B.E. COMPUTER ENGINEERING

SECOND YEAR SEMESTER IV

SUBJECT: APPLIED MATHEMATICS IV

Lectures: 4 per week	**One paper**: 100 marks. (3 Hrs.)

Objectives Of The Course: This course aims to build concepts of Complex Variables, Residue theorem, Matrices and Numerical Methods. These topics are included to provide required mathematical background for subsequent courses**.**

Pre-requisites: NIL

DETAILED SYLLABUS

1. **Complex Variables:**

- Regions and Paths in Z plane ;Taylor's and Laurent's development t;Singularities, Poles, residue at isolated singularity and its evaluation ;Residue theorem: Application to evaluate real integrals.

2. **Matrices:**

- Vectors; real field inner products; Norm; Linear independence; orthogonality; Characteristic values and vectors; their properties for Hermitian and real symmetric matrices;Characteristic polynomial; Cayley Hamilton theorem; Functions of square matrix; Minimal polynomial; Diagonalizable matrix.

1. **Numerical Methods:**

- Errors: Types and Estimation ;Solutions to Transcendental and polynomial equations: Bisection method; Gauss-Jordan method; Newton-Raphson method;Solutions to system of linear algebraic equations: Gauss elimination method; Gauss-Jordan method; Gauss Siedel iteration method;Interpolation: Linear interpolation; High order interpolation using Lagrange and Newtons methods; Finite difference operators and difference tables;Numerical Integration: Trapezoidal rule; Simpson's $1/3^{rd}$ and $3/8^{th}$ rules.Solutions to ordinary differential equations: Taylor's series method; Euler's predictor-corrector method; Rungekutta method of second and fourth order.

BOOKS

TEXT BOOKS

1. P. N. Wartikar and J. N. Wartikar, "Element of applied mathematic", Vol I/Vol II, A. V. Griha, Pune.
2. Shanti Narayan, "Matrices", S. Chand Publishing House, Delhi.
3. Shanti Narayan, "Theory Of Functions Of Complex Variables", S. Chand Publishing House, Delhi.
4. S. S. Shastri, "Introductory Methods of Numerical Analysis" , Vol-2, PHI, Second edition , 1994..

References:

1. John S. Mathews , “Numerical Method for Mathematics, Science and Engineering”.
2. Salvadari and MacCraken, “Numerical Methods”.

B.E. COMPUTER ENGINEERING

SECOND YEAR SEMESTER IV

SUBJECT : PRINCIPLES OF COMMUNICATION ENGINEERING.

Lectures: 3 per week **Practical:** 2 per week;	**One paper**: 100 marks. (3 Hrs.) **Term work**:25 marks **Oral Exam**:25 marks

Objectives Of The Course: This course aims to build the basics of communication principles.

Pre-requisites: NIL

DETAILED SYLLABUS

1. Introduction:

- Elements of a communication system, Modulation and demodulation; Noise in Communication systems, Signal-to-Noise ratio, Noise factor and Noise Figure, Equivalent Noise Temperature.

2. Amplitude Modulation:

- DSB Full carrier AM – principles, modulator circuits, transmitters. Different types of AM, Suppressed – carrier AM, SSB, ISB – Principles, transmitters.

3. Angle Modulation:

- Frequency modulation, Phase modulation, Effect of noise, FM modulators, Transmitters.

4. Radio Receivers:

- Receiver characteristics, TRF and Superheterodyne receivers, AM detectors, FM detectors, Receiver circuits

5. Radio Wave Propagation:

- Electromagnetic waves, Properties of radio waves, Propagation of waves, Propagation terms and definitions.

6. Analog Pulse Modulation:

- Sampling Theorem for Low-pass and Band-pass signals - proof with spectrum, Aliasing. Sampling Techniques – principle, generation, demodulation, spectrum. PAM, PWM, PPM – generation and detection.

7. Digital Transmission:

- Quantization , Quantization error, Non-uniform quantizing, Encoding. PCM, PCM, Delta modulation, Adaptive Delta modulation – transmission system, bandwidth.

