Practical Slot)		Total Marks
			L	T	P		End Sem. Exam	Tests (Two)	Assign ments /Quiz	End Sem. Practical/ Viva	Practical Record / Assignment/ Quiz/Presentation	
1.	680403	Unix and Shell Programming	3	1	-	4	70	20	10	-	-	100

Objectives

1. To describe key concepts, issues, and operational terminology
2. To identify and discuss current issues in education
3. To study and apply concepts relating to operating systems, such as concurrency and control of asynchronous processes, deadlocks, memory management, processor and disk scheduling, parallel processing, and file system organization
4. To develop utilities for the Linux operating system using the system call interface
5. To explain why we use Unix operating system
6. To learn and understand topics
7. To understand the relationships of key components behind concepts such as hardware, networks, data storage, operating systems, and software programs.

UNIT-I

General Overview of the System: System structure, user perspective/S services assumption about Hardware, The Kernel and buffer cache architecture of UNIX O/S, System concept Kernel data structure, System administration, Buffer headers, Structure of the buffer pool, scenarios for retrieval of the buffer, Reading and Writing disk block, Advantage and disadvantage of buffer cache.

UNIT-II

Internal Representation of Files: INODES, Structure of regular, Directories conversation of path name to an inode, SuperBlock, node assignment to a new file, Allocation of Disk blocks.

UNIT-III

System Calls for the System: Open read write file and record close, File creation Operation Special files change directory and change root, change owner and change mode, STAT ai FSTAT, PIPES mounting and unmounting files system, Link & Unlink.

UNIT-IV

Structure of Process and Process Control: Process states and transaction layout of the syste memory, the context of the process, and manipulation of process address space, Sleep Proce creation/termination, The user Id of a process, changing the size of the process, The SHELL.

Interprocess Communication and multiprocessor system: Process tracing system V IP network communication sockets problem of multiprocessor systems, solution with master ai hare process, solution with semaphores.

UNIT-V

Introduction to shell scripts: Bourn shell, C shell, shell variables, scripts, metacharacters an environment, if and case statements, for while and until loops.

Awk Programming: Awk pattern scanning and processing language BEGIN and END pattern Awk arithmetic and variables, built in variables names and operators, arrays, strings.

Linux History & Features of Linux, Linux structure, various flavours of linux.

Books:

1. Design of UNIX O.S. by M.J. Bach,Prentice Hall of India.
2. B.W. Kernighan & R. Pike, The UNIX Programming Enviornment,Prentice Hall of
3. India,1995.
4. S. Prata Advanced LINUX A Programming Guide,BPB Publication, New Delhi.
5. Guide to UNIX using LINUX by Jack Dent Tony Gaddis,Vikas.Thomsaon Pub.
6. House Pvt. Ltd.
7. Linux complete by BPB Publications.
8. Linux Kernel by Beck Pearson Education, Asia.

Outcomes:

Student would be able to

CO1: **Use** software development tools including libraries, preprocessors, compliers, linkers and make files.

CO2: **Execute** basic commands in Unix

CO3: **Develop** programs with the help of shell script

CO4: **Identify** and use Unix utilities to create and manage simple file processing operations, as well as more complex tasks.

CO5: **Analyze** the process states.

CO6: **Differentiate** memory management techniques used in operating systems and how cache memory should work.

680404 Java Programming and Technologies

S. No.	Subject Code	Subject Name	Periods per week			Credits	Maximum Marks (Theory Slot)			Maximum Marks (Practical Slot)		Total Marks
			L	T	P		End Sem. Exam	Tests (Two)	Assignments /Quiz	End Sem Practical/ Viva	Practical Record / Assignment/ Quiz/Presentation	
1.	680404	Java Programming and Technologies	3	1	-	4	70	20	10	-	-	100

Objectives:

1. To write, compiling & execute basic java program.
2. To use of data types & variables, decision control structures: if, nested if etc.
3. To learn the use loop control structures: do, while, for etc.
4. To create classes and objects and use them in their program.
5. To learn the use of oop concept i.e data abstraction & data hiding, encapsulation, inheritance, polymorphism.
6. To create and use threads, handle exceptions and write applets.
7. To learn the use interfaces and inner classes, wrapper classes, generics
8. To learn configuration of web server(Tomcat)
9. To write small servlet program.
10. To write small JSP program

UNIT-I

The Java Environment: History of Java: Comparison of Java and C++; Java as an object oriented language: Java buzzwords; A simple program, its compilation and execution; the concept of CLASSPATH; Basic idea of application and applet;

Basics: Data types; Operators- precedence and associativity; Type conversion; The decision making – if, if ..else, switch; loops – for, while, do…while; special statements–return, break, continue, labeled break, labeled continue; Modular programming methods; arrays; memory allocation and garbage collection in java keywords.

