



# SARVEPALLI RADHAKRISHNAN UNIVERSITY, BHOPAL (M.P.)

## Scheme of Examination

### Third Semester-Master of Computer Application

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	MCA 301	Software Engg.	3	1	-	4	70	20	10	-	-	100
2	MCA 302	OOPs with C++	3	1	-	4	70	20	10	-	-	100
3	MCA 303	Theory of computation	3	1	-	4	70	20	10	-	-	100
4	MCA 304	Computer Network	3	1	-	4	70	20	10	-	-	100
5	MCA 305	Operation Research	3	1	-	4	70	20	10	-	-	100
6	MCA 306	Programming Lab (Any Two Tools from VB &VC++)	-	-	8	8	-	-	-	120	80	200
7	MCA 307	Programming Lab in C++	-	-	2	2	-	-	-	30	20	50
		Total	15	5	10	30	350	100	50	150	100	750

**L: Lecture - T: Tutorial - P: Practical**



# SARVEPALLI RADHAKRISHNAN UNIVERSITY, BHOPAL (M.P.)

## MCA-301 Software Engineering

### 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. Introduction system planning & initial investigation, various information Gathering tools feasibility study conretions & structures tools of system analysis, various methods of Process design, form design methodologies, introduction to information system testing, quality assurance security & destruct computer various (deleting recovery).

### Unit-II

#### **Software Process, Product and Project:**

The Product: Software, Software Myths, The process: 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. OOA, OOD.

### 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 concepts, 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

#### **Books**

1. R. S. Pressman, "Software Engineering – A practitioner's approach", 6th ed., McGraw Hill Int. Ed., 2002.
2. Pankaj Jalote "Software Engg" Narosa Publications.
3. Ian Sommerville : Software Engineering 6/e (Addison-Wesley



# SARVEPALLI RADHAKRISHNAN UNIVERSITY, BHOPAL (M.P.)

## MCA-302 Object Oriented Programming with C++

### Unit-I

Overview of C++: Object oriented programming, Concepts, Advantages, Usage. C++ Environment: Program development environment, the language and the C++ language standards. Introduction to various C++ compilers, C++ standard libraries, Prototype of main () function, Data types. C++ as a superset of C, New style comments, main function in C++, meaning of empty argument list, function prototyping, default arguments and argument matching. User defined data types: enumerated types, use of tag names, anonymous unions, scope of tag names Classes & Objects : Classes, Structure & Classes, Union & Classes, Inline Function, Scope Resolution operator, Static Class Members: Static Data Member, Static Member Function, Passing Objects to Function, Returning Objects, Object Assignment. Friend Function, Friend Classes

### Unit-II

Array, Pointers References & The Dynamic Allocation Operators: Array of Objects, Pointers to Object, Type Checking C++ Pointers, The This Pointer, Pointer to Derived Types, Pointer to Class Members, References: Reference Parameter, call by reference and return by reference Passing References to Objects, Returning Reference, Independent Reference, C++'S Dynamic Allocation Operators, Initializing Allocated Memory, Allocating Array, Allocating Objects. Constructor & Destructor : Introduction, Constructor, access specifiers for constructors, and instantiation, Parameterized Constructor, Multiple Constructor in A Class, Constructor with Default Argument, Copy Constructor, Destructor

### Unit-III

Overloading as polymorphism: Function & Operator Overloading : Function Overloading, Overloading Constructor Function Finding the Address of an Overloaded Function, Operator Overloading: Creating A Member Operator Function, Creating Prefix & Postfix Forms of the Increment & Decrement Operation, Overloading The Shorthand Operation (I.E. +=,-= Etc), Operator Overloading Restrictions, Operator Overloading Using Friend Function, Overloading New & Delete, Overloading Some Special Operators, Overloading [ ], ( ), -, Comma Operator, Overloading << And . Namespaces: global namespace and namespace std, nested namespaces.

