School of Mathematical & Computer Sciences

Department of Computer Sciences

Course Scheme & Syllabus

For

Master of Computer Applications (MCA) - M.Sc. Computer Science

For the year

2016, 2017 & 2018.

BABA GHULAM SHAH BADSHAH UNIVERSITY, RAJOURI,

J&K-185234

Website: www.bgsbuniversity.org

COURSE SCHEME & SYLLABUS FOR MCA-M.Sc. COMPUTER SCIENCE

FOR THE YEAR

2016, 2017, 2018

MCA - M.Sc. Computer Science – SEMESTER-IV

Core Courses

Course Code	Course Title (Core Courses)	Credits	Scheme of Examination			
			Duration	Marks		
			Hours	IA	UE	Total
MC-441	Theory of Computation	4	3	40	60	100
MC-442	Dot Net Technologies using C#	4	3	40	60	100
MC-443	Minor Project	8	3	50	150	200
Choice Based Complimentary Elective **						
MC-444	Management Information System	4	3	40	60	100
MC-445	Operations Research					
MC-446	Wireless & Mobile Communication					
MC-447	Simulation and Modeling					
MC-448	Data Storage and Management					
MC-449	Object Oriented Analysis & Design					
MC-450	Computer Graphics					
MC-451	Software Testing					
MC-471	Lab 7: Dot Net Technologies using C#	4	3	50	50	100
Total Marks				**260**	**340**	**600**

****** Students will have to choose one course from Choice Based Complimentary Elective depending upon the availability of faculty.

Course Code: MC-441 **Maximum Marks : 100**
Course Title : Theory of Computation **University Examination: 60**
Credits: 4 **Internal Assessment: 40**
Duration of Examination:3 Hours

Objective

The objective of the course is to introduce students to the basic concepts of theory of computation. The students shall also get acquainted with the relationship among formal languages along with notion of computability and common paradigms of computing.

Unit – I

Introduction: Finite Automata, Strings, Alphabets and Languages, state tables & diagram. Acceptability of a String by a Finite Automaton. Regular Expressions, Identities for Regular expressions, Conversion of FA to RE and vice versa.

Unit- II

Non-Deterministic Machines: Nondeterministic Finite State Machines, Conversion of NFA to DFA , The Equivalence of DFA and NDFA, Minimization of Finite Automata.

Transducers: Mealy & Moore machines, Conversion: Mealy to Moore, Moore to Mealy. Pumping Lemma for Regular sets.

Unit- III

Grammars: Context free Grammar, Right-Linear Grammar, Left-Linear Grammar, Derivation Trees, Parsing and Ambiguity, Top-down Parsing, Bottom-up Parsing , Chomsky Normal form and Greibach Normal form.

Unit- IV

Context Free languages: Properties of Context free languages. Chomsky Classification of languages.

Push Down Automaton: Introduction, Deterministic and Non Deterministic PDA, Relationship between PDA and CFL, Conversion from PDA to CFG.

Unit- V

Turing Machines: Computing with Turing Machines, Nondeterministic Turing Machines, Unrestricted Grammars, Context Sensitive languages, Church's Thesis, Types of Turing Machine (Multi-tape TM, Multi-Dimensional and Multi-Head TM), Universal Turing Machines, Concept of Halting problem.

Note for Paper Setting:

The question paper will be divided into two sections. **Section A** will include 10 compulsory objective-cum-short answer type questions from each unit, each carrying 1 mark. **Section B** will have ten (10) long answer questions, two from each unit. The student will have to attempt one (01) question from each unit. Each question will carry 10 marks.

Textbook:

1. **Eugene Xavier, S.P**, "Theory of Automata and Formal Languages and Computation", **New Age International Publishers, New Delhi.**
2. **Mishra, K.L.P., and Chandrasekaran, N. (2010),** "Theory of Computer Science: Automata, Languages and Computation"**, PHI Learning Private Limited, New Delhi.**

References:

1. **Hopcroft, J., and Ullman, J. (1979)**, "Introduction to Automata Theory, Languages and Computation", **Addison-Wesley**.