8. Multiplexing:

- TDM, FDM – Principles, Hierarchy.

BOOKS

TEXT BOOKS

1. Wayne Tomasi, "Electronic Communication Systems", Pearson Education, Third Edition, 2001.
2. Roy Blake, "Electronic Communication Systems", Thomson Learning, Second Edition.
3. Kennedy and Davis, "Electronic Communication Systems", TMH.

References:

1. Leon W Couch, "Digital and Analog Communication Systems", Pearson Education, Sixth Edition.

2. Taub and Schilling, "Principles of Communication Systems", Tata McGraw-Hill, Second Edition.

Topics of Experiments

1. AM generation and detection.
2. FM generation and detection.
3. Superheterodyne Receiver.
4. Sampling and reconstruction.
5. PWM generation and detection.
6. PPM generation and detection.
7. PCM generation and detection.
8. Delta modulation generation and detection.
9. Time Division Multiplexing.
10. Frequency Division Multiplexing.

TERM WORK

1. Term work should consist of at least 8 experiments and 5 assignments covering all the topics.
2. A term work test must be conducted with a weightage of 10 marks.

ORAL EXAMINATION

An oral examination based on the above syllabus should be conducted to test the knowledge of the students.

B.E. COMPUTER ENGINEERING
SECOND YEAR SEMESTER IV

SUBJECT : COMPUTER ORGANIZATION AND ARCHITECTURE

Lectures: 4 per week **Practical**: 2 per week	**One paper:** 100 marks. (3 Hrs.) **Term work:** 25 marks **Oral Exam :** 25 marks

Objectives of the course: **Computer Organization and architecture is a subject of increasing relevance with the merging of computer, communication technology and consumer electronics. The purpose of this course is to acquaint budding engineers with the basic principles of organization, operation and performance of modern-day computer systems. It covers all aspects of computer technology, from the underlying integrated circuit technology used to construct computer components, to the use of parallel organization concepts in combining those components.**

Pre-requisites: Digital Logic and Design

DETAILED SYLLABUS

1. Overview:

- General organization and architecture ;Structural/functional view of a computer; Evolution/brief history of computers.

2. System Buses:

- Computer components-memory, cpu , i/o ;Interconnection structures ;Bus interconnection,multiple bus hierarchies, pci bus structure.

3. Memory Organization:

- Internal memory—characteristics, hierarchy; Semiconductor main memory – types of ram, chip logic, memory module organization; Cache memory--elements of cache design, address mapping and translation, replacement algorithms; advanced dram organization ;Performance characteristics of two-level memories; External memory: magnetic disk, tape, raid, optical memory; High speed memories: associative and interleaved memories.

4. **Data Path Design:**

- Fixed point representation; Floating point representation ;Design of basic serial and parallel high speed adders, Subtractor, multipliers, Booth's algorithm ;The arithmetic and logic unit (ALU): Combinational and sequential ALU's

.

5. The Central Processing Unit:

- Basic instruction cycle ;Instructions sets, formats and addressing; Processor organization; Register organization; Instruction pipelining; Co-processors, pipeline processors;RISC Computers, RISC versus CISC

characteristics.

6. **The Control Unit:**
   - Micro- operations; Hardwired implementation;Microprogrammed control;Micro-Instruction format ;Applications of microprograming.

7. **Input and Output Unit:**
   - External devices-: keyboard, monitor, disk drive and device drivers ;I/O modules: programmed I/O, interrupt driven I/O, DMA, I/O channels and I/O processors ;Serial transmission and synchronization.

8. **Multiple Processor Organizations:**
   - Flynn's classification of parallel processing systems ;Pipelining concepts.

BOOKS

TEXT BOOKS

1. William Stallings, "Computer Organization and Architecture", Prentice Hall / Pearson Education Asia, Fifth Edition.
2. John P. Hayes, "Computer Architecture and Organization", Mc-Graw Hill, Third Edition.
3. Tannenbaum, "Computer Organization", PHI.

