B.E. COMPUTER ENGINEERING
THIRD YEAR SEMESTER V

SUBJECT: APPLIED MATHEMATICS

Lectures: 4 Hrs per week	Theory: 100 Marks

DETAILED SYLLABUS

1. **Random Variables:**
   Discrete and Continuous Random Variables. Probability Mass Function and Density Function. Probability Distribution for Random Variables, Expected Value, Variance, Moment and Moments Generating Function. Relation between Raw Moments and Central Moments.

2. **Bernoull's Trails:**
   Binomial, Poisson, and Normal Distributions for Detailed Study. Central Limit Theorem and Problems Based on this Theorem.

3. **Sampling Theory:**
   Sampling Distribution. Test of Hypothesis. Level of Significance Critical Region. One Tailed and Two Tailed Tests. Interval Estimation of Population Parameters. Large and Small Samples.
   Test of Significance for Large Samples: Test for Significance of the Difference between Sample Mean and Population Means; Test for Significance of the Difference between the Mean of Two Samples. Student's 't' Distribution and its Properties.
   Test of Significance of Small Samples: Test for Significance of the Difference between Sample Means and Population Mean; Test for Significance of the Difference between the Mean of Two Samples; Paired t-tests. Chi-square Distribution and its Properties. Test of the Goodness of Fit and Independence of Attributes Contingency Table Yate's Correction.

4. **Fitting Of Curves Least Square Method:**

   Fitting the Straight Line and Parabolic Trend. Bivariate Frequency Distribution Correlation, Co-variance Karl Pearson Coefficient and Spearman's Rank Co-relation Coefficient (non-repeated ranks and repeated ranks). Regression, coefficients and lines of regression.

5. **Mathematical Programming:**
   Linear Optimization Problem Formulation and Graphical Solution. Standard and Canonical Form. Basic Solution and feasible solution Primal Simplex Method.

6. **Artificial Variables:**

Big M Method (method of penalty). Dual Simplex Method. Duality.
Degeneracy. Alternative Optima. Unbounded Solution and Sensitivity
Analysis.

7. **Nonlinear Programming:**
Unconstrained Extremal Problems. Necessary and Sufficient Conditions for
Extrema.
Constrained Extremal Problems. Lagrange Multiplier and Kunh Tucker
Method.

BOOKS

Text Books:

1. S.C. Gupta and U.K. Kapur, "Fundamentals of Mathematical Statistics",
   Sultan Chand and sons New Delhi.
2. T.V. Veerrajan, "Probability Statistics and Random Processes", TMH.
3. Probability and Statistics, Schaum series.

References:

1. M.D.Taha, "Operation Research".
2. N.D. Vora, "Quantitative Techniques in Management", TMH.
3. J.K. Sharma, "Operation Research Theory and Application", Mackmillan.
4. S.S. Rao, "Operation Theory And Applications",

B.E. COMPUTER ENGINEERING
THIRD YEAR SEMESTER V

SUBJECT: COMPUTER NETWORKS

Lectures: 3 Hrs per week	**Theory: 100 Mar**
Practical: 2 Hrs per week	**Term work: 25 Mar**

Objectives of the course: This is first course in computer networks. Students should able to
identify networking layers properly. (For example where are the boundaries of system network
programmers and network application developers). Subject can be studied in different ways like to
down, bottom up, concept wise, programming wise. This subject reasonably creates base for
further studies of high performance networks, network design and analysis, Network system and
application programming.

Pre-requisites: Course in Data Structures and computer organization, C/C++.

DETAILED SYLLABUS

1. **Introduction:**

   Network Applications. Network Hardware. Network Software. Reference Models.

2. **The Physical Layer**

Guided Transmission Media. Wireless Transmission. Communication Satellites. The Public
Switched Telephone Network. The Mobile Telephone System. Cable Television.

3. **The Data Dink Layer:**

Data Link Layer Design Issues. Elementary Data Link Protocols. Sliding Window Protocols.
Example of Data Link Protocols: HDLC: High-Level Data Link Control, The Data Link Layer I
The Internet.

4. **The Medium Access Sub-layer:**

The Channel Allocation Problem. Multiple Access Protocols. Ethernet. Wireless LANS.
Broadband Wireless. Blue Tooth. Data Link Layer Switching.