Course Code: MC-442 **Maximum Marks : 100**
Course Title : Dot Net Technologies using C# **University Examination:60**
Credits: 4 **Internal Assessment: 40**
Duration of Examination:3 Hours

Objective:
The course is designed to introduce students to the concept the .Net framework. The course shall cover Visual C# .Net as well as ADO.Net. Emphasis of the course is on enhancing programming skills of students for developing projects.

Unit-I
.Net Framework and IDE : Introduction To .Net Framework, .Net Architecture, Advantages of Dot Net Frame Work, Common Language Runtime, MSIL And JIT, Class Library, Integrated **Development Environment (IDE)**: IDE Components, Windows Forms and Basic Controls, Windows Forms And Events, Message Box, Basic Controls like Command Buttons, Text Box, List Box, Radio Buttons, Labels, Link Labels, Combo Box, Building Small Applications.

Unit-II
C# Basics: C# Literals, Variables & Data Types, Operators and Expressions.
Working with Events and Event Driven programming. Conditional Logic, Looping Logic, Branching Logic.
Classes and Objects: Introduction, Methods: Argument Passing, Passing Objects and Lists.
Constructors, constructor overloading.
Inheritance: introduction Single and Multiple, Polymorphism- Method Overloading and Operator Overloading.

Unit-III
Interfaces: Introduction, Defining an Interface, Extending an Interface, Implementing Interfaces, Interfaces and Inheritance, Abstract Class and Interfaces.
Delegates and Events: Introduction, Delegates, Delegate Declaration, Delegate Methods, Delegate Instantiation, Delegate Invocation, Using Delegates. Array Lists, Hash Tables and Dictionaries.

Unit-IV
Manipulating Strings: Introduction, Creating Strings, String Methods, Inserting Strings Using System, Comparing Strings, Finding Substrings, Mutable Strings, and Arrays of Strings.
Generics, Generic collection classes.
Error and Exception Handling: Introduction, Types of Errors, Exceptions, Syntax of Exception Handling Code, Multiple Catch Statements. Working with Date and Time.
Threading: Applications with multiple threads, Manipulating Threads, Creating Threads with Thread pool.

Unit-V

Data Base Connectivity: Architecture of ADO .Net, Working with ADO .Net, Data Access with ADO .Net, Using Databases, Server Explorer, Data Adapter and Datasets,

Data controls: Data Grid, Data Binding, and Creating New Data Connection in Code. Managing data and relationship: XML schemas, Populating a Dataset, Persisting Dataset Changes, windows forms , viewing .Net data. Reporting in .Net

Note for Paper Setting:

The question paper will be divided into two sections. **Section A** will include 10 compulsory objective-cum-short answer type questions from each unit, each carrying 1 mark. **Section B** will have ten (10) long answer questions, two from each unit. The student will have to attempt one (01) question from each unit. Each question will carry 10 marks.

Text Books:

1. **Platt ,D S (2005),** "Introducing Microsoft .Net", **Microsoft Press,PHI.**
2. **Simon et. al(2005),** " C# for Begineers", **Wrox Publications.**
3. **Simon et. al(2005),** "Professional C#", **Wrox Publications.**

References:

1. **Schildt,H(2005),** "The Complete Reference C #",**TMH.**

Course Code: MC-443 **Maximum Marks : 200**
Course Title : Minor Project **University Examination: 150**
Credits: 8 **Internal Assessment: 50**
Duration of Examination: 3 Hours

Objective:

The aim is the minor project is to prepare students by giving them a feel of how the project is done. The project will be assigned at the start of the fourth semester and will be evaluated by both the concerned Internal teacher & External Examiner.

Points to be noted:

1) The students will carry out the project in the department.
2) The students will be required to submit a hard copy of the report at the end in which the Analysis and design of the project will be explained.
3) The mode of assessment will be internal & external.

Objective:
The aim of the course is to make students well acquainted with system designed in an organization to provide right information at the right time to facilitate managerial decision making with an efficient management information system.

Unit-I
Management Information System: Concept, Fundamental role of MIS in business, MIS and user, Management as a control system, MIS as a support system to management, MIS in organizational effectiveness, Trends in Information systems, Types of Information systems(Operation support system, Management support system).

Unit-II
Components of an Information system: Information system Resources (People, Hardware, software, Data, Network), Information system activities (Input of date resource, processing of date into information, output of information products, storage of data resources, control of system performance).Executive information Systems, Strategic uses of Information technology.

