

**SCHEME FOR M.E. (Comp. Engg.) (R 2002) University of Mumbai**

Serial Number	Subjects	TEACHING SCHEME		EXAMINATION SCHEME				
		Lecture per week	Practical / Tutorial per week	Theory Marks	Internal Assessments Marks	Viva - Voce	Duration of papers	Total Marks
<b>Sem – I</b>								
1	Parallel Computer Architecture	3P	2P	100	50	—	3	150
2	Algorithms and Complexity	3P	2P	100	50	—	3	150
3	Object Oriented Analysis & Design	3P	2P	100	50	—	3	150
4	Network Protocol & Networking	3P	2P	100	50	—	3	150
5	Elective – I	3P	2P	100	50	—	3	150
	<b>TOTAL</b>	<b>15</b>	<b>10</b>	<b>500</b>	<b>250</b>	<b>—</b>	<b>—</b>	<b>750</b>
<b>Sem – II</b>								
1	Software Engineering	3P	2P	100	50	—	3	150
2	Distributed Operating System	3P	2P	100	50	—	3	150
3	Advance Database Management Systems	3P	2P	100	50	—	3	150
4	Image Processing	3P	2P	100	50	—	3	150
5	Elective – II	3P	2P	100	50	—	3	150
	<b>TOTAL</b>	<b>15</b>	<b>10</b>	<b>500</b>	<b>250</b>	<b>—</b>	<b>—</b>	<b>750</b>
<b>Sem – III#</b>								
1	Seminar on special topics*	—	—	—	50	—	—	50
2	Dissertation Seminar	—	—	—	50	—	—	50
	<b>TOTAL</b>	<b>—</b>	<b>—</b>	<b>—</b>	<b>100</b>	<b>—</b>	<b>—</b>	<b>100</b>
<b>Sem – IV#</b>								
1	Pre-Synopsis Dissertation Seminar	—	—	—	50	—	—	50
2	Dissertation and Viva-Voce	—	—	—	100	100	—	200
	<b>TOTAL</b>	<b>—</b>	<b>—</b>	<b>—</b>	<b>150</b>	<b>100</b>	<b>—</b>	<b>250</b>
	<b>GRAND TOTAL</b>	<b>—</b>	<b>—</b>	<b>1000</b>	<b>750</b>	<b>100</b>	<b>—</b>	<b>1850</b>

**Elective – I [SEM I] (Any one)**

- [1] Artificial Intelligence
- [2] Neural Network and Fuzzy System
- [3] Data mining & Information Retrieval
- [4] Cryptography & Networking Security

**Elective – II [SEM II] (Any one)**

- [1] E-Commerce
- [2] Advanced Systems
- [3] Advances in Management Information System
- [4] Wireless Communication and Networks

**Seminar on Special topics** – Each candidate should be assigned the seminar topic right in the beginning of the semester, and the student has to do exhaustive literature survey, cases studies etc. which has to be presented at the end of the semester. The student has to be in association with the staff member for conducting the seminar. The student should be present in the seminar in front of the committee consisting of the faculty members of the department and has to be evaluated by the committee combinely.

- # 1. During the III and IV semester, the student should work full time for his/her Seminar and dissertation work.
- 2. Student teacher contact hours for dissertation and seminar during III and IV semester will be 2 hours /teacher/week.

# PARALLEL COMPUTER ARCHITECTURE

**Prerequisite:** Course on computer organization and architecture at UG level.

## Contents:

### 1. Introduction to parallel processing

- Parallel Computer Structure.
- Architecture & Classification schemes.
- Parallel Processing Application.

### 2. Memory and input and output systems

- Memory structure hierarchy.
- Addressing system for main memory.
- Virtual memory systems.
- Memory allocation and management strategies.
- Virtual memories, cache memories.
- Management and design criteria.
- I/O subsystems, Interrupt mechanism.
- Vector processing requirement.

### 3. Principles of pipelining and vector processing

- Pipelining.
- Instruction and arithmetic pipelines.
- Principles of designing pipelined processors.
- Vector processing requirement.

### 4. Pipeline, Computers and Vectorization method

- Vectorization and optimization methods.

### 5. SIMD computers and performance enhancement

- Study of SIMD array processor and associative processor.
- Scientific attached processor.

### 6. Architecture and memory organization of MIMD and Interconnection N/W

### 7. Data Driven Computing, Data Flow Computer Architecture

### 8. Parallel Software Environment

- Parallel algorithm.
- Features of parallel Languages.
- Parallel compiler and OS.