5. **The Network Layer:**

Network Layer Design Issues. Routing Algorithms. Congestion Control Algorithms. Quality C
Service. Internetworking. The Network Layer In The Internet: The IP Protocol, IP Addresses
Internet Control Protocols, The Interior Gateway Routing Protocol: OSPF. The Exterior
Gateway Routing Protocol: BGP, Internet Multicasting, Mobile IP, Ipv6.

6. **The Transport Layer:**

The Transport Service. Elements Of Transport Protocols. A Simple Transport Protocol. The
Internet Transport Protocols: UDP;
TCP: Introduction To TCP, The TCP Service Model, The TCP Protocol The TCP Segment
Header, TCP Connection Establishment, TCP Connection Release, Modeling TCP
Connection Management, TCP Transmission Policy, TCP Congestion Control, TCP Timer
Management, Wireless TCP And UDP, Transactional TCP.
Performance Issues: Measuring Network Performance, System Design For Better
PERFORMANCE, FAST TPDU Processing, Protocols For Gigabit Networks.

7. **The Application Layer:**

DNS: The Domain name system; Electronic Mail; SNMP.

8. **ATM Network:**

ATM Layer. ATM Application Layer. ATM Signaling. PNNI Routing.

9. **Case study with Window2000/Linux**

TOPICS FOR EXPERIMENT
1. PC-to-PC file transfer using serial ports.
2. Network OS installation and configuration.
3. Networking Hardware and software components.
4. Network Routing.
5. Network Socket programming.
6. Shortest path routing.

7. Modem commands study.
8. Use network simulators like NS2, DLL simulators.
9. Implement multithreaded client- server application.
10. Assignment: prepare short note on any one advanced topic (not from above syllabus)

BOOKS

Text Books:
1. A.S.Tanenbaum, "Computer Networks", 4th edition, Prentice Hall.
2. B.F.Ferouzan, "Data and Computer Communication", Tata McGraw Hill

References:
1. Peterson & Davie," Computer Networks", 2nd Edition, Morgan Kaufmann.
2. Kurose, Ross, "Computer Networking", Addison Wesley
3. Leon-Garcia And Widjaja, "Communication Networks", Tata Mcgraw Hill
4. S.Keshay,"An Engg. Approach To Computer Networking", Addison Wesley.
5. W.Richard Stevens,"TCP/Ip Volume1, 2,3 ", Addison Wesley.
6. D.E.Comer, "Computer Networks And Internets", Prentice Hall
7. Warland, Varaiya, "High Performance Communication Networks", Morgan Kaufmann.
8. B.F.Ferouzan, "TCP/IP Protocol Suit", Tata McGraw Hill

TERM WORK

1. Term work should be based on above listed practical.
2. A term work test must be conducted with a weightage of 10 marks

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B.E. COMPUTER ENGINEERING
THIRD YEAR SEMESTER V

SUBJECT: THEORETICAL COMPUTER SCIENCE

Lectures: 3 Hrs per week	**Theory: 100 Mar**
Tutorials: 2 Hrs per week	**Term work: 25 Mar**

Objectives of the course: This course aims to build concepts regarding the fundamental principle
of grammars, automata theory and Turing machine.

DETAILED SYLLABUS

1. Regular Sets And Automata Theory:
   Regular Sets, Regular Grammars and Languages; Regular Expressions, Grammars a
   Languages, Pumping Lemma, Closure properties, Decision problems, Myhill-Nerode theorem
   Finite automata and Finite State Machines, NFA, DFA, FSM, Moore and Mealy Machine
   Converting NFA to DFA, Minimization of Automata and FSM, Kleene's Theorem.

2. Context Free Grammars And Push Down Automata:
   Context Free Grammars and Languages, Parse Trees, CNF and GNF, Pumping Lemm

Closure properties; Push Down Automata, Concept of Stack, PDA for CFG.

3. **Turing Machine:**
   Construction of Turing Machine for problem solving, TM as Acceptors and Generators, Variations and Equivalence of TM, TM Languages, Post Machine, Universal Turing Machine, Church's Hypothesis.

4. Undecidability:
   Undecidability and Halting problem, Rice's Theorem, Post Correspondence Problem; Unsolvable problems using TM, Unsolvable problems using CFG, Greibach Theorem; Enumerable and Recursively Enumerable Languages.

BOOKS

Text Books:

1. J.C. Martin, "Introduction To Languages and the Theory of Computation", TMH, 2003,3 Edition.
2. Peter Linz, "Introduction Formal Languages and Automata", Narosa.
3. Michael Sipser, "Introduction to the Theory of Computation", Thompson Learning, 1997.

