

**JABALPUR ENGINEERING COLLEGE, JABALPUR (MP)**  
**(An Autonomous Institute of Govt. of M.P. )**  
**Affiliated to Rajiv Gandhi Technological University, Bhopal (MP)**  
**Scheme of Study and Examination (w.e.f. July 2010)**  
**MCA III<sup>rd</sup> Semester**

Course Code	Subject	Periods			EVALUATION SCHEME					Credits
		L	T	P	SESSIONAL EXAM			ESE	SUB TOTAL	
					TA	CT	TOT			
<a href="#">MA-107</a>	Computer Oriented Optimization Techniques	3	1	-	10	20	30	70	100	4
<a href="#">CA-114</a>	Software Engineering Methodologies	3	1	-	10	20	30	70	100	4
<a href="#">CA-115</a>	Object Oriented Methodology & C++	3	1	-	10	20	30	70	100	4
<a href="#">CA-116</a>	Theory of Computation	3	1	-	10	20	30	70	100	4
<a href="#">CA-117</a>	Computer Network	3	1	-	10	20	30	70	100	4
(PRACTICAL/DRAWING/DESIGN)										
<a href="#">CA-118L</a>	Programing in Computer Oriented Optimization Techniques	-	-	3	30	-	30	45	75	3
<a href="#">CA-119L</a>	Object Oriented Methodology & C++ Lab	-	-	3	30	-	30	45	75	3
<a href="#">CA-120L</a>	Programming Laboratory	-	-	4	40	-	40	60	100	4
Total		15	5	10	150	100	250	500	750	30

T.A. Teachers Assessment, CT- Class Test, ESE - End Semester Examination,  
Total Marks 750 Total Periods : 30 Total Credits : 30

## COURSE CONTENT & GRADE

(w.e.f. July 2010)

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
	COMPUTER ORIENTED OPTIMIZATION TECHNIQUES	MA-107	Min "D"	Min "D"	5.0

### COMPUTER ORIENTED OPTIMIZATION TECHNIQUES

#### UNIT-I

**Introduction of Operation Research:** LP Formulations, Graphical Method for solving LPP, Simplex Method, Duality Theory in Linear Programming and Applications, Dual Simplex Method,

#### UNIT-II

**Transportation Problem :** Introduction, Initial basic feasible solution, Optimality test, Degeneracy in Transportation problems.

**Assignment Problem :** Introduction, Mathematical formulation of an Assignment problem, Solution of Assignment problems.

**Sequencing Models :** Sequencing problems, Johnson's Algorithm for processing in jobs through two machines, three machines or more machines. Travelling salesman problems.

#### UNIT-III

**Queuing System :** Essential Features in Queuing Systems, Operating Characteristics of Queuing System, Probability Distribution in Queuing Systems, Classification of Queuing Models, study of (M/M/1 : /FCFS) and M/M/1 : N/FCFS,) models.

**Dynamic programming :** Basic concepts, Bellman's optimality principles, Dynamic programming approach in decision making problems, Optimal sub division problem.

#### UNIT-IV

**Project Management :** PERT and CPM : Project Management 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 Labeling, Project Cost Curve and Crashing in Project Management.

#### UNIT-V

**Inventory Models :** Introduction to the Inventory, Deterministic Models, The Classical EOQ (Economic Order Quantity) Model, Inventory Models with Deterministic Demands(no shortage & shortage allowed), Inventory Models with Probabilistic Demand, Multi item Deterministic Models.

#### BOOKS

1. Taha H.A. "Operations Research" PHI
2. Hiller and Lieberman, Introduction to OR, TMH
3. J.K. Sharma, "Operations Research: Theory and Applications", Mac Millan. Pub.
4. Banerjee B, Operation Research, Business Publicity Bombay.
5. Hira and Gupta, Operation Research 5 Chand.
6. S.S. Rao "Optimization, Jain Bros Delhi
7. Chitale A.K., J.Negi, Text Book of Operation Research Jain Bros, Delhi

**Note :** Paper is to be set unit wise with internal choice & emphasis is to be given on computerized implementation.

**COURSE CONTENT & GRADE****(w.e.f. July 2010)**

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
	<b>SOFTWARE ENGINEERING METHODOLOGIES</b>	<b>CA-114</b>	Min “D”	Min “D”	5.0

**SOFTWARE ENGINEERING METHODOLOGIES****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 Conventions & Structures Tools of System Analysis, Various Methods of Process Design, Form Design Methodologies, Introduction to Information System Testing, Quality Assurance Security & Disaster 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”, 6 ed., McGraw Hill Int. Ed. 2002.
2. Pankaj Jalote “Software Engg” Narosa Publications.
3. Ian Sommerville : Software Engineering 6/e (Addison-Wesley)
4. Richard Fairley : Software Engineering Concepts (TMH)
5. Elis Awad, "System Analysis & Design", Galgotia publications
6. W.S. Jawadekar: Management Information Systems, TMH Publication, India
7. Hoffer “Modern System Analysis & Design” 3e, Pearson Edition

**Note :** Paper is to be set unit wise with internal choice.

**COURSE CONTENT & GRADE****(w.e.f. July 2010)**

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
	<b>OBJECT ORIENTED METHODOLOGY &amp; C++</b>	<b>CA-115</b>	Min “D”	Min “D”	5.0

**OBJECT ORIENTED METHODOLOGY & C++****UNIT-I**

C++ Basics, Loops and Decisions, Structures and Functions, Object and Classes, Object Arrays, Constructor and Destructor Functions.