UNIT-II

Object Oriented Programming in Java: Class; Packages; scope and lifetime; Access specifies; Constructors; Copy constructor; this reference; finalize () method; arrays; Memory allocation and garbage collection in java keywords; variable argument list; command line arguments; super keyword.

UNIT-III

Multithreading and Exception Handling: Basic idea of multithreaded programming; The lifecycle of a thread; Creating thread with the thread class and runnable interface; Thread synchronization; Thread scheduling; Producer-consumer relationship; Daemon thread. Selfish threads; Basic idea of exception handling; The try, catch and throw; throws Constructor and finalizers in exception handling; Exception Handling.

UNIT-IV

Applets: Applet security restrictions; the class hierarchy for applets; Life cycle of applet; HTML Tags for applet.

The AWT: The class hierarchy of window fundamentals; The basic user interface components Label, Button, Check Box, Radio Button, Choice menu, Text area, Scroll list, Scroll bar; Frame; Layout managers- flow layout, Grid layout, Border layout, Card layout.

The Java Event Handling Model: Java's event delegation model – Ignoring the event, Self contained events, Delegating events; The event class hierarchy; The relationship between interface, methods called, parameters and event source; Adapter classes; Event classes action Event, Adjustment Event, Container Event, Focus Event, Item Event, Eey Event, Mouse Event, Text Event, Window Event.

Swing: Comparison between Swing and AWT; Basic containers- Content pane, layered pane, glass pane; Swing package components – Jframe, JPanel, JButton, JLabel, JtextField, JPasswardField, JCheckBox, JRadioButtons, ComboBox, JtextArea, JOptionPane, JSlider, JMenu. JPopUpMenu, JList; MDI support; Tables; Dialogs.

UNIT-V

JDBC: JDBC-ODBC bridge; The connectivity model; The driver manager; Navigating the resultset object contents; java.sql Package; The JDBC exception classes; Connecting to Remote database.

Networking & RMI: Basic idea of TCP/IP, UDP and ports; An example demonstrating the establishment of connection; the distributed object system; RMI for distributed computing; RMI registry services; Steps of creating RMI Application and an example.

Other Topics: Streams & Files; Some useful Java packages; Basic idea of Java servlets; Basic idea of Apache server; Basic idea of Java beans

Books:

1. Java- How to Program: Deitel; [Pearson Education, Asia]
2. Core Java 2(Vol I & II):Horstmann & Cornell[Sun Microsystems]
3. The Complete Reference Java 2: Naughton & Schildt [Tata McGraw Hill]
4. Java 2.0 : Ivan Bayross [bpb publications]

Outcomes:

Student would be able to

CO1: **Apply** the principles and practice of object oriented analysis and design in the construction of robust, maintainable programs which satisfy their requirements;

CO2: **Implement, compile, and run** Java programs comprising more than one class, to address a particular software problem.

CO3: **Demonstrate** the ability to use simple data structures like arrays in a Java program.

CO4: **Use** of members of classes found in the Java API (such as the Math class).

CO5: **Demonstrate** the ability to employ various types of selection constructs in a Java program.

CO6: **Employ** a hierarchy of Java classes to provide a solution to a given set of requirements.

680405 Computer Networks & Communication

S. No.	Subject Code	Subject Name	Periods per week			Credits	Maximum Marks (Theory Slot)			Maximum Marks (Practical Slot)		Total Mark:
			L	T	P		End Sem. Exam	Tests (Two)	Assign ments /Quiz	End Sem. Practical/ Viva	Practical Record / Assignment/ Quiz/Presentation	
1.	680405	Computer Networks and Communication	3	1	-	4	70	20	10	-	-	100

Objectives:

1. To introduces students to computer networks and concentrates on building a firm foundation for understanding Data Communications and Computer Networks.
2. To introduce the student to the major concepts involved in wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs).
3. To have a good understanding of the OSI Reference Model and in particular have a good knowledge of Layers 1-3.
4. To identify the different types of network devices and their functions within a network
5. To understand network terminology and build the skills of subnetting and routing mechanisms.
6. To acquire Familiarity with the basic protocols of computer networks and how they can be used to assist in network design and implementation.
7. To have a basic knowledge of the use of cryptography and network security.
8. To expose students to emerging technologies and their potential impact.