References:
1. J.E.Hopcroft, J.D.Ullman, "Introduction To Automata Theory, Languages And Computation", Addison-Wesley.

TERM WORK

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

B.E. COMPUTER ENGINEERING
THIRD YEAR SEMESTER V

SUBJECT: MICROPROCESSORS	
Lectures: 4 Hrs per week **Practical: 2 Hrs per week**	**Theory: 100 Mar** **Term work: 25 Mar**

Objectives of the course: This course deals with the systematic study of the Architecture and programming issues of 8086/88-microprocessor family. The aim of this course is to give the students basic knowledge of the above microprocessor needed to develop the systems using it.

Pre-requisites: Digital Logic Design

DETAILED SYLLABUS

1. Introduction to Microcomputer Systems:
    **Introduction to Microprocessors & its evolution, Overview of 8086 Family, Case study of
    System**

2. **Architecture of 8086/88 Family:**
    Memory organization & Architecture of 8086 family, 8086 Hardware Design, System clock

    (8284) & reset signal, buffering & latching circuits, Minimum mode & Maximum mode

    Operation, Study of bus controller 8288 & its use in maximum mode Connection, System
    Timing diagrams for 8086.

3. **8086 Instruction Set & Programming:**
    Addressing modes, Instruction Set in detail, ALP, Mixed language programming, Stacks,
    Strings, Procedures, Macros, Timers, Counters & delay. Programming examples using DOS
    And BIOS Interrupts, Device Drivers Programming.

4. **8086 Interrupt System:**
    8086 Interrupt structure, types and applications: Study of   Programmable Interrupt Controller
    8259A & Interrupt Priority Management using 8259A,

5. **Memory System Design & I/O Interfacing:**
    Interfacing SRAM, ROM and DRAM to 8086, Address decoding   & Timing Considerations.
    I/O interfacing in 8086: Serial communication interface includes Synchronous & Asynchronou
    Protocols, parallel communication Interface includes I/O Mapped I/O, Memory Mapped I/O,
    Handshaking Signals.

6. I/O Controllers for 8086 and Data communication:
    Study of 8255AH Programmable Peripheral Interface & its modes; Study of 8250 UART, DMA
    Concepts & transfer types: Study of DMA controller 8237, Study of Programmable Timer
    8254 & its modes. Data communication includes EIA RS-232C Standard, IEEE 488 GPIB.

7. **8087 Numeric Co-processor:**
    8087 NDP Architecture, Data types & formats, Numeric Instruction Set, Stacks in 8087,
    Interface of Coprocessor (8087) to Host (8086), ALP for 8086-8087 systems; Study of IOP
    8089, its interaction with 8086.

8. Multiprocessor Systems**:**
8086/88 based Multiprocessor systems, Study of Multiprocessor configurations, Study of Bus
Arbiter 8289, Bus arbitration & control using 8289.

BOOKS

Text Books:

1. Douglas Hall, "Microprocessors and Interfacing, Programming and Hardware",
   Tata McGraw-Hill.1999, Second Edition.
2. John Uffenback, "8086/8088 Interfacing, Programming and Design", 1987,PHI.
3. Yu-Cheng Liu, Glenn A. Gibson, "The 8086/8088 Family Architecture, Programming and
   Design", PHI. 1986, Second Edition.
4. Peter Able, "IBM PC, Assembler Language Programming ", PHI.

References:
1. A. K. Ray, K. M. Bhurchandi, "Advanced Microprocessors and Peripherals", Tata McGraw Hill**,** 2000.
2. B. B. Brey, "The Intel Microprocessors", PHI, 2003, Sixth Edition.
3. Peter Norton, "IBM PC, Assembly Language programming", BPB publication.
4. Manuals from Intel.

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.

B.E. COMPUTER ENGINEERING
THIRD YEAR SEMESTER V

SUBJECT: COMPUTER PROGRAMMING LABORATORY

Practical: 3 Hrs per week **Tutorials: 2 Hrs per week**	**Term work: 25 Mar**

Objectives of the course: This course aims at giving students rigger for programming independent of any particular language and develop a strong problem solving skill.

Pre-requisites: One programming course, Course in Data Structures.