Unit-III
Decision Support Systems in Business: Introduction, Information, Decisions, and Management, Information Quality, Decision Structure, Decision Support Trends, DSS Components, Online Analytical Processing, Analytical Models (what-if-analysis, Sensitivity analysis, Goal-seeking analysis, & Optimization analysis) Role of Decision making in Business.

Unit-IV
Development of MIS: Concept, The Systems Approach, System thinking, The Systems Development Cycle (The Prototyping Process, System Development Process, System Analysis, System Design, & End-User Development), Implementing new Systems, Implementation Activities (Hardware Evaluation factors, Software Evaluation factors, Testing, Data Conversion, & Documentation).

Unit-V
Management challenges: Concept, Security & Ethical challenges of Information technology. Ethical responsibility of business professionals (Business ethics, Technology ethics, Ethical guidelines).Other Challenges (Employment challenges, computer Monitoring, Challenges in working conditions, Challenges to individuality).
Security Management: concept, Tools of Security Management, Internetworked Security Defenses (Encryption, Firewalls, e-mail monitoring), other security measures (Security codes, Security monitors, Biometric security).

Note for Paper Setting:

Course Code: MC-445 **Maximum Marks : 100**
Course Title : Operations Research **University Examination: 60**

The question paper will be divided into two sections. **Section A** will include 10 compulsory objective-cum-short answer type questions from each unit, each carrying 1 mark. **Section B** will have ten (10) long answer questions, two from each unit. The student will have to attempt one (01) question from each unit. Each question will carry 10 marks.

Text Books:

1. **Jawadekar, W. S**, "Management Information Systems", **TMH.**
2. **O'Brien, J. A**,"Management Information Systems", **TMH.**

References:

1. **O'Brien, J. A**, "Introduction to Information Systems", **TMH.**
2. **Mcleod, R**, "Management Information Systems", **Pearson Education**.

Credits: 4 **Internal Assessment: 40**
Duration of Examination:3 Hours

Objective:
The course introduces the students the concept of scientific approach to decision making which will help them to determine an optimal schedule of interdependent activities in view of available resources.

Unit-I
Introduction to Operational Research: Concept, models, characteristics, Applications.
Linear Programming problems (LPP): Introduction, Formulation, Graphical Solution, Simplex Method, Two Phase method, Big-M method, Exceptional cases in LPP (Degeneracy, Unbounded Solution, infeasible Solution, Optimality).

Unit-II
Transportation Problems: Concept, Methods for finding initial solution (Northwest Rule, Least Cost Method, Vogel's Approximation), Test for optimality by Modified Distribution (MODI) Method, Unbalanced Transportation Problem, Maximization case.
Assignment Problems: Concept, Hungarian Assignment Method (Minimization and Maximization cases).

Unit-III
Game theory: Introduction, Two-Person Zero-Sum Game, Maximin-Minimax Principle, Games without saddle points–Mixed Strategies, Graphical Solution of 2×n and m×2 games, Dominance Property.
Replacement Theory: Introduction, Replacement of items that deteriorate, Replacement of items that fails.

Unit-IV
Queuing Theory: Queuing problem, characteristics, general structure of queuing system, probabilistic queuing models (Poisson-exponential single server model with infinite population), applications of queuing theory.
Sequencing Problem: Introduction, Processing n jobs on two machines and three machines, processing n jobs on m machines.

Unit-V
Project Management: Basic concepts of Network Analysis, Rules of network Construction, Critical Path Method (CPM), Program evaluation and Review Technique (PERT), Distinction between CPM & PERT.

Note for Paper Setting:

The question paper will be divided into two sections. **Section A** will include 10 compulsory objective-cum-short answer type questions from each unit, each carrying 1 mark. **Section B** will have ten (10) long answer questions, two from each unit. The student will have to attempt one (01) question from each unit. Each question will carry 10 marks.

Textbooks:

1. **N.D. Vohra**, "Quantitative Techniques in Management",6th Ed.,2004 , **BPB**.