UNIT-I

Introduction: Layered Networks Architecture, Review of ISO-OSI model, Data Communication techniques pulse code modulation (PCM) Differential Pulse Code Modulation (DPCM), Delta Modulation (DM), transmission media wires cables, radio links, satellite links, fiber-optic links, error detection, parity check codes, cyclic redundancy codes, & Hamming code.

UNIT-II

Multiplexing and DLC Preliminaries:

Multiplexing techniques Frequency division, time division, statistical time division multiplexing, multiplexing hierarchies,

DLC Preliminaries: Stop and wait protocols: Noise free and noisy channels, performance and efficiency, sliding window protocols: Go back and selective repeat.

UNIT III

Data Link Protocols:

HDLC data link protocol, Integrated services digital networks; interfaces, Devices, Channel structure, Asynchronous transfer node (ATM) cells, header and cell formats, Layers in ATM, Class 1,2,3,4 traffic.

FDDI, token bus, token ring; Reservation, polling, Multiple access protocols: Concept of random access Pure ALOHA, Slotted ALOHA, CSMA, CSMA/CD, FDMA, TDMA, CDMA;

UNIT-IV

Network Layer Protocols: Design Issues : Virtual Circuits and Datagram, Internetworking & devices: Repeaters, Hubs, Bridges, Switches, Router, Gateway; Addressing : Internet address, classful address, subnetting; Routing : techniques, static vs. dynamic routing , routing table for classful address;Routing algorithms: Optimality principle, Shortest path routing – Dijkstra, bellman-ford and floyd warshall algorithms, flooding and broadcasting, distance vector routing, link state routing, flow based routing, multicasting, routing.

UNIT-V

Transport Layer Protocols and Congesting Control: General principles of congestion control, window flow control, packet discarding, Isarithmic control, traffic shaping, choke packets Leaky bucket algorithm, Token bucket algorithm, choke packets; Connection Management, Addressing, Connection Establishment and releases, flow control and buffering, multiplexing, crash recovery in TCP.

Presentation and Application Layer Protocols: Presentation concepts, Cryptography: Substitution and transposition, ciphers, data encryption standard (DES), DES chaining, breaking DAS, public key cryptography, RSA , authentication protocols.

Books:

1. A.S. Tanenbaum, "Computer Networks", Second Ed., Prentice Hall India(tan).
2. J.F.Hayes, "Modeling and Analysis of Computer Communication Networks", Plenum press.
3. D.Bertsekas and R. Gallager, "Data Networks", Second Ed. Prentice Hall, India.
4. D.E. Comer, "Internetworking with TCP/IP", vol. 1, prentice Hall India.
5. G.E. Keiser, "Local Area Networks", McGraw Hill, international Ed.
6. W. Stalling, "Data & Computer Communications", Maxwell Macmillan international Ed.

Outcomes:

Student would be able to

CO1: **Describe** various data communication techniques, OSI reference model, the TCP/IP reference model and other basics in data communication and networking .(Understanding)

CO2: **Discuss** some medium access protocols (like, Pure ALOHA, Slotted ALOHA, CSMA, CSMA/CD etc) ,some Modern topics (like ISDN services, ATM) (Understanding)

CO3: **Examine** various multiplexing techniques, error detection & correction methods, flow control methods and other concepts of computer networks to achieve required networking results as per standards. (Analyzing)

CO4: **Illustrate** different types of network devices and their functions within a network, Internetworking devices, Routing concepts, techniques and protocols and other concepts of computer networks (Applying)

CO5: **Evaluate** various congestion prevention, avoidance and control mechanisms and other concepts of computer networks (Evaluation)

CO6: **Justify** the use of cryptography, security and networking techniques and other concepts of computer networks for providing better network/applications in society. (Evaluation)

FIFTH SEMESTER

680501 Analysis and Design of Algorithms

S. No.	Subject Code	Subject Name	Periods per week			Credits	Maximum Marks (Theory Slot)			Maximum Marks (Practical Slot)		Total Marks
			L	T	P		End Sem. Exam	Tests (Two)	Assignments /Quiz	End Sem. Practical/ Viva	Practical Record / Assignment/ Quiz/Presentation	
1.	680501	Analysis and Design of Algorithms	3	1	-	4	70	20	10	-	-	100

Objectives:

1. To introduce students to the design and analysis of algorithms.
2. To reinforce basic design concepts (e.g., pseudocode, specifications, top-down design)
3. To give Knowledge of algorithm design strategies
4. To familiarize with an assortment of important algorithms
5. To analyze time and space complexity
6. To identify limitation of algorithms.
7. To explain techniques for analyzing the efficiency of algorithms and the inherent complexities of problems

UNIT – I

Pre-requisites: Data structure & Discrete structures, models of computation, algorithm analysis, order architecture, time space complexities average and worst case analysis.