DETAILED SYLLABUS

1. Programming Assignments:
Students will implement programs adhering to good programming practices. Problems selected should be able to use the selected programming style and language appropriately. Suggested programming style is object-oriented programming and languages may be C++, java, VC++. The assignments should be approximately 10 in number and to be completed in about 5 weeks.

2. **Problem solving assignment:**
This will be a mini group project to be completed within the Institute in a span of about 10 weeks. Student group should select any one stream area like database programming, network programming, multimedia programming, system programming etc. and use the appropriate skill set to design and implement the mini project.

References:

 A.D.Smith and P.D. Smith , "Graded Problems in Computer science ",Addison-Wesley.

1. Term work should consist of at least 10 programs covering all the topics.
2. A mini project.

B.E. COMPUTER ENGINEERING
THIRD YEAR SEMESTER V

SUBJECT: PRINCIPLES OF DIGITAL COMMUNICATION

Lectures: 3 Hrs per week	**Theory: 100 Mar**
Practical: 2 Hrs per week	**Term work: 25 Mar**

Objectives of the course: Digital communication systems are becoming increasingly attractive because of the ever growing demand for data communication and because digital transmission offers data processing options and flexibilities not available with analog communication.

Pre-requisites: Principles Of Communication Engineering

DETAILED SYLLABUS

1. **Random Variables and Processes:**
    Probability, Mutually Exclusive Events, Joint Probability of Related and Independent Events. Random variables, Cumulative Distribution Function, Probability Density Function, Relation between Probability and Probability Density, Joint Cumulative Distribution and Probability Density. A Communication Example, Average value of Random Variable, Variance of Random Variables, The Gaussian Probability Density, The Error Function. Random Processes, Autocorrelation, Power Spectral Density of a sequence of random pulses, Power Spectral Density of digital data.

2. **Baseband Modulation and Demodulation:**
    Pulse Code Modulation, PCM Waveform Types, PCM Word Size, M-ary Pulse-Modulation Waveform, Correlative Coding; A Base Band Signal Receiver, Detection of binary signals in Gaussian Noise, Inter Symbol Interference, Equalization.

3. **Bandpass Modulation and Demodulation:**
    Binary Phase-Shift Keying, Differential Phase Shift Keying, Differentially Encoded PSK, QPSK M-ary PSK, Quadrature Amplitude Shift Keying(QASK), Binary Frequency Shift Keying, M-ary FSK, Minimum Shift keying (MSK). Error performance for Binary systems, Probability of Error for coherently detected BPSK, Probability of Error for coherently detected Differentially Encoded BPSK, Probability of Error for coherently detected Binary Orthogonal FSK, Probabili

of Error for non-coherently detected Binary Orthogonal FSK, Probability of Error for Binary Orthogonal DPSK. Symbol Error Performance for M-ary systems, Probability of Symbol Error for MPSK, Probability of Symbol Error for MFSK, Bit Error Probability Vs. Symbol Error Probability, Effects of Inter Symbol Interference.

4. **Communication Link Analysis:**
   The Channel: Concept of Free Space, Error Performance Degradation, Sources of Signal Loss and noise. Frequency representation of Noise, Spectral component of Noise, Superposition of Noise, Noise Bandwidth, Resister Noise, Multiple Resister Noise Source, Networks with Reactive Elements, Noise Temperature, Effective Input Noise Temperature, Antennas, Sky Noise Temperature.

5. **Information Theory:**
   Discrete Messages, The Concept of amount of Information, Average Information, Entropy, Information Rate, Coding to increase Average Information per bit, Shannon's Theorem, Capacity of Channel, Capacity of a Gaussian Channel, Bandwidth S/N Ratio tradeoff, Use of Orthogonal signals to attend Shannon's Limit, Efficiency of Orthogonal signal transmission.

6. **Channel Coding:**
   Wave form coding, Types of Error Control, Structured sequences, Linear Block Codes, Error Detection and Correcting capability, Cyclic Codes, Hamming Codes, Extended Goyal Code, BCH Codes, Convolution Encoding, Convolution Encoder Representation, Formulation of the Convolution Decoding Problem, Properties of Convolution Codes, Reed- Solomon Codes, Interleaving and Concatenation Codes, Coding and Interleaving applied to the Compact Disk and Digital Audio System, Turbo Codes.

7. **Source Coding:**
   Sources, Amplitude quantizing, Differential Pulse Code Modulation, Adaptive Prediction, Block Coding, Transform Coding, Source Coding for Digital data, Huffman Codes, Run Length Codes, Examples of Source Coding, Audio Compression, Image Compression.