References:

1. **V.K.Kapoor**, "Operations Research Techniques for Management",1st Ed., 2001. **Sultan Chand**
2. **K. Swarup, P.K.Gupta** and **M. Mohan**, "Operations Research", 12th Ed.,2006, **Sultan Chand**
3. **Hamady A. Taha**, "Operations Research", 7th Ed., 2005, **Wesley**.

Course Code: MC-446 **Maximum Marks : 100**
Course Title : Wireless & Mobile Communication **University Examination: 60**
Credits: 4 **Internal Assessment: 40**
Duration of Examination:3 Hours

Objective:
The objective of the course is to acquaint students acquainted with the technologies involved in wireless communications and make them understand the mobile communication infrastructure and operating environments.

Unit I
Introduction to Wireless Communication: Various Types Of Wireless Communication Systems (Paging System, Cordless Telephone Systems, Cellular Telephone Systems); Comparison Of Common Wireless Communication Systems; Applications Of Wireless Communication; Introduction To Various Generations Of Mobile Phone Technologies And Future Trends; Concept Of Mobile Originated & Mobile Terminated Calls.

Unit II
Introduction to Cellular concept: Cell fundamentals; Frequency reuse; Channel Assignment Strategies; Handoff strategies (Prioritizing & Practical Handoff Considerations); Interference & System capacity (Co-channel Interference, Adjacent Channel Interference), Concept of trunking; Concept of Coverage Area, Cell splitting and Sectoring.

Unit III
Wireless transmission concepts: Concept of signals; Antennas, Types of antennas; Signal propagation (Path-loss of Radio Signals, Multi-path propagation); Concept of multiplexing, Comparison of FDM, TDM, CDM Techniques; Basic Concept of Spread Spectrum (SS) Techniques (Direct Sequence and Frequency Hopping Spread Spectrum).

Unit IV
CDMA: Introduction to IS-95 CDMA,Concept of CDMA Channels (Forward and Reverse CDMA channels for a Cell; Concept of Code channels within CDMA Channel; Purpose of Pilot, Sync, Paging and Traffic channels.
General Introduction to GPRS, Bluetooth, Infrared Technology.

Unit V
GSM: Mobile Communication System: Basic GSM architecture; Terminology and interfaces; Components of Wireless Communication Infrastructure (MS, BTS, BSC, MSC) their basic functions and characteristics; Mobility Management Issues – Initiation of handoffs, Types of handoffs, Concept of roaming and Registration; Use of HLR and VLR in Mobile networks. Introduction to 3G and 4G Technology.

Note for Paper Setting:

The question paper will be divided into two sections. **Section A** will include 10 compulsory objective-cum-short answer type questions from each unit, each carrying 1 mark. **Section B** will have ten (10) long answer questions, two from each unit. The student will have to attempt one (01) question from each unit. Each question will carry 10 marks.

Text Books:

1. **Jochen Schiller**, "Mobile Communication", 2nd Ed., **Pearson edition.**

References:

1. **K. Pahlavan**, P. Krishnamurthy "Principles of Wireless Networks", **PHI, New Delhi.**
2.**Theodore S. Rappaport**, "Wireless Communication Principles & Practice", 2nd Ed. **PHI, New Delhi.**

Course Code: MC-447 **Maximum Marks : 100**
Course Title: Simulation & Modeling. **University Examination: 60**
Credits: 4 **Internal Assessment: 40**
Duration of Examination:3 Hours

Objective:

This course covers simulation and modeling principles with applications to system development. The content focuses on modeling approaches and surveys applications for complex systems.

Unit I
Introduction to Simulation:
Simulation definition, examples, steps in computer simulation, advantages and disadvantages of simulation, classification of simulation languages. Experimental nature of simulation, CSSLS, CSMPIII language.
Continuous Simulation: Pure-pursuit Problem

Unit II
Models: Models types, mathematical model, physical model, analog model. Estimation of model parameters. Principles used in modeling, Distributed Lag Models, Cobweb Models.
System simulation: The Monte Carlo method, Comparison of simulation and Analytical methods, Experimental nature of simulation, Numerical Computation Technique for continuous models, Numerical Computation Technique for discrete models, Progress of a simulation study.

Unit III
Analysis of simulation output:
Nature of problem, Estimation methods, Simulation run stastics, Replication runs, Elimination of initial bias, Batch means, Regenerative techniques, Time series analysis, Spectral analysis, Autoregressive processes.