UNIT-II

Divide and conquer: Structure of divide-and-conquer algorithms: examples; Binary search, quick sort, Strassen Multiplication; Analysis of divide and conquer run time recurrence relations.

Graph searching and Traversal: Overview, Traversal methods (depth first and breadth first search)

UNIT-III

Greedy Method: Overview of the greedy paradigm examples of exact optimization solution (minimum cost spanning tree), Approximate solution (Knapsack problem), Single source shortest paths.

Brach and bound: LC searching Bounding, FIFO branch and bound, LC branch and bound application: 0/1 Knapsack problem, Traveling Salesman Problem, searching & sorting algorithms.

UNIT-IV

Dynamic programming: Overview, difference between dynamic programming and divide and conquer, Applications: Shortest path in graph, Matrix multiplication, Traveling salesman Problem, longest Common sequence.

Back tracking: Overview, 8-queen problem, and Knapsack problem

UNIT-V

Computational Complexity: Complexity measures, Polynomial Vs non-polynomial time complexity; NP-hard and NP-complete classes, examples.

Combinational algorithms, string processing algorithm, Algebric algorithms , set algorithms

BOOKS

1. Ullman "Analysis and Design of Algorithm" TMH
2. Goodman "Introduction to the Design & Analysis of Algorithms, TMH-2002.
3. Sara Basse, A. V. Gelder, " Computer Algorithms," Addison Wesley
4. T. H. Cormen, Leiserson , Rivest and Stein, "Introduction of Computer algorithm," PHI
5. E. Horowitz, S. Sahni, and S. Rajsekaran, "Funadmentals of Computer Algorithms," Galgotia Publication

Outcomes:

Student would be able to

CO1: **Apply** the algorithms and design techniques to solve problems;
CO2: **Demonstrate** how the worst-case time complexity of an algorithm is defined;
CO3: **Analyze** and compare the efficiency of algorithms using time and space complexity theory or asymptotic complexity theory;
CO4: **Prove** the correctness and analyze the running time of the basic algorithms for those classic problems in various domains;
CO5: **Demonstrate** a number of standard algorithms for problems in fundamental areas in computer science and engineering such as sorting, searching, and problems involving graphs.
CO6: **Apply** prior knowledge of standard algorithms to solve new problems, and mathematically evaluate the quality of the solutions

680502 Network and Cyber Security

S. No.	Subject Code	Subject Name	Periods per week			Credits	Maximum Marks (Theory Slot)			Maximum Marks (Practical Slot)		Total Marks
			L	T	P		End Sem. Exam	Tests (Two)	Assign ments /Quiz	End Sem. Practical/ Viva	Practical Record / Assignment/ Quiz/Presentation	
1.	680502	Network and Cyber Security	3	1	-	4	70	20	10	-	-	100

Objectives:

1. To understand and appreciate computer/information security
2. To provide students with concepts of computer security, cryptography, digital money, secure protocols, detection and other security techniques
3. To explain the core information assurance (IA) principles
4. To identify the key components of cyber security network architecture
5. To apply cyber security architecture principles
6. To describe risk management processes and practices Identify security tools and hardening techniques
7. To distinguish system and application security threats and vulnerabilities
8. To describe different classes of attacks
9. To define types of incidents including categories, responses and timelines for response
10. To describe new and emerging IT and IS technologies
11. To analyze threats and risks within context of the cyber security architecture
12. To appraise cyber security incidents to apply appropriate response
13. To access additional external resources to supplement knowledge of cyber security

UNIT I

Computer Security : Introduction, Need for security, Basics of Cryptography : Plain text and Cipher Text, Substitution techniques, Caesar Cipher, Mono-alphabetic Cipher, Polygram, Polyalphabetic Substitution, Playfair, Hill Cipher, Transposition Cipher, Encryption and Decryption, Symmetric and Asymmetric Key Cryptography, Steganography, Key Range and Key Size, Possible Types of Attacks

UNIT II

Symmetric Key Algorithms and AES: Brief history of Asymmetric Key Cryptography, Overview of Asymmetric Key Cryptography, RSA algorithm. Overview of Symmetric key Cryptography, Data Encryption Standard (DES), International Data Encryption Algorithm (IDEA), RC4, RC5, Advanced Encryption Standard (AES) Asymmetric Key Algorithms, Digital Signatures

UNIT III

Network Security, Firewalls and Virtual Private Networks: Brief Introduction to TCP/IP, Firewalls, Virtual Private Networks (VPN), Secure Socket Layer (SSL), Transport Layer Security (TLS), Secure Hyper Text Transfer Protocol (SHTTP), Time Stamping Protocol (TSP), Secure Electronic Transaction (SET), Secure Sockets Layer (SSL), E-mail Security.