### Unit-IV

Inheritance : Base Class Access Control, C, Protected Base Class Inheritance, Inheriting Multiple Base Classes, Constructors, Destructors & Inheritance, When Constructor & Destructor Function are Executed, Passing Parameters to Base Class Constructors, Granting Access, Virtual Base Classes. Virtual Functions & Polymorphism : Virtual Function, Pure Virtual Functions, Early Vs. Late Binding

### Unit-V

Exception Handling, Exception handling in C++, try, throw, catch sequence, multiple catch blocks, uncaught exceptions, catch-all exception handler, The C++ I/O System Basics : C++ Streams, The Basic Stream Classes C++ Predefined Streams, Formatted I/O: Formatting Using The Ios Members, Setting The Formal Flags, Clearing Format Flags, An Overloaded Form Of Setf ( ), Using Width() Precision() and Fill(), Using Manipulators to Format I/O, Creating Your own Manipulators

### **Books**

1. Lafore R. "Object Oriented Programming in C++", Galgotia Pub.
2. Schildt "C++ the complete reference 4ed, 2003.
3. Balagurusawmy "Object Oriented Programming with C++".



# SARVEPALLI RADHAKRISHNAN UNIVERSITY, BHOPAL (M.P.)

## MCA-303 Theory of Computation

### Unit-I

**Review of Mathematical Preliminaries:** Set, Relations and functions, Graphs and trees, string, alphabets And languages. Principle of induction, predicates and propositional calculus.

**Theory of Automata:** Definition, description, DFA, NFA, Transition systems, 2DFA, equivalence of DFA & NFA, Regular expressions, regular grammar, FSM with output (mealy and moore models), Minimization of finite automata.

### Unit-II

**Formal Languages:** Definition & description, Parse structured grammars & their classification, Chomsky classification of languages, closure properties of families of language, regular grammar, Regular set & their closure properties, finite automata, equivalence of FA and regular expression, Equivalence of two way finite automata, equivalence of regular expressions.

### Unit-III

**Context-Free grammar & PDA:** Properties unrestricted grammar & their equivalence, derivation tree Simplifying CFG, unambiguifying CFG,  $\epsilon$ -productions, normal form for CFG, Pushdown automata, 2 Way PDA, relation of PDA with CFG, Determinism & Non determinism in PDA & related theorems, Parsing and pushdown automata.

### Unit-IV

**Turing Machine:** Model, design, representation of TM, language accepted by TM, universal turing

Machine, determine & non-determinism in TM, TM as acceptor/generator/algorithms, multidimensional, Multitracks, multitape, Two way infinite tape, multihead, Halting problems of TM.

### Unit-V

**Computability:** Concepts, Introduction to complexity theory, Introduction to undecidability, recursively Enumerable sets, primitive recursive functions, recursive set, partial recursive sets, concepts of linear Bounded Automata, context sensitive grammars & their equivalence

### **Books**

1. Hopcroft & Ullman "Introduction to Automata theory, languages & Computation" , Narosha Publishing house.
2. Peter Linz, "An Introduction to formal language and automata", Third edition, Narosa publication.
3. Marvin L. Minsky "Computation: Finite & Infinite Machines", PHI.
4. Mishra & Chander Shekhar "Theory of Computer Science (Automate, Language & Computations), PHI.



# SARVEPALLI RADHAKRISHNAN UNIVERSITY, BHOPAL (M.P.)

## MCA-304 Computer Networks

### UNIT-I

. **Introduction:** Computer Network, Layered Network Architecture-Review of ISO-OSI Model., Transmission Fundamentals-, Communication Media-Conductive Metal (Wired Cable), Optical Fiber links, Wireless Communication-Radio links, Satellite Links, Communication Services & Devices, Telephone System., Integrated Service Digital Network (ISDN)., Cellular Phone., ATM, Modulation & Demodulation-, Digital to Analog Conversion-Frequency Modulation (FM), Amplitude Modulation (AM), Phase Modulation (PM)., Analog to Digital Conversion-Pulse Amplitude Modulation(PAM), Pulse Code Modulation (PCM), Differential Pulse Code Modulation, (DPCM)., Modem & Modem Types., Multiplexing-, Frequency Division Multiplexing (FDM)., Time Division Multiplexing (TDM), Statistical Time Division Multiplexing(STDM)., Contention Protocol-, Stop-Go-Access Protocol, Aloha Protocol- Pure aloha & Slotted aloha, Carrier sense multiple access with collision detection (CSMA/CD).