## References:

1. Computer Architecture and parallel processing – by Kai Hwang and Briggs, Tata Mc-Graw Hill.
2. Computer Architecture – by Flynn, Narosa Publication.

# ALGORITHMS AND COMPLEXITY

**Prerequisite:** Programming in C

## Contents:

- Formal models of computation, time & space complexity.
- Theory of NP Completeness, Approximability of NP Hard Problems.
- Introduction to parallel, randomized and on-line algorithms.
- Complexity classes such as RP, NC, #P, PSPACE.
- Selected algorithms from areas such as GRAPH, Combinatorial algorithms, algebraic & number theoretic algorithms.

## References:

1. The design and analysis of algorithms - A.V.Aho, J.E Hopcroft and J.D Ullman, Addison Wesley (1974).
2. Introduction to Algorithms – MIT PRESS 1990.
3. Computer & Intractability: A guide to the Theory of NP-Completeness, FREEMAN, 1979.
4. Hand book of theoretical Computer Science – J. Van Leuween ed, Vol A, Elsevier, 1990.

## OBJECT ORIENTED ANALYSIS AND DESIGN

### Contents:

1. **Introduction to Object Oriented Paradigm.**
2. **The Object Model:** Evolution of Object Model, Elements of Object Model, Applying Model Object.
3. Classes, Object, Links and Association, Inheritance, Generalization, Grouping Constructs, Aggregation.
4. **Methods:** Diagram representation, Class diagram, State transition Diagram, Object Diagram, Interaction diagram.
5. **Process:** Macro and Micro Processes.
6. **Management Issues:** Planning, Staffing, Release Management, documentation, Quality Assurance and Metrics.
7. Case studies.

### References:

1. Object Oriented Analysis and Design with Application – Grady Booch, Addison-Wesley.
2. Object Solution – Grady Booch, Addison Wesley.

## NETWORK PROTOCOLS AND NETWORKING

**Prerequisite :** Fundamentals of  
Computer Networks at UG Level

### Contents :

1. **TCP/IP :** Introduction, Internetworking Concepts and Architecture Models, Internet Addresses, ARP, RARP, Internet Protocols – Connection less datagram Routing IP data grams, ICMP, UDP, TCP, DNS, Socket, Telnet, FTP, NFS, TFTP, POP Server, SMTP Server.
2. **Network Management Fundamentals:** N/W monitoring, N/W Control.
3. **SNMP family :** SNMP N/W management concepts, SNMP management Information Base, Remote N/W monitoring, secure SNMP, SNMP version 2, security of SNMP Version 2.
4. Layer 3 switching, Layer 4 switching.

### References:

1. Internetworking with TCP/IP Vol. 1 – By D. Comer (PHI).
2. SNMP, SNMPV2 and CMIP, The Practical Guide to Network Management Standards – William Stallings.
3. UNIX Networking Programming – By W. Richard Stevens, PHI (1995).
4. Internet Secrets – By John R Levine and Carol Barondi, IDG Books.
5. Adventures in UNIX Networking Application programming – By Bill Riken et-al, John Wiley & Sons.

## ARTIFICIAL INTELLIGENCE (ELECTIVE – I)

### Contents:

1. **What is Artificial Intelligence? :** Definition, A.I. Technique, Pattern Recognition, The level of the Model, Criteria for success.
2. **Problem and Problem Spaces :**  
2.1 **Defining the problem on a state space search :** Production Systems, Control Strategies, Heuristic, Search  
2.2 **Problem Characteristic :** Decomposable problem, Predictable Universe, Absolute or Relative Good solution, Consistent Knowledge Base Person Interaction, Production Systems Characteristics.
3. **Basic Problem Solving Methods :** Forward VS Backward Reasoning, Problem Trees VS Problem Graphs, Knowledge representation and Frame Problem, Matching, Heuristic Functions, Weak Methods, Analyzing Search algorithms, Game Playing, Overview, The minimax, search procedure, Adding Alpha-Beta Cutoffs, Addition Refinements, imitation of the method.
4. **Knowledge Representation using Predicate Logic:** Introduction to Representation, Presenting simple facts in Logic, Augmenting the representation with computable function and predicates, Resolution, Natural Deduction.
5. **Programming in LISP or PROLOG.**
6. **Overview of:** Advances problem solving systems, Natural Language Understanding, Perception, Learning, Neural Network.

## References:

1. Principles of Artificial Intelligence – N.J. Nilsson, Tioga Hill, 1992.
2. Artificial Intelligence – Elaine Rich, McGraw Hill, 1992.
3. Artificial Intelligence and Design of Expert Systems – C.F. Luger & W.A. Stubblefield, Addison-Wesley.

## NEURAL NETWORKS & FUZZY SYSTEMS (ELECTIVE – I)

### Contents :

1. **Fundamentals Concepts and Models of Artificial Neural Systems :** Biological Neuron and their Artificial Models, Models of ANN, Learning and Adaptation, Neural Networking Learning Rules.
2. **Single-layer Perception Classifiers.**
3. **Multilayer Feedforward Networks :** Linearly Nonseparable Pattern Classification, Delta Learning Rule, Feedforward Recall and Error Back-Propagation Training, Learning Factors.
4. Single-layer Feedback Networks.
5. Associative Memories.
6. Matching and Self-Organization Networks.
7. Application of Neural Algorithm and Systems.
8. Introduction to Fuzzy Systems.
9. **Fuzzy Sets :** Fuzzy Relations, Fuzzy Function, Fuzzy Measures, probabilities / possibilities.
10. Fuzzy Modeling and applications of Fuzzy Control.

## References:

1. Artificial Neural Networks- B.Yegnanarayana, PHI, 1999.
  2. Introduction to Artificial Neural Systems – Jacek M. Zurada, Jaico Publishing House, 2001.
  3. Neural Network – Simson Haykin, Macmillan Publication, 1994.
- Neural Network & Fuzzy Logic Applications in C/C++ : Stephen T. Welstead, John Wiley, 1994.
4. Fuzzy Set Theory & its Applications – H.J.Zimmermann, Allied Publishers Ltd, 1996.

5. Fuzzy Control – D. Prianleav, Narossa Publication.

## DATA MINING & INFORMATION RETRIEVAL (ELECTIVE – I)

- Data warehousing & Data Mining.
- Online Analytic Processing [OLAP]: its architecture and its use. Java implementations, classification trees and exploratory data analysis [EDA].
- EDA Vs Hypothesis Testing.
- Computational EDA Techniques.
- Basic Statistical Exploratory Methods like distribution, correlation matrices, and multiway frequency tables.
- Multivariate exploration techniques like Cluster Analysis, Factor Analysis, Discriminant Function Analysis, Multidimensional Scaling, Log Linear Analysis, and Canonical Correlation, Stepwise Linear & Non linear, Regression, Correspondence Analysis, Time Series Analysis and Classification Trees.
- Graphical [Data Visualization] EDA techniques for function fitting, data smoothing, layering, tessellations, contour projections.
- Verification of results of EDA.
- Neural networks for prediction.
- Fundamentals of Genetic Algorithms for Pattern Searching.
- Applications & trends in data mining.

## References:

1. Data Mining – Adriaans, Pieter & Dolf zantinge, Addison Weley.
2. Introduction to Data Mining & Knowledge Discovery – Edelstein, Herbert A.

## CRYPTOGRAPHY AND NETWORK SECURITY (ELECTIVE – I)

### Contents :

1. **Introduction to basic terms :** Basic goals and concepts, Brief history of cryptography and cryptanalysis, Uses and misuses, Politics, Basic Number Theory, Divisibility.

## COMPUTER ENGINEERING SEM – II

### SOFTWARE ENGINEERING

#### Contents :

1. **Introduction** : The Software Problem, Software Engineering Problem, The Software Engineering Approach.
2. **Software Process** : Software Process, Characteristics of software process, Software Development Process, Project Management Process, Software Solution Architecture, Process Management Process.
3. **Software Requirement Analysis and Specification** : Software Requirement, Problem Analysis, Requirement Specification, Validation, Metrics.
4. **Planning a Software Project** : Cost Estimation, Project Scheduling, Staffing and Personnel Planning, Software Configuration Management Plans, Quality Assurances Plans, Project Monitoring Plans, Risk Management.
5. **Function – Oriented Design** : Design Principles, Module – Level Concepts, Design Notation and Specification, Structured Design Methodology, Verification, Metrics.
6. **Object – Oriented Design** : Object – Oriented Design Analysis and Object – Oriented Design.
7. **Detailed Design** : Module Specification, Detailed Design, Verification, Metrics
8. **Coding** : Programming Practice, Verification, Metrics.
9. **Testing** : Testing Fundamentals, Functional Testing, Structural Testing, Structural Testing, Testing as applicable to SSAD & OO paradigm.

#### Text Book

An Integrated Approach to Software Engineering – By Pankaj Jalote, Narosa Publication House, 1998.

#### References :

1. An Introduction to Object Oriented Programming :- Timothy Budd, Addison Wesley.
2. Object Oriented Programming Using C++ :- Ira Pohl, Benjamin Cummings, 1993.
3. Object Oriented Design & Analysis : Grady Booch, Benjamin Cummin, 1993.

2. **Primmality** : Bases, congruences, modular arithmetic, GCD's Euclidian Algorithm, Fermat and Euler theorms, Finding large primes, Pohling-Hellman, RSA.
3. **Basic Information theory Entropy** : Equivocation, Work factors, Key size VS message size, Redundancy, Unicity distance, Perfect secrecy.
4. **Element and Historic Ciphers** : Caesar cipher, Transposition and substitution, Polyalphabetic ciphers, Product cipher, DES, IDEA, Exponentiation cipher, Cipher modes, Block cipher, Stream cipher, ECB, OFB, CFB, CBC.
5. **Public VS Private Key** : LFSRs, Diffe-Hellman key exchange, Mental Poker, Quadratic residues, Obilivious transfer, Zero-knowledge proofs, Authentication methods.
6. **One-way cipher** : Authentication function, Message digest, MDS, SHA, Kerberos, Privacy-enhanced communication.
7. **Privacy** : Non-repudiation, digital signatures, Certification hierarchies, X.509.PGP.PKI., Digital Water Making, Digital Cash, Digital voting, Contract signing.
8. **Key Management Threshold Schemes** : Random Number generation, Key escrow, Key recovery.
9. **Introduction to Bio metrics for security**: Signature verification, figure print recognition, voice recognition, Iris recognition system.

#### References :

1. Cryptography and Data Security – By D. Denning, Addison-Wesley.
2. RSA securities official Guide to cryptography – S Bueert and Stephen Paine.
3. Internet Security Protocols – Uyles Black, Pearson Education
4. Internet and Cryptography – Richard Smith.
5. Cryptography and Network Security, Principles and Practice – William Stalling, Pearson Education.

4. Software Engineering – A Practitioner's Approach :- Roger S. Pressman, McGraw Hill.
5. Software Engineering :- Sommerville, 4<sup>th</sup> Ed, Addison Wesley.

## DISTRIBUTED OPERATING SYSTEMS

**Prerequisite** : Course on operating systems at U.G. level

### Contents :

1. Review of Basic concepts and issues such as process and process life cycle, file management, IPC, Mutual Exclusion and Critical Section Problem, semaphores and Monitors, deadlock, performance issues.
2. **Study of Design of UNIX operating systems** : process management and control, file management, memory management, IPC, sockets, I/O subsystems, scheduling.
3. **Study of Distributed Systems** : Basic issues in Design, distributed file systems, NFS, case study of two distributed O.S. such as Windows NT and Mach.
4. **Introduction to real time O.S.**

### References :

1. The design of UNIX O.S. – By Morris Bach(PHI)
2. Modern O.S. – By Tannenbaum (PHI publication).

## ADVANCED DATABASE MANAGEMENT SYSTEMS

### Contents :

1. Overview of Relational Model, Relational Database Design.
2. **Query Processing** : Estimation of Query Processing Cost, Structure of Query optimizer.
3. **Crash Recovery.**
4. **Table Management.**
5. **Object Oriented Model** : New applications, Object Structure, Class Hierarchy, Organization, Object Oriented Queries, Scheme modification, operational data VS Decision Support Data.
6. **Distributed Database** : Structure of distributed database, Trade-off, Design,

Transparency, Autonomy, Distributed query processing, Recovery in distributed systems, Commit protocol, Concurrency control, Deadlock handling.

7. **Data warehousing** : Evolution, architecture, Online Transaction Processing VS Online Analytical Processing, Star Schemas, Implementation
8. **Data Mining.**
9. **Introduction to advanced data Modeling technique such as temporal, multimedia and deductive databases.**

### References :

1. Database System Concepts :- H.F. Korth, Avi Silberschatz, S. Sudarshan, Tata McGraw Hill.
2. Database System Design Implementation and Management : – Peter Rob, Carlos, Coronel, Galgotia Publishers.
3. Reading in Database Systems :- M. Stonebraker, Morgan Kaufmann.
4. Fundamental of Database Systems :- R. Elmasri, S.B. Navathe, Benjamin Publishers.
5. Intelligent Databases : Object –Oriented, Deductive, Hypermedia Technologies, K. Parasaye, M. Chignell, S. Khoshafian, H. Wong, Wiley.
6. Distributed Database :- S Ceri, G Pelagatti, McGraw Hill.
7. Multimedia and Imaging Databases :- S Khoshafian, A Brad Baker Morgan Kaufmann.
8. The TSQL2 temporal Query Language. R.T. Shodgrass (ed), Kluwer Academic.
9. Data Warehousing, Data Mining and OLAP, A. Berson, S.J. Smith, McGraw Hill.
10. The Datawarehouse Lifecycle Toolkit :- R. Kimball et al, John Wiley.

## IMAGE PROCESSING

### Contents :

1. **Digital Image Processing Systems** : Image acquisition storage, processing, communication, display.
2. **Visual perception** : Structure of human eye, Image formation in the human eye, brightness, adaptation and discrimination.
3. **Image Model** : Uniform and non-uniform sampling, quantization.

## E – COMMERCE (ELECTIVE – II)

4. **Image Transform** : Introduction to Fourier transform, DFT and two dimensional DFT, some properties of DFT – reparability, translational, periodicity, conjugate symmetry, rotation, scaling, average value, convolution, correlation FFT algorithm, inverse FFT, filter implementation through FFT.
5. **Other Transform** : Other Separable Image Transform and their algorithms, Walsh Hadamard Transform, Discrete Cosine and Sine Transform, Harr Transform – Karhunen – Loeve (Hotelling) Transform.
6. **Image Enhancement** : Contrast Manipulation, Histogram modification, noise cleaning, edge sharpening, Frequency domain methods low-pass and high – pass filtering, homomorphic filtering.
7. **Image data Compression** : Coding redundancy, psycho-visual redundancy, fidelity criteria, MSE, Elements of Information theory, Fundamental coding theorem, Error Free Compression, variable length coding, DPCM, DM, ADM etc.
8. **Image Segmentation** : Detection of discontinuity, Point Line and Edge detection, Edge linking and Boundary detection, Thresholding, Optional Thresholding, Region Orientation segmentation, region growing and merging, texture analysis, and using texture for Image segmentation.
9. **Image Representation and Description:** Cain codes polygon approximation, signature, Boundary segments, Boundary description, shape numbers, Fourier descriptors, topological, descriptors, textures, moments, morphology, dilation, erosion, opening and closing, hit or miss transform.
10. **Image Restoration.**

### References :

1. Digital Image processing – R.C. Woods (Addison)
2. Fundamentals of Image Processing : Anil K. Jain (PHI).
3. Digital Image Processing : William Pratt (John Wiley)
4. Orthogonal Transform for Digital Signal Processing : N. Ahmed & K. R. Rao (Springer).

### Contents :

1. **Introduction to Electronic Commerce** : Its impact, social cause, and the business models, Classification of E-Commerce application solutions.
2. **Infrastructure for Electronic Commerce** : small scale, mid size, large size and enterprise wide application development and deployment.
3. **Web-based tools for Electronic Commerce.**
4. **Electronic Commerce Software Components.**
5. **Security Threats to Electronic Commerce** : fire walls, encryption, digital signatures, certificate authorities.
6. **Implementing Security for Electronic Commerce.**
7. **Electronic Payment System** : Credit card authorization, cyber cash, digital wallets, Electronic checks and Microtransaction, Smart Cards Protocols and Standards.
8. **Strategies for Marketing, sales and promotion, Identifying customer behavior.**
9. **Personalization of web sites** : Profiling, Business intelligence gathering, recommendation systems.
10. **Strategies for purchasing, Logistic and support activities** : From electronic data Interchange to Electronic Commerce, ECRM.
11. **Strategies for web Auctions, Virtual Communities and web Portals.**
12. **The Environment of Electronic Commerce** : Public Policy issues, International, Legal, Ethics and Tax Issues.
13. **Planning for Electronic Business** : Recourse and Implementation Issues.

### References :

1. Electronic Commerce – Schneider, Perry, Tompson – 2000.
2. Frontiers of E-Commerce – R Kalakota & A.B. Whiaston, Pearson Education.
3. E-Commerce, Whitely, TMH.



## **ADVANCED COMPILERS (ELECTIVE – II)**

### **Contents :**

1. Compiler Structures, scanner, parser, Symbol table, parse tree nodes, static semantics, interpreter, code generator, compiler utilizes.
2. OOP and parallel language design.
3. Object Oriented Compiler design.
4. Parallel Compiler Design, Technique for language, implementation, compilation, optimization and complexity analysis.
5. Interaction of Compiler with Computer Architecture.
6. Case Study Building a family of compilers
7. Analysis and Controllers.

### **References :**

1. Practical computation and the construction of language processor – By Pagan.
2. Object Oriented Compiler Design – By P.H.I.
3. Parallel logic Programming Technique – By Taylor, P.H.I.
4. Object Oriented Compiler Constructor – By Jim Holmes, P.H.I.

## **ADVANCES IN MANAGEMENT INFORMATION SYSTEM (ELECTIVE – II)**

1. **Introduction to Management.**
2. **Managing Functions, Planning and Managing.**
3. **Introduction to MIS, Overview of MIS, Structure of MIS, Need for MIS.**
4. **System Concepts, Concepts of planning and controlling, Organization structure and Management Concepts.**
5. **The Decision making process :** Support system for management of knowledge work, Development of long range information system plans, Strategies for determination of information requirements User interface requirement, Developing and implementing, application systems, Quality assurance and evaluation of information systems.
6. **Decision Support System :** Data Warehouse, OLTP VS OLAP, Overview Data Mining, EIS.

### **References :**

1. Laudon, K.C and Laudon, J.P. Management Information system : A contemporary Perspective Maxwell MacMillan, 1990.
2. O'Breien, James A.: Management Information System – Managerial End User Perspective, Galgotia.
3. Davis G.B. Olson M.H “Management Information System – Conceptual Foundation Structures and Development, Davis, G.B. and Olson, McGraw Hill, 2<sup>nd</sup> Edition, 1985.
4. H. F. Korth, Avi Silberschatz, S. Sudarshan : “Database System Concept”, Tata McGraw Hill.

## **WIRELESS COMMUNICATION & NETWORKS (WCN) (ELEC II)**

Cellular system techniques & capacity, radio wave propagation & coverage, modulation formats and efficiency, RF system design, signal processing and coding techniques & multiples access techniques.

Cellular telephone systems and the Global Positioning System concepts. Issues in translation with illustrative examples from two existing wireless standards (GSM & WCDMA).

Wireless Networking for local access. Wireless local loop technology. Use of development systems for design of wireless applications using Bluetooth frame work. PDA / Mobile handset emulators for common handsets like Nokia, Siemens, Palm -7 etc.

### **BOOKS**

- 1.] Wireless Networked Communications – Bates R.J McGraw Hill.1994
- 2.] Mobile Communications – Schiller, Pearson Education.
- 3.] Wireless Communications & Networks – William Stallings, Pearson Education.

[www.db.grussell.org](http://www.db.grussell.org)

## **M.E. (COMPUTERS) SEM – III**

### **SEMINAR ON SPECIAL TOPICS**

Each student shall be assigned a topic on which he/ she will do self-study. The work may involve review of literature, laboratory experimental work, development of software, development of model, case study, field data collection and analysis etc. On completion of the work the student shall prepare a report and will give a seminar on the report.

The student is expected to spend at least 8 hours a week for this seminar.

### **DISSERTATION SEMINAR**

Student shall finalize a theme related to Computer engineering and / or Information Technology area for the dissertation work. Student shall prepare a report on the theme outlining importance of the theme of the study, objective, scope of work, methodology & review of literature published in the relevant area. The student shall present a seminar on this report.

## **M.E. (COMPUTER) SEM – IV**

### **PRE-SYNOPSIS DISSERTATION SEMINAR**

Student shall study the problem of dissertation in the light of outcome of STAGE 1 seminar. On completion of data collection, analysis & inferencing the student shall prepare an interim report & shall present a seminar on the work done before the submission of synopsis to the University.

### **DISSERTATION & VIVA – VOCE**

On finalization of the dissertation student shall submit the dissertation report to the University. The student shall have to appear for a Viva-Voce examination for the dissertation.

### **COMPLIED, TYPED & PRESENTED BY:**

**1.] Krantivir Rajput**

**2.] Narayann Rajput**

**ALL THE BEST FOR M.E.  
PROGRAMME !**