UNIT IV

Introduction to information systems, Types of information Systems, Development of Information Systems, Need for Information security, Threats to Information Systems, Information Assurance, Cyber Security, and Security Risk Analysis.

UNIT V

Security Policies, Why Policies should be developed, WWW policies, Email Security policies, Policy Review Process-Corporate policies-Sample Security Policies, Publishing and Notification Requirement of the Policies. Information Security Standards-ISO, IT Act, Copyright Act, Patent Law, IPR.

REFERENCES

1. Bernard Menezes, "Network Security and Cryptography", CEGAGE Learning , ISBN-10:81-315-1349-1, ISBN-13: 978-81-315-1349-1, 2014.
2. Charles Pfleeger, "Security in Computing", Prentice Hall, 4 th Edition, ISBN-10: 0132390779, ISBN-13: 978-01323907744, 2006.
3. Ulysess Black, "Internet Security Protocols: Protecting IP Traffic", Prentice Hall PTR; 1st edition, ISBN-10: 0130142492, ISBN-13: 978-0130142498, 2000.
4. William Stallings, "Cryptography and Network Security", Pearson Education, 6th Edition, ISBN 10: 0133354695, 2013.
5. Jonathan Rosenoer,"Cyber Law: The law of the Internet", Springer-Verlag, 1997.
6. Mark F Grady, Fransesco Parisi, "The Law and Economics of Cyber Security", Cambridge University Press, 2006.

Outcomes:

Student would be able to

CO1: **Employ**, design and implement appropriate security technologies and policies to protect computers and digital information.

CO2: **Gain** familiarity with prevalent network and distributed system attacks, defenses against them, and forensics to investigate the aftermath.

CO3: **Develop** an understanding of security policies (such as authentication, integrity and confidentiality), as well as protocols to implement such policies in the form of message exchanges.

CO4: **Manage** multiple operating systems, systems software, network services and security. Evaluate and compare systems software and emerging technologies.

CO5: **Develop** solutions for networking and security problems, balancing business concerns, technical issues and security.

CO6: **Use** appropriate resources to stay abreast of the latest industry tools and techniques analyzing the impact on existing systems and applying to future situations.

680503 Web Technologies and Cloud Computing

S. No.	Subject Code	Subject Name	Periods per week			Credits	Maximum Marks (Theory Slot)			Maximum Marks (Practical Slot)		Total Marks
			L	T	P		End Sem. Exam	Tests (Two)	Assign ments /Quiz	End Sem Practical/ Viva	Practical Record / Assignment/ Quiz/Presentation	
1.	680503	Web Technologies and Cloud Computing	3	1	-	4	70	20	10	-	-	100

Objectives:

1. To provide readers with an understanding of cloud computing, its technology enablers and the business drivers behind this new IT platform
2. To identify the related risks, controls and frameworks that can be used to address challenges and maximize value in the cloud
3. To identify the required cloud application processes to achieve stated goals.
4. To identify the applicable compliance regulations.
5. To compare these goals for the cloud vs. traditional IT

UNIT I

History of the internet, internetworking concepts, architecture, and protocol: Switch router etc., internet address and domains. Introduction World Wide Web (WWW), Hyper Text Transfer Protocol (HttP), feature of HTTP protocol HTTP request-response model, Hyper Text Transfer Protocol Secure (HTTPS).Security on the web, proxy server, Firewall.

UNIT II

Introduction to Hyper Text Markup Language (HTML), HTML elements, XHTML syntax and Semantics, extensible Markup Language (XML), element, attributes, entity declarations. DTD files and basics of Cascading Style Sheet (CSS),Document object Model (DOM) history and levels, Document tree.

UNIT III

Introduction to Java Script, Basic concepts, variables and data types, functions, conditional statements, Loops, Operators, Arrays. Introduction to Web Services: UDDI, SOAP, WSDL.

UNIT IV

Cloud Computing Fundamental: Cloud Computing definition, private, public and hybrid cloud. Cloud types; IaaS, PaaS, SaaS. Benefits and challenges of cloud computing, public vs private clouds, role of virtualization in enabling the cloud.

Service Management in Cloud Computing, Data Management in Cloud Computing.