8. **Encryption And Decryption:**
   Models, Goals and early chipper systems, The Secrecy of Chipper Text, Practical Security, Stream Encryption, Public Key Cryptosystems.

BOOKS

Text Books:
1. Taub and schilling, "Principles of Communication Systems", TMH, 1991, 2nd Edition.
2. Sklar, "Digital Communications", Pearson Education, 2001, 2nd Edition.

References:
1. Prokies, "Digital Communications", TMH.
2. Haykins, "Digital Communications", John Weily.

TERM WORK

3. Term work should consist of at least 10 practical experiments covering all the topics of t
   syllabus.
4. A term work test must be conducted with a weightage of 10 marks.

B.E. COMPUTER ENGINEERING
THIRD YEAR SEMESTER V

SUBJECT: PRESENTATION AND COMMUNICATION TECHNIQUES

Lectures: 2 Hrs per week	**Term work: 25 Mar**
Tutorials: 2 Hrs per week	**Oral Exam.: 25 Mar**

DETAILED SYLLABUS

1. COMMUNICATION IN A BUSINESS ORGANISATION

Internal (Upward, Downward, Horizontal, Grapevine, Problems, Solutions) External Communication, Strategies for conducting successful business meetings, documentation (notice, agenda, minutes of meetings, Introduction to modern communication techniques (for e.g. e-mail, internet, video conferencing etc), Legal & ethical issues in communication (intellectual property rights, patents

6 – 7 Lectur

2. ADVANCED TECHNICAL WRITING

REPORT – WRITING AND PRESENTATION: Definition and importance of repor Qualities of Reports, language and style in reports, type of reports, formats (lette memo, project – reports), methods of compiling data. A computer-aided presentation a project report based on technical, survey-based, reference based or campus relate topic. Topics to be assigned to a group of 8-10 students. The written report shou not exceed 20 printed pages.

9 – 10 Lectures

3. TECHNICAL PAPER-WRITING

4. WRITING PROPOSALS

5. INTERPERSONAL SKILLS

Introduction to emotional intelligence, Motivation, Negotiation and conflict-resolution, Assertiveness, Leadership, Term-building, Decision-making, Time-management

9-10 lectur

6. INTERVIEW TECHNIQUES

Preparing for job interviews, verbal and non-verbal communication during interviews. Observation sessions and role-play techniques may be used to demonstrate interview strategies.

1 – 2 lecture

7. GROUP DISCUSSION

Dynamics of Group Behavior, Techniques for effective participation.

1 – 2 lecture

BOOKS

Text Books:

1. Fred Luthans, 'Organizational Behavior' McGraw Hill International Edition
2. Lesiker and Petit 'Report writing For Business'   McGraw Hill International Edition
3. Huckin and Olsen   'Technical Writing and Professional Communication' - McGraw H International Edition
4. Wallace and Masters 'Personal Development for Life and Work' (workbook) Thomson Learnin
5. Herta Murphy   'Effective Business Communication' Hearta Murphy Herburtwhildebraudt McGraw Hill

References:
1. Lewicki, Saunders, Minton 'Essential of Negotiation'   McGraw Hill International Edition
2. Hartman Lemay   'Presentation Success'   Thomson learning.
3. Kitty O Locker & Kaczmark - 'Business Communication Building Critical Skills' McGraw Hi
4. **Vikas Gupta: Comdex Computer Course Kit, IDG Books Pvt. Ltd.**
5. Heller & Handle : The Essential Manager's Manual – Dorleen Kindercey
6. The Sunday Times 'Creating Success Series'
    1. Develop your Assertiveness
    2. Make every Minute Count
    3. Successful Presentation Skills
    4. How to motivate people
    5. Team building

TERM WORK

1. 2 assignments on Communication topics

2. 3 assignments on Report writing

3. 3 assignments on Interpersonal   Skills

4. 1 class test
Oral:
    Practical sessions on Group-discussion / Interview Skills / Project Presentation / Power point
    Presentation.

5. BREAK UP OF TERM WORK MARKS (External Exam)
     Assignment   15 marks

     Test   10 marks

     Total   25 marks

6. BREAK UP OF ORAL EXAMINATION (Internal Exam)
     Project Report Presentation   20 marks
      Group Discussion   5 marks
      Total   25 marks