**UNIT-II**

Operator and Function Overloading, Pointers, Pointers to Base and Derived Classes Inheritance, Public and Private Inheritance, Multiple Inheritance.

**UNIT-III**

Polymorphism, Virtual Functions, Abstract Base Classes and Pure Virtual Function, Friend Function, Early and Late Binding.

**UNIT-IV**

C++ I/O System, Formatted I/O, Creating Insertors and Extractors, File I/O Basis, Creating Disk Files and File Manipulations Using seekg(), seekp(), tellg() and tellp() functions, Exception Handling: try, catch and throw.

**UNIT-V**

UML Concepts, Object-Oriented Paradigm and Visual Modeling, UML Diagrams, UML Specifications, Object Model, Object Oriented Design, Identifying Classes and Object, Object Diagrams.

**BOOKS**

1. Lafore R. “Object Oriented Programming in C++”, Galgotia Pub.
2. Lee “UML & C++ a practical guide to Object Oriented Development 2 ed, Pearson.
3. Schildt “C++ the complete reference 4ed, 2003.
4. Hans Erit Eriksson “UML 2 toolkit” Wiley.
5. Balagurusawmy “Object Orienter Programming with C++”.
6. B.G., Boach “Object Oriented Analysis & Design with Applications”, Addison Wesley.
7. S. Parate “C++ Programming”, BPB.
8. Boggs “Mastering UML” BPB Publications.

**Note :** Paper is to be set unit wise with internal choice.

**COURSE CONTENT & GRADE****(w.e.f. July 2010)**

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
	<b>THEORY OF COMPUTATION</b>	<b>CA-116</b>	Min “D”	Min “D”	5.0

**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 Automation : Definition, Description, DFA, NFA, Transition Systems, 2DFA, Equivalence of DFA & NDFA, Regular Expressions, Regular Grammar, FSM with Output (mealy and moore models), Minimisation 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, -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 Accept or/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. Lewis Papadimitraou “Theory of Computation” , Prentice Hall of India, New Delhi.
3. Peter linz, “An Introduction to formal language and automata”, Third edition, Narosa publication.
4. Marvin L. Minsky “Computation : Finite & Infinite Machines”, PHI.
5. Mishra & Chander Shekhar “Theory of Computer Science (Automata, Language & Computations), PHI.

**Note :** Paper is to be set unit wise with internal choice.

**COURSE CONTENT & GRADE****(w.e.f. July 2010)**

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
	<b>COMPUTER NETWORKS</b>	<b>CA-117</b>	Min "D"	Min "D"	5.0

**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, Setellite 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 Standard, 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", 4<sup>th</sup> addition, PHI
2. Forouzan "Data Communication and Networking 3ed", TMH
3. J.F.Hayes, "Moduling and Analysis of Computer Communication Networks", Plenum Press
4. D.E.Comer, "Internetworking with TCP/IP", Volume Ist & IInd, PHI
5. Willium Stalling, "Data & Computer communications", Maxwell Macmillan International Ed.
6. D.Bertsekas and R.Gallager, "Data Networks", 2<sup>nd</sup> Ed. ,PHI.
7. G.E. Keiser , "Local Area Networks ", McGraw Hill, International Ed.

**Note :** Paper is to be set unit wise with internal choice.

**COURSE CONTENT & GRADE****(w.e.f. July 2010)**

<b>Branch</b>	<b>Subject Title</b>	<b>Subject Code</b>	<b>Grade for End Sem</b>		<b>CGPA at the end of every even semester</b>
			<b>T</b>	<b>P</b>	
	<b>PROGRAMMING IN COMPUTER ORIENTED OPTIMIZATION TECHNIQUES</b>	<b>CA-118L</b>	Min “D”	Min “D”	5.0

**PROGRAMMING IN COMPUTER ORIENTED OPTIMIZATION TECHNIQUES**

The exercises in this component shall be designed to demonstrate the basic principles outlined in different units of the theory paper. After completing the exercises the student should have developed a good grasp of the practical utilities of the theory content.

**(Suggested Exercise)**

**COURSE CONTENT & GRADE****(w.e.f. July 2010)**

<b>Branch</b>	<b>Subject Title</b>	<b>Subject Code</b>	<b>Grade for End Sem</b>		<b>CGPA at the end of every even semester</b>
			<b>T</b>	<b>P</b>	
	<b>OBJECT ORIENTED METHODOLOGY &amp; C++ LAB</b>	<b>CA-119L</b>	Min “D”	Min “D”	5.0

**OBJECT ORIENTED METHODOLOGY & C++ LAB**

The exercises in this component shall be designed to demonstrate the basic principles outlined in different units of the theory paper. After completing the exercises the student should have developed a good grasp of the practical utilities of the theory content.

**(Suggested Exercise)**



**COURSE CONTENT & GRADE****(w.e.f. July 2010)**

<b>Branch</b>	<b>Subject Title</b>	<b>Subject Code</b>	<b>Grade for End Sem</b>		<b>CGPA at the end of every even semester</b>
			<b>T</b>	<b>P</b>	
	<b>PROGRAMMING LABORATORY</b>	<b>CA-120L</b>	Min “D”	Min “D”	5.0

**PROGRAMMING LABORATORY**

The exercises in this component shall be designed to demonstrate the basic principles outlined in different units of the theory paper. After completing the exercises the student should have developed a good grasp of the practical utilities of the theory content.

**(Suggested Exercise)**