UNIT V

Cloud Computing Architecture: Cloud Reference Model, Layer and Types of Clouds, Architectural design of Compute and Storage Clouds, Cloud Security: Cloud Information security fundamentals, Cloud security services.

Case study : Google App Engine, Microsoft Azure , Hadoop , Amazon , Aneka.

TEXT BOOKS:

1. A. Srinivasan, J.Suresh, Cloud Computing – A Practical approach for learning and implementation, Pearson India, [ISBN-978131776513]
2. GautamShroff, Enterprise Cloud Computing Technology Architecture Applications [ISBN: 978-0521137355]
3. Kumar Saurabh "Cloud Computing – insights in to New-Era Infrastructure", Wiley India,2011
4. Dimitris N. Chorafas, Cloud Computing Strategies [ISBN: 1439834539]
5. Black Book Web Technologies, Dreamtech Press [ISBN: 978-93-5004-530-0] Edition 2013

6. Chris Bates, "*Web Programming – Building Intranet applications*", Wiley Publications, 3rd Edition, 2009

Outcomes:

Student would be able to

CO1: **Deploy** onto the cloud infrastructure customer-created or customer-acquired applications developed using programming languages and tools supported by the provider

CO2: **Effectively** manage increasing risk, including security, compliance, projects and partners

CO3: **Communicate** clear enterprise objectives internally and to third parties

CO4: **Flexibility**, scalability and services are changed in the cloud, enabling the enterprise and business practices to adjust to create new opportunities and reduce cost.

CO5: **Identify** the desired business goals beyond capabilities of current IT, which is essential to sustain and grow the business

CO6: **Quantify** the gains envisioned in a cloud application.

680504 Elective-I (MCA 504 Elective - I) .NET Technologies & C#

S. No.	Subject Code	Subject Name	Periods per week			Credits	Maximum Marks (Theory Slot)			Maximum Marks (Practical Slot)		Total Marks
			L	T	P		End Sem. Exam	Tests (Two)	Assignments /Quiz	End Sem. Practical/ Viva	Practical Record / Assignment/ Quiz/Presentation	
1.	680504	.NET Technologies and C# (Elective-I)	3	1	-	4	70	20	10	-	-	100

Objectives:

1. To Learn about MS.NET framework developed by Microsoft.
2. To use XML in C#.NET specifically ADO.NET and SQL server
3. To understand use of C# basics, Objects and Types, Inheritance
4. To develop, implement and creating Applications with C#.
5. To understand and be able to explain Security in the .NET framework and Deployment in the .NET.

UNIT-I

Introduction to .NET Technology

Introduction to Microsoft .NET. .NET Framework and the Common Language Runtime. Tour of the Book. Internet and World Wide Web Resources. Visual Studio .NET Integrated Development Environment (IDE) Overview. Menu Bar and Toolbar. Visual Studio. .NET Windows. Using Help. Simple Program: Displaying Text and an Image

Introduction to C# Programming and Control Structures:

Simple Program: Printing a Line of Text. Another Simple Program: Adding Integers. Memory Concepts. Arithmetic. Decision Making: Equality and Relational Operations.

Algorithms. Pseudocode. Control Structures. **if** Selection Structure. **if/else** Selection Structure. **while** Repetition Structure. Formulating Algorithms: Case Study 1 (Counter-Controlled Repetition). Formulating Algorithms with Top-Down, Stepwise Refinement: Case Study 3 (Nested Control Structures). Assignment Operators. Increment and Decrement Operators. Introduction to Widows Application Programming. Essentials of Counter-Controlled Repetition. **for** Repetition Structure. Examples Using the **for** Structure. **switch** Multiple-Selection Structure. **do/while** Repetition Structure. Statements **break** and **continue**. Logical and Conditional Operators. Structured-Programming Summary.

Methods.

Program Modules in C#. **Math** Class Methods.Methods. Method Definitions. Argument Promotion. C# Namespaces. Value Types and Reference Types. Passing Arguments: Pass-by-Value vs. Pass by-by-Reference. Random-Number Generation. Example: Game of Chance. Duration of Variables. Scope Rules. Recursion. Example Using Recursion: The Fibonacci Series. Recursion vs. Iteration. Method Overloading.

UNIT-II

Object-Based Programming.

Implementing a Time Abstract Data Type with a Class. Class Scope. Controlling Access to Members. Initializing Class Objects: Constructors. Using Overloaded Constructors. Using Overloaded Construction. Properties. Composition: Objects References as Instance Variables of Other Classes. Using the **this** Reference. Garbage Collection. **static** Class Members. **const** and **ReadOnly** Members. Indexers Data Abstraction and Information Hiding. Software Reusability. Namespaces and Assemblies. **Class View** and **Object Browser**.