References:

1. V. Carl Hamacher and Zaky, "Computer Organization", Mc-Graw Hill.
2. Thomas C. Bartee, "Computer Architecture and Logic Design", Tata Mc-Graw Hill.
3. Moris Mano, "Computer System Architecture", Prentice Hall of India, Second Edition.

TERM WORK

1. The term work must consist of at least 6 simulation programs (for example implementation of high speed adders/sub tractors and multipliers, simulation of pipelined multipliers etc.).
2. The term work must also include 4 assignments. The assignments should include case studies of at least two RISC and CISC processors and the corresponding P.C. used in the lab.

A term work test must be conducted with a weightage of 10 marks.

ORAL EXAMINATION

An oral examination is to be conducted based on the above syllabus.

B.E. COMPUTER ENGINEERING

SECOND YEAR SEMESTER IV

SUBJECT : DATABASE SYSTEMS

Lectures: 4 per week **Practicals:** 2 per week;	**One paper:** 100 marks. (3 Hrs.) **Term work:** 25 marks **Oral :**25 marks.

Objectives Of The Course: Database management has evolved from a specialized computer application to becoming the central component of modern computer systems. Therefore knowledge of database systems has become essential for engineers both in the computer and information technology area. This course on database systems helps students learn the concept of relational database systems, their management and implementation.

Pre-requisites: A basic course on data structures and algorithms. Knowledge of any programming language.

DETAILED SYLLABUS

1. Introductory Database Concepts:

- Introduction to data processing; Overview of files and file systems; Drawbacks of file systems; Concept of a database; Database systems versus File systems; Data abstraction and data independence; Data models; Database languages; Database users and administrators; Transaction management; Database system structure.

2. Entity-Relationship Model:

- Basic concepts; Constraints ;Design Issues; Entity-Relationship diagram ;Weak entity sets; Extended E-R features ;Design of an E-R database schema ;Reduction of an E-R schema to tables.

3. Relational Model:

- Concept of a relation ;Notion of primary and secondary keys, foreign keys ;Structure of relational database s;The relational algebra and extended relational-algebra operations; Formation of queries; Modification of the database; views.

4. SQL:

- Background; Basic Structure ;Set Operations; Aggregate functions; Null values ;Nested Queries; Views; Complex queries; Database modification ;DDL; Embedded SQL; Stored procedures and functions; Dynamic SQL; Other SQL features.

5. Integrity and Security:

- Domain Constraints; Referential integrity ;Assertions; Triggers; Triggers and assertions in

- SQL ; Security and authorization; Authorization in SQL; Encryption and authentication.

6. Relational-Database Design:

- First normal form; Pitfalls in relational-database design; Functional dependencies; Decomposition; Desirable properties of decomposition; Boyce–Codd normal form; 3rd and 4th normal form; Mention of other normal forms; Overall database design process;

1. Storage and File Structure:

- Overview of physical storage media; Magnetic disks; RAID; Tertiary storage; Storage access; File organization; Organization of records in files; Data-dictionary storage

8. Indexing and Hashing:

- Basic Concepts; Ordered Indices ;B+ Tree Index Files; B-Tree Index Files ;Static Hashing; Dynamic Hashing; Index Definition in SQL; Multiple-Key Access;

9.Transactions:

- Transaction concept; Transaction state ;Implementation of atomicity and durability; Concurrent executions; Serializability; Recoverability; Implementation of isolation; Transaction definition in SQL.

10. Concurrency Control:

- Lock-based protocols; Timestamp-based protocols;Validation-based protocols; Multiple granularity;Multiversion schemes; Deadlock handling;Insert and delete operations; Weak levels of consistency ; Concurrency in index structures.

11. Recovery System:

- Failure classification; Storage structure ;Recovery and atomicity; Log-based recovery;Shadow paging; Recovery with concurrent transactions;Buffer management.