Unit IV
Queuing Models
Little's theorem, analytical results for M/M/1 queuing system, analytical results for M/M/1/N queuing system, Simulation of an Inventory System.
Random numbers: Random variables, random number generation, Linear Congruential Generators, testing random number generators.

Unit V
Introduction to Simulation languages and some simple simulated models: Introduction to GPSS, General Description, GPSS block-diagram, Simulation of a Manufacturing Shop. SNA, Function, Simulation of a Supermarket, GPSS Model of a Simple Telephone System, An introduction of different types of simulation languages

Note for Paper Setting:

The question paper will be divided into two sections. **Section A** will include 10 compulsory objective-cum-short answer type questions from each unit, each carrying 1 mark. **Section B** will have ten (10) long answer questions, two from each unit. The student will have to attempt one (01) question from each unit. Each question will carry 10 marks.

Textbooks:

1. **G. Gordon**, "System Simulation", **Prentice Hall**.

References:

1. **Nar Singh Deo (1979)**, "System Simulation with Digital Computer", **Prentice Hall of India.**
2. **Law and Kelton (2001)**, "Simulation Modeling and Analysis", **McGraw Hill**.
3. **T.A. Payer**, "Introduction to Simulation", **McGraw Hill**.
4. **J. Reitman**, Computer Simulation Application", **Wiley**.

Course Code: MC-448
Course Title : Data Storage and Management
Credits: 4

Maximum Marks : 100
University Examination: 60
Internal Assessment: 40
Duration of Examination:3 Hours

Objective:
The core objective of this course is to introduce the concept of data proliferation with an understanding of Information Life cycle and to offer various storage technologies.

Unit-I
Introduction to Storage Technology: Data proliferation, evolution of various storage technologies, Overview of storage infrastructure components, Information Lifecycle Management, Data categorization.

Unit-II
Storage Systems Architecture: Intelligent disk subsystems overview, Contrast of integrated vs. modular arrays, Component architecture of intelligent disk subsystems, Disk physical structure components, properties, performance, and specifications, RAID levels & parity algorithms, hot sparing, Front end to host storage provisioning, mapping and operation.

Unit-III
Introduction to Networked Storage: JBOD, DAS, NAS, SAN & CAS evolution and comparison. Applications, Elements, connectivity, standards, management, security and limitations of DAS, NAS, CAS & SAN.

Unit -IV
Hybrid Storage solutions; Virtualization: Memory, network, server, storage & appliances. Data center concepts & requirements, Backup & Disaster Recovery: Principles Managing & Monitoring: Industry management standards (SNMP, SMI-S and CIM), Key management metrics (Thresholds, availability, capacity, security, and performance).

Unit-V
Data Storage on Cloud: Concept of Cloud, Cloud Computing, storage on Cloud, Cloud Vocabulary, Architectural Framework, Cloud benefits, Cloud computing Evolution, Applications & services on cloud, Cloud service providers and Models, Essential characteristics of cloud computing, Cloud Security and integration.

Note for Paper Setting:

The question paper will be divided into two sections. **Section A** will include 10 compulsory objective-cum-short answer type questions from each unit, each carrying 1 mark. **Section B** will have ten (10) long answer questions, two from each unit. The student will have to attempt one (01) question from each unit. Each question will carry 10 marks.

Textbooks:

1. **G. Somasundaram & Alok Shrivastava** (EMC Education Services) editors, "Information Storage and Management: Storing, Managing, and Protecting Digital Information", **Wiley India.**

References:

1. **UlfTroppens, Wolfgang Mueller-Friedt, Rainer Erkens, Rainer Wolafka, Nils Haustein,** "Storage Network explained: Basic and application of fiber channels, SAN, NAS, iSESI, INFINIBAND and FCOE", **Wiley India**.
2. **John W. Rittinghouse and James F. Ransome, "**Cloud Computing: Implementation, Management and Security", **CRC Press, Taylor Frances Pub**.
3. **Nick Antonopoulos, Lee Gillam, "**Cloud Computing : Principles, System & Application, **Springer.**
4. **Anthony T. Velete, Toby J.Velk, and Robert Eltenpeter**, "Cloud Computing: A practical approach",**TMH Pub.**
5. **Saurabh**, "Cloud Computing: Insight into New Era Infrastructure" , **Wiley India**.
6. **Sosinsky**, "Cloud Computing Bible", **Wiley India**.