Object-Oriented Programming:
Base Classes and Derived Classes. **protected** and **internal** Members. Relationship between Base Classes and Derived Classes. Three-Level Inheritance Hierarchy. Constructors and Destructors in Derived Classes.Derived-Class-Object to Base-Class-Object Conversion. Type Fields and **switch** Statements. Polymorphism Examples. Abstract Classes and Methods. Case Study: Inheriting Interface and Implementation. **sealed** Classes and Methods.. Delegates.

UNIT-III

Exception Handling.
Exception Handling Overview. Example: **DivideByAZeroException**. .NET **Exception** Hierarchy. **Final** Block. **Exception** Properties. Programmer-Defined Exception Classes. Handling Overflows.

Multithreading.
Thread States: Life Cycle of a Thread. Thread Priorities and Thread Scheduling. Thread Synchronization and Class **Monitor**. Producer/Consumer Relationship without Thread Synchronization. Producer/Consumer Relationship with Thread Synchronization. Producer/Consumer Relationship: Circular Buffer.

Networking: Streams-Based Sockets and Datagrams.
Establishing a Simple Server (Using Stream Sockets). Establishing a Simple Client (Using Stream Sockets). Client/Server Interaction with Stream-Socket Connections. Connectionless Client/Server Interaction with Datagrams.

UNIT-IV

Graphical User Interface Programming:
Window Forms. Event-Handling Model. Control Properties and Layout. **Labels**, **TextBoxes** and **Buttons**. **GroupBoxes** and **Panels**. **CheckBoxes** and **RadioButtons**. **PictureBoxes**. Mouse-Event Handling. Keyboard-Event Handling. Menus. **LinkLabels**. **ListBoxes** and **CheckedListBoxes**. **ComboBoxes**. **TreeViews**. **ListViews**. Tab Control. Multiple-Document-Interface (MDI) Windows. Visual Inheritance. User-Defined Controls.

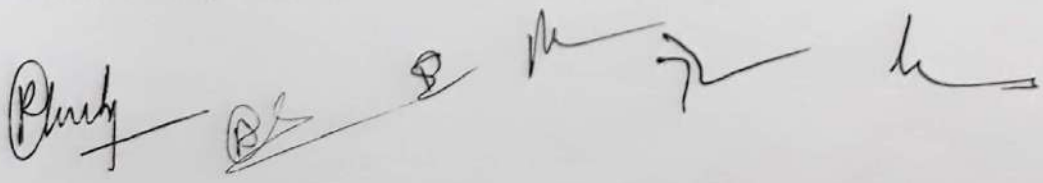
Arrays.
Declaring and Allocating Arrays. Examples Using Arrays. Passing Arrays to Methods. Passing Arrays by Value and Reference. Sorting Arrays. Searching Arrays: Linear Search and Binary Search. Multidimensional Rectangular and Jagged Arrays. Variable-Length Parameter Lists. **For Each/Next** Repetition Structure.

Files and Streams.
Data Hierarchy. Files and Streams. Classes **Files** and **Directory**. Creating a Sequential-Access File. Reading Data Sequentially from a Random-Access File.

UNIT-V

Database, SQL and ADO.NET.
Relational Database Model. Relational Database Overview: **Books** Database. Structured Query Language (SQL). ADO .NET Object Model. Programming with ADO .NET: Extracting Information from a DBMS. Prog4amming with ADO .NET: Modifying a DBMS. Reading and Writing Files.

ASP .NET, Web Forms and Web Controls.
Simple HTTP Transaction. System Architecture. Creating and Running a Simple Web Form Example. Basics . Session Tracking.. Tracing. Internet and World Wide Web Resources. Web Services. Simple Object Access Protocol (SOAP) and Web Services.



Books

1. C# How to program : Dietel & Dietel, Pearson educations
2. Developing window based applications with Visual C#: MicroSoft Press
3. Developing web applications with Visual C#.NET: MicroSoft Press
4. Visual Sudio.NET Programming: Wiley-Dreamtech India Pvt. Ltd.

