

SCHEME OF INSTRUCTIONS AND EXAMINATION (R-2007)  
UNIVERSITY OF MUMBAI

Second Year Semester IV

Scheme of Instructions

Scheme of Examinations

Subjects	Lect	Pract	Tuto	Theory Time	Marks	T/W Marks	Practical Marks	Oral Marks	Total Marks
Computational Mathematics	4	---	1*	3	100	25	---	---	125
Principles of Communication	4	2	---	3	100	25	---	---	125
Microprocessors & Microcontrollers	4	2	---	3	100	25	--	--	125
Internet Programming	2	4	---	3	100	25	25	25	175
Networking technology for digital devices	4	---	1	3	100	25	25	25	175
Financial accounting & Management of technology innovation	4	---	1	3	100	25	---	---	125
<b>TOTAL</b>	<b>22</b>	<b>10</b>	<b>2</b>	<b>---</b>	<b>600</b>	<b>150</b>	<b>50</b>	<b>50</b>	<b>850</b>

(\*Applied Mathematics III Tutorial be conducted class/division wise not batch wise)

## Sub :-Computational Mathematics

Class S.E (Information Technology)

Semester IV

Hours per	Lectures	:	04		
Week	Tutorial	:	--		
	Practical	:	02		
			Hours	Marks	
Evaluation	Theory		3	100	
System	Practical	:	-	--	
	Oral		-	--	
	Term work		-	25	

### 1. Numerical Methods :

Errors : Types and Estimation.

Solution to Transcendental and polynomial equations: Bisection method, Newton-Rap son method, Secant method

Numerical Integration: Trapezoidal Rule, Simpson 1/3 rd and 3/8 th rules.

Solution to system of linear algebraic equations, Gauss elimination method, Gauss-Jordan elimination method, Gauss- Siedel iteration method.

Interpolation : Linear interpolation, Higher order interpolation using Lagrange's & Newton's method, Finite difference operators and difference tables.

### 2 . Statistics:

Portability

Random variables: Discrete & Continuous random variables , Portability density Function, Portability destination of random variables, Expected value, variance, Moments & moment generating functions, Relation between Raw moments & Central moments.

Binomial, Poisson & Normal distributions for detailed study, Central limit theorem (statement only) & problems based on this theorem.

Fitting of curves: Least square method, fitting the straight line & parabolic curve, Correlation, Covariance, Kari Pearson's coefficient & Spearman's Rank Correlation coefficient, Regression coefficients & lines of regression.

3 . Sampling Theory : Sampling distribution, test of Hypotheses, Level of significance, Critical Region, One Tailed & two Tailed Test, Interval Estimation of Population Parameters, test of Significance for large Samples & Small Samples, Students 't' Distribution & its properties