Course Code: MC-449 **Maximum Marks : 100**
Course Title : Object Oriented Analysis & Design. **University Examination: 60**
Credits: 4 **Internal Assessment: 40**
Duration of Examination:3 Hours

Objective:

The objective of the course is to introduce the students to techniques for developing quality software by implementing Object Oriented Design Methodologies.

Unit-I

Object Oriented: Concept, Objects and classes, Abstraction, Encapsulation, Polymorphism, Object Oriented Development, The Traditional Paradigm versus the Object-Oriented Development, Need for object oriented approach. Object Orientation, Analysis and Problem Statement, Development and Modeling.

The Object Modeling: Evolution of Object model, Elements of Object Model, Applying Object Model, Links and association, advanced link and association, generalization and inheritance, Grouping Constructs.

Unit-II

Advanced Object Modeling: Aggregation, abstraction classes, generalization as Extension and restriction, multiple inheritance, Meta data, Candidate Keys, Constrains.

Dynamic Modeling: Events and States, Operations, Nested State Diagram, Concurrency, Relation of Object and Dynamic Models.

Functional Modeling: Functional Models, Data Flow Diagrams, Specifying Operations and Constraints. Relation of Functional model to Object and Dynamic Models.

Unit-II

System Design: Concept, Subsystems, Concurrency, Allocation to processor and tasks, Management of data stores, Handling Global Resources, Choosing Software Control Implementation, Handling boundary Conditions, Setting Trade-off priorities.

Object Design: Overview, Combining the three models, Designing Algorithms, Design Optimization, Implementation of Control, Adjustment of Inheritance, Design of Associations, Object Representation, Physical Packaging, and Document Design Decision.

Unit-IV

Implementation: Implementation using Programming Language, a Database System and outside a Computer.

Programming Style: Object Oriented Style, Reusability, Extensibility, Robustness, Programming-in-the-large.

Unified Process: The Workflows of Unified Process (Requirements, Analysis, Design, Implementation and Test Workflow). The Phases of Unified Process- Inception, Elaboration, Construction, Transition Phase.

Unit-V

UML: Basics, Emergence of UML, Basics of Different Types of Diagrams(Class diagram, Sequence diagram, Use-Case diagram, Collaboration diagram, state-charts, Activity diagram, Package Diagram, Component diagram, Deployment diagram). Class Diagrams: Aggregation, Multiplicity, Composition, Generalization, Association.

Note for Paper Setting:

The question paper will be divided into two sections. **Section A** will include 10 compulsory objective-cum-short answer type questions from each unit, each carrying 1 mark. **Section B** will have ten (10) long answer questions, two from each unit. The student will have to attempt one (01) question from each unit. Each question will carry 10 marks.

Textbooks:

1. **James R. Rumbaugh, Michael R. Blaha, William Lorensen, Frederick Eddy (2005)**, "Object-Oriented Modeling and Design", **PHI**.
2. **Michael R. Blaha, James R Rumbaugh**, "Object-Oriented Modeling and Design with UML" , 2nd Edition, **PHI**.

References:

1. **Bernd Oestereich**, "Developing Software With UML", **Pearson Education.**
2. **James Rumbaugh**, "Object Oriented Models and Design" 2nd Edition, **Pearson Education.**

Course Code: MC-450 **Maximum Marks : 100**
Course Title : Computer Graphics **University Examination: 60**
Credits: 4 **Internal Assessment: 40**
Duration of Examination:3 Hours

Objective:
The main objective of this course is to introduce the basic concepts of 2D and 3D graphics, image processing and animation.

Unit I
Introduction to computer graphics, Applications of Computer graphics, Graphical primitives, An introduction to graphical devices, Display Devices (Refresh Cathode Ray Tube, Raster-Scan Displays, Random-Scan Displays, Color monitor, Video Graphic Array, Flat Panel Displays, Plasma Panels), Input Devices.