### UNIT-II

**Data Security and Integrity:** Parity Checking Code, Cyclic redundancy checks (CRC), Hemming Code, Protocol Concepts –, Basic flow control, Sliding window protocol-Go-Back-N protocol and selective repeat protocol, Protocol correctness- Finite state machine.

### UNIT-III

**Local Area Network:** Ethernet: 802.3 IEEE standards, Token Ring: 802.5 IEEE standard, Token Bus: 802.4 IEEE standard, FDDI Protocol, DQDB Protocol, Inter Networking, Layer 1 connections- Repeater, Hubs, Layer 2 connections- Bridges, Switches, Layer 3 connections- Routers, Gateways.

### UNIT-IV

**Wide Area Network:** Introduction, Network routing, Routing Tables, Types of routing, Dijkstra's Algorithm, Bellman-Ford Algorithm, Link state routing, Open shortest path first, Flooding, Broadcasting, Multicasting, Congestion & Dead Lock, Internet Protocols, Overview of TCP/IP, Transport protocols, Elements of Transport Protocol, Transmission control protocol (TCP), User data-gram protocol (UDP).

### UNIT-V

Network Security, Virtual Terminal Protocol, Overview of DNS, SNMP, email, WWW, Multimedia.

### **BOOKS:**

1. A.S.Tanenbaum, "Computer Network", 4th addition, PHI
2. Forouzan "Data Communication and Networking 3ed", TMH
4. D.E.Comer, "Internetworking with TCP/IP", Volume Ist & IInd, PHI
5. William Stalling, "Data & Computer communications", Maxwell Macmillan International Ed



# SARVEPALLI RADHAKRISHNAN UNIVERSITY, BHOPAL (M.P.)

## MCA-305 Operation Research

### UNIT-I

Introduction of operation research. LP Formulations, Graphical method for solving LP's with 2 variables, Simplex method, Duality theory in linear programming and applications, Integer linear programming, dual simplex method,

### UNIT-II

Transportation problem, Assignment problem.

### UNIT-III

Dynamic Programming: Basic Concepts, Bellman's optimality principles, Dynamics programming approach in decision making problems, optimal subdivision problem.

Sequencing Models: Sequencing problem, Johnson's Algorithm for processing n jobs through 2 machines, Algorithm for processing n jobs through 3 or more machines, Processing 2 jobs through n machines.

### UNIT-IV

Project Management: PERT and CPM: Project management origin and use of PERT, origin and use of CPM, Applications of PERT and CPM, Project Network, Diagram representation, Critical path calculation by network analysis and critical path method (CPM), Determination of floats, Construction of time chart and resource labelling, Project cost curve and crashing in project management, Project Evaluation and review Technique (PERT).

### UNIT-V

Inventory Models: Introduction to the inventory problem, Deterministic Models, The classical EOQ (Economic Order Quantity) model, Inventory models with deterministe demands(no shortage & shortage allowed), Inventory models with probabilistic demand, multiitem determinise models.

### **BOOKS**

1. P.K. Gupta & D.S. Hira, "Operations Research", S.Chand & Co.
2. J.K. Sharma, "Operations Research: Theory and Applications", Mac Millan.
3. S.D. Sharma, "Operations Research", Kedar Nath Ram Nath, Meerut (UP).
4. S.S. Rao "Optimization Theory and Application", Wesley Eastern.