BOOKS

Text Books :

1. Korth, Silberchatz, Sudarshan, "Database System Concepts", Fourth Edition, McGraw-Hill .
2. Peter Rob and Carlos Coronel, "Database Systems, Design, Implementation and Management", Thomson Learning, Fifth Edition.

References :

1. Elmasri and Navathe, “Fundamentals of Database Systems”, Fourth Edition, Addison-Wesley.
2. C. J. Date, “Introduction To Database Systems”, Seventh Edition, Addison Wesley Longman.
3. Mark Whitehorn nad Bill Markyln, “Inside Relational Databases”, Springer Verlag.
4. Mark Levene and George Lizou, “Guided Tour Of Relational Databases And Beyond”, Springer Verlag.
5. “Structured COBOL”, Schuam’s series.
6. Raghu Ramkrishnan and Johannes Gehrke, “Data base Management Systems”, TMH.

TERM WORK

1. Term work should consist of two programs in COBOL, using file processing and Report Writer facilities.
2. It should include at least 8 practical assignments in SQL, which will include basic SQL, advanced SQL (“Group By”, nested queries etc.). Programs must also include use of Embedded SQL, Stored procedures, Triggers and Assertions.
3. A small application to be designed and implemented in SQL.
4. A term work test must be conducted with a weightage of 10 marks.

ORAL EXAM

An oral examination is to be conducted based on the above syllabus.

B.E. COMPUTER ENGINEERING

SECOND YEAR SEMESTER IV

SUBJECT: ANALYSIS OF ALGORITHMS

Lectures: 4 per week **Practical:** 2 per week;	**One paper:** 100 marks. (3 Hrs.) **Term work:** 25 marks **Practical:** 25 marks;

Objectives of the course: This course deals with the systematic study of the design and analysis of *algorithms*. The aim of this course is to give the students some basic tools needed to develop their own algorithms, whenever necessary.

Pre-requisites: Course in Data Structures.

DETAILED SYLLABUS

1. Algorithm Analysis:

- Mathematical Background; The Model;
- The Time Complexity:
  - How to Analyze and Measure;
  - Big-Oh and Big-Omega Notations;
  - Best Case, Average Case and Worst Case Analyses.

2. Sorting Methods:

- Efficiency Considerations in Sorting;
- Different Sorting Methods :Bubble Sort ;QuickPort ;Straight Selection Sort ;Binary Tree Sort; Heaps and Heap sort ; Heap as Priority Queue; Insertion Sort; Shell Sort; Bucket Sort; Merge Sort; Radix Sort.
- Time Complexity Calculation: Best Case, Worst Case and Average Case Calculations of the Different Sorting Methods.

3. Searching Methods:

- Efficiency Considerations in Searching;

Basic Searching Techniques: Sequential Search; Efficiency Considerations for Sequential

Search; Searching Ordered Table; Indexed Sequential Search; Binary Search; Interpolation

Search. Binary Search Tree:Implementation;Insertions and Deletions;Efficiency

Considerations; General Search Trees:Multiway Search Trees;B-Trees;B+-Trees;Tries;AVL

Trees.Hashing:Hash Functions; Resolving Clashes (Open and Closed Hashing);Hashing in

External Storage; Dynamic Hashing.

4. Graph:

- Graph Traversal; Application of Graph Structures: Shortest Path Problem; Topological Sorting; Minimum Spanning Tree; Connectivity in a Graph;Euler's and Hamiltonoan Graph.

5. Algorithms:

- Analysis of all the above Algorithms;Greedy Method ;Divide and Conquer Method; Dynamic Programming; Back-Tracking Method.

Topics for Experiment

1. Various sorting methods.
2. Various searching techniques.
3. Implementation of graph along with applications.

BOOKS

TEXT BOOKS

1. Y. Langsam, M. J. Augenstein and A. M. Tannenbaum, “Data Structures Using C and C++", Prentice-Hall India, Second Edition.
2. G. Brassard and P. Bratley, “Fundamentals of Algorithmics", Prentice-Hall India.
3. R. F. Gilberg, “Data Structure: A Pseudocode Approach with C”, Thomson Learning.