Unit II
Graphical User Interface: Introduction, Types of Graphical User Interfaces, Designing a Graphical User Interface, Principles for Good Graphical User Interface.
2-D Graphics: DDA Algorithm, Bresenham's Line Algorithm, Midpoint Circle algorithm, Mid-point ellipse algorithm.

Unit-III
Polygon Filling: Boundary-Fill Algorithm, Flood-Fill algorithm.
Windows & View-point: Introduction to window and view-point. Windows to view-point mapping.
Clipping: Point Clipping, Line Clipping, Cohen Sutherland Line Clipping.

Unit-IV
Transformations: Introduction, Representation of a 2D object in matrix form, 2-D Transformations (Translation, Rotation, Scaling), Composite transformations, reflection, shearing.
3-D Transformation: Introduction, 3-D Transformations (Translation, Rotation, Scaling).
3D Projection: Parallel Projection, Perspective Projection.

Unit-V
Visible Surface Detection: Hidden Surface and lines,Back-face Detection Concept, A-Buffer Algorithm
Image Manipulation and Storage: Concept, Filtering (Overview), Mechanisms of image storage, Image processing.

Note for Paper Setting:

The question paper will be divided into two sections. **Section A** will include 10 compulsory objective-cum-short answer type questions from each unit, each carrying 1 mark. **Section B** will have ten (10) long answer questions, two from each unit. The student will have to attempt one (01) question from each unit. Each question will carry 10 marks.

Textbooks:

1. **Donald Hearn and M.Pauline Baker**, "Computer Graphics", **PHI.**

References:

1. **Foley, Van Dam, Feiner, Huges**, "Computer Graphics", **Pearson Edition.**
2. **Steven Harrington**, "Computer Graphics: A–Programming Approach", **TMH.**
3. **ISRD Group** "Computer Graphics", **Tata McGraw Hill, New Delhi.**

Course Code: MC-451 **Maximum Marks : 100**
Course Title : Software Testing. **University Examination: 60**
Credits: 4 **Internal Assessment: 40**
Duration of Examination:3 Hours

Objective:
The objective of the course is to introduce the students to techniques for developing quality software by implementing the various testing strategies.

Unit I
Introduction to Testing: Verification and Validation; Software Testing for Conventional & Object Oriented Architectures; Testing Completion criteria; Strategic Issues; Test Strategies for Conventional & Object Oriented Software; Validation Testing; System Testing.

Unit II
Testing Tactics: Black Box Testing; Basis Path Testing; Control Structure testing; White Box Testing; Object Oriented Testing Methods(Test Case design, Implications of OO concepts, Fault based Testing, Test Cases);

Unit III
Risk management: Concept, Reactive vs. Proactive Risk strategies, Software risks, Risk identification (Assessing Overall Project Risk, Risk Components and drivers), Risk Projection (Developing a risk table, assessing a Risk Impact), Risk Refinement, Risk Mitigation, Monitoring and Management, The RMMM Plan.

Unit IV
Introduction to Metrics: Process Metrics; Project Metrics; Software Measurement (Size Oriented Metrics, Function Oriented Metrics, OO Metrics); Metrics for Software Quality; Integrating Metrics within the Software Process; Metrics for Small Organizations.

Unit V
Quality Management: Quality Concepts (Quality, Quality Control, Quality assurance, Cost of quality),Software Quality assurance, Software reviews, Formal Technical Reviews, Formal approaches to Software quality assurance, Software Reliability(Measures of Reliability and Availability, Software Safety), ISO 9000 Quality standards.

Note for Paper Setting:

The question paper will be divided into two sections. **Section A** will include 10 compulsory objective-cum-short answer type questions from each unit, each carrying 1 mark. **Section B** will have ten (10) long answer questions, two from each unit. The student will have to attempt one (01) question from each unit. Each question will carry 10 marks.

Textbooks:

1. **Pressman, R S (2006)**, "Software Engineering - A Practitioner's Approach", Sixth Edition, **TMH**.

References:

1. **Jalote, P(2005)**,"An Integrated Approach to Software Engineering", 3Rd Edition, **Narosa Publication.**
2. **SommerVille**, **"**Software Engineering", **Addison Wisley-2000**
3. **SCHAUM'S Outlines(2005)**,"Software Engineering", **TMH.**