Outcomes:

Student would be able to

CO1: **Display** proficiency in C# by building stand-alone applications in the .NET framework using C#.
CO2: **Create** distributed data-driven applications using the .NET Framework, C#, SQL Server and ADO.NET
CO3: **Create** web-based distributed applications using C#, ASP.NET, SQL Server and ADO.NET
CO4: **Implement** 2D and 3D animations and game-related graphic displays and audio
CO5: **Create** Web Service-based applications and components using XML
CO6: **Implement** Component Services, Threading, Remoting, Windows services, web

680505 Elective II

DATA WAREHOUSING & MINING

S. No.	Subject Code	Subject Name	Periods per week			Credits	Maximum Marks (Theory Slot)			Maximum Marks (Practical Slot)		Total Marks
			L	T	P		End Sem. Exam	Tests (Two)	Assign ments /Quiz	End Sem. Practical/ Viva	Practical Record / Assignment/ Quiz/Presentation	
1.	680505	Data Warehousing and Mining (Elective –II)	3	1	-	4	70	20	10	-	-	100

Objectives:

1. To introduce and understand the basic concepts of Data Warehouse and Data Mining principles and techniques.
2. To identify the scope and necessity of Data Mining & Warehousing for the society.
3. To study the methodology of engineering legacy databases for data warehousing and data mining to derive business rules for decision support systems
4. To describe the designing of Data Warehousing so that it can be able to solve the root problems.
5. To Develop skills to write queries using DMQL
6. To examine the types of the data to be mined and apply preprocessing methods on raw data.
7. To discover interesting patterns, analyze supervised and unsupervised models and estimate the accuracy of the algorithms.
8. To understand various tools of Data Mining and their techniques to solve the real time problems.
9. To Develop and apply critical thinking, problem-solving, and decision-making skills.
10. To Introduce DM as a cutting edge business intelligence method and acquaint the students with the DM techniques for building competitive advantage through proactive analysis, predictive modelling, and identifying new trends and behaviours.

UNIT-I

Data Warehouse Basic: Data ware housing Definition, usage and trends, DBMS vs. data warehouse, statistical databases vs. data warehouses. Data marts, Metadata, Multidimensional data model, Data cubes, Schemas for Multidimensional Database: stars, snowflakes and fact constellations.

UNIT-II

Storage and Architecture of Data Warehouse: Data warehouse process & architecture, OLTP vs. OLAP, ROLAP vs. MOLAP types of OLAP, servers, 3 – Tier data warehouse architecture, distributed and virtual data warehouses, data warehouse manager, data consolidation, ware house internals, storage and indexing, Operations, materialized , online analytical processing(OLAP) systems

UNIT-III

Data Mining Basic: Data mining definition & task, KDD versus data mining, tools and applications. Data mining query languages, Preprocessing, pattern presentation & visualization specification, data mining techniques, tools and applications.
Data mining techniques: Statistical perspective, Regression, Bayes Theorem, Hypothetical testing.

UNIT-IV

Classification and Clustering: Issues in classification, Statistical –Based Algorithms, Distance–Based Algorithms, Decision Tree–Based Algorithms, ID3,C4.5, Evaluating the performance.
Clustering: Basic concepts, Partition algorithms, Agglomerative Hierarchical algorithms, DBSCAN, BIRCH, CURE algorithm. Clustering with categorical attributes, Comparison.

UNIT-V

Association Rules: Frequent Itemset generation, Apriori Algorithm. Rule generation, Compact representation of frequent Itemset.
Advanced Topics: Dimensionality Reduction, overview of Principle Component Analysis and SVD, Spatial mining, Web mining, Temporal mining.

Books:

1. Jiawei Han & Micheline Kambe :Data Mining – Concepts & Techniques;
2. Margaret H. Dunham, S. Sridhar:Data Mining Introductory and Advanced Topics
3. Pang-Ning Tan, Michael Steinbach, Vipin Kumar: Introduction to Data Mining
4. Kimball R, Reeves L , Ross M etc – Data Warehouse life cycle tool kit, John Wiley.
5. Anahory: Data Warehousing in Real World, Addision Wesley
6. Adriaans: Data Mining, Addision Wesley.
7. Jayee Bischaff & Ted Alexender : Data Warehouse: Practical advice from the Expert, Prentice Hall, New jursey.

Outcomes:
Student would be able to

CO1: **Describe** the basics of data warehouse, it's storage fundamentals and knowledge discovery in databases
CO2: **Discuss** the storage and architectures of data warehouse and it's operations.
CO3: **Apply** the basics of data mining and it's techniques
CO4: **Analyze** classification and clustering algorithms and concepts
CO5: **Select** appropriate DM tools and methods to manipulate and achieve data and apply the concepts of Data Warehouse and DM techniques for clustering, association, and classification in order to design a data mart or data warehouse for any organization
CO6: **Explore** recent trends in data mining such as web mining, spatial-temporal mining