### UNIVERSITY OF MUMBAI

#### B.E, COMPUTER ENGINEERING

**SCHEME OF INSTRUCTIONS AND EVALUATION (R-2001)**

**T.E. SEMESTER V**

<table>
<thead>
<tr>
<th>Subjects</th>
<th>Lect/ Week</th>
<th>Pract/ Week</th>
<th>Tuto/ Week</th>
<th>Paper Hours</th>
<th>T/W Marks</th>
<th>Pract</th>
<th>Oral</th>
<th>Total</th>
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<tbody>
<tr>
<td>1. Applied Mathematics V (IT)*</td>
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<td>3</td>
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<td>2. Digital Communication</td>
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<td>3. Theoretical Computer Science</td>
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<td>4. Microprocessors</td>
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<td>5. Computer Network</td>
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<td>6. Presentation and Communication Techniques $</td>
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<td>7. Computer Programming Laboratory *</td>
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|                | 19 | 9 | 5 | 500 | 150 | -- | 25 | 675 |
# Subject: Applied Mathematics

<table>
<thead>
<tr>
<th>Lectures: 4 Hrs per week</th>
<th>Theory: 100</th>
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<tbody>
<tr>
<td>Marks</td>
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## Detailed Syllabus

1. **Random Variables:**

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:**

5. **Mathematical Programming:**

6. **Artificial Variables:**

7. **Nonlinear Programming:**

**BOOKS**

**Text Books:**

**References:**
2. N.D. Vora, “Quantitative Techniques in Management”, TMH.

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**B.E. COMPUTER ENGINEERING**

**THIRD YEAR SEMESTER V**

**SUBJECT: COMPUTER NETWORKS**

**Lectures:** 3 Hrs per week  
**Practical:** 2 Hrs per week  
**Theory:** 100 Mar  
**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 top 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:**
2. The Physical Layer

3. The Data Link Layer:

4. The Medium Access Sub-layer:

5. The Network Layer:

6. The Transport Layer:

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

<table>
<thead>
<tr>
<th>TOPICS FOR EXPERIMENT</th>
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<tbody>
<tr>
<td>1. PC-to-PC file transfer using serial ports.</td>
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<tr>
<td>2. Network OS installation and configuration.</td>
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<tr>
<td>3. Networking Hardware and software components.</td>
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<tr>
<td>5. Network Socket programming.</td>
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</tbody>
</table>
7. Modem commands study.
8. Use network simulators like NS2, DLL simulators.
10. Assignment: prepare short note on any one advanced topic (not from above syllabus)

**BOOKS**

**Text Books:**

**References:**
2. Kurose, Ross, "Computer Networking", Addison Wesley
5. W.Richard Stevens,"TCP/IP Volume1, 2,3 “, Addison Wesley.

**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**

<table>
<thead>
<tr>
<th>Lectures: 3 Hrs per week</th>
<th>Theory: 100 Mar</th>
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<tr>
<td>Tutorials: 2 Hrs per week</td>
<td>Term work: 25 Mar</td>
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**Objectives of the course:** This course aims to build concepts regarding the fundamental principles of grammars, automata theory and Turing machine.

**DETAILED SYLLABUS**

1. **Regular Sets And Automata Theory:**
   - Regular Sets, Regular Grammars and Languages; Regular Expressions, Grammars and Languages, Pumping Lemma, Closure properties, Decision problems, Myhill-Nerode theorem.
   - Finite automata and Finite State Machines, NFA, DFA, FSM, Moore and Mealy Machines.
   - 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 Lemma.
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:**


**References:**


### 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.
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

3. 8086 Instruction Set & 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 & Asynchronous 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",
2. John Uffenback, "8086/8088 Interfacing, Programming and Design", 1987, PHI.
4. Peter Able, "IBM PC, Assembler Language Programming ", PHI.
References:
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

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.
TERM WORK
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
Practical: 2 Hrs per week
Theory: 100 Mar
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.

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:
4. **Communication Link Analysis:**

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:**

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**BOOKS**

**Text Books:**

**References:**
1. Prokies, “Digital Communications”, TMH.
<table>
<thead>
<tr>
<th><strong>TERM WORK</strong></th>
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<tbody>
<tr>
<td>3. Term work should consist of at least 10 practical experiments covering all the topics of the syllabus.</td>
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<tr>
<td>4. A term work test must be conducted with a weightage of 10 marks.</td>
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<th><strong>B.E. COMPUTER ENGINEERING</strong></th>
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<td><strong>THIRD YEAR SEMESTER V</strong></td>
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</table>
# SUBJECT: PRESENTATION AND COMMUNICATION TECHNIQUES

<table>
<thead>
<tr>
<th>Lectures: 2 Hrs per week</th>
<th>Term work: 25 Mar</th>
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<tbody>
<tr>
<td>Tutorials: 2 Hrs per week</td>
<td>Oral Exam.: 25 Mar</td>
</tr>
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## 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 (e.g. e-mail, internet, video conferencing)
- Legal & ethical issues in communication (intellectual property rights, patents)

### 2. ADVANCED TECHNICAL WRITING

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

### 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

### 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.

### 7. GROUP DISCUSSION

- Dynamics of Group Behavior, Techniques for effective participation.

## BOOKS

*Text Books:*
4. Wallace and Masters ‘Personal Development for Life and Work’ (workbook) Thomson Learning

References:
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