Referrences:

1. A. Aho, J. E. Hopcroft and J. D. Ullman, “Data Structures and Algorithms", Addison Wesley,

Low Price Edition.

2. M. A. Weiss, “Data Structures and Algorithm Analysis in C++", Addison Wesley Longman,

International Student Edition.

3. R. Kruse, “Data Structures and Program Design in C", Prentice-Hall India.

2. Tremble and Sorenson, “Data Structures and Algorithms", Tata McGraw-Hill.

TERM WORK

1. Term work should consist of at least 12 practical experiments covering all the topics.
2. A term work test must be conducted with a weightage of 10 marks.

PRACTICAL EXAMINATION
A practical examination should be conducted to test the work done by the students in the Laboratory.

B.E. COMPUTER ENGINEERING

SECOND YEAR SEMESTER IV

SUBJECT: INDUSTRIAL ECONOMICS AND MANAGEMENT

Lectures: 4 per week;
One paper: 100 marks. (3 Hrs.)

Objectives Of The Course: This course aims making Engineering students familiar with the concepts in Economics and Management. This familiarity will enable them to understand the industrial set-up, which is enhanced by the domain of Economics and Management.

Pre-requisites: NIL

DETAILED SYLLABUS

1. Nature and significance of economics, science, engineering, technology and their relationship with economic development, appropriate technology for developing countries.
2. Demand, supply, elasticity of demand and supply, Competition, monopoly, oligopoly, monopolistic competition, causes creating categories of monopoly organization, price determination under perfect competition and monopoly, Price discrimination, equilibrium of firm under competition and monopoly.

3. Functions of money, supply and demand for money, money price level and inflation, black money, meaning, magnitude and consequences.

4. Functions of commercial banks, multiple credit creation, banking system in India, shortcomings and improvement.

5. Central Banking: Function of central banking illustrated with reference to RBI, Monetary policy – meaning, objectives and features.

6. Sources of public revenue, principles of taxation, direct and indirect taxes, distribution of incidence, tax structure, reform of tax system.

7. Theory of International Trade, balance of trade and payment, theory of protection, tariffs and subsidies, foreign exchange control, Devaluation.

8. New Economic Policy: Liberalization, extending privatization, globalization, market-friendly state, export-led-growth.

9. Causes of underdevelopment, determinants of economic development, economic and non-economic factors, stages of growth, strategy of development—big push, balanced and unbalanced, critical minimum effort strategy.

10. Management functions, responsibilities of management to society,

development of management thought, contribution of F.W. Taylor, Henri Fayol, Elton Ma'o, System contingency approaches to management.

11. Nature of planning, decision-making process, management by objectives.

12. Organization: line and staff authority relationships, decentralization of delegation of authority, span of management, flat organization.

13. Communication process, media channels and barriers to effective communication

14. Maslow, Herzberg and Macgregor's theory of motivation. McClelland's achievement motivation, Blanchard's situational leadership theory.

15. Production management: Production planning and control, Inventory control, Quality control and Total quality management.

16. Project management : Project development like cycle, project feasibility, project planning, organization and control, Tools of project management – CPM, PERT. Project information systems.

17. Need for good cost accounting system, cost control techniques of financial control, financial statements, financial ratios, break-even analysis, budgeting and budgetary control.

18. Marketing functions, managements of sales and advertising, marketing research.

19. Human resource management: Function, Application of industrial psychology for selection, training, machine design and man-machine systems.

20. Engineering economics: Investment decision, present worth, Annual worth and rate of return methods. Payback time.

BOOKS

TEXT BOOKS

1. A. N. Agarwal, "Indian Economy".
2. Koonz and Odonnel, "Essentials of Management".
3. B. K. Chatterji, "Finance for Non-Finance Managers".
4. Prasanna Chandra, "Project Management".

References:

1. Samuelson, “Economics”.
2. Dewet and Warma, “Modern Economic Theory”.
3. V. S. Ramaswamy, “Marketing Management”.
4. Hampton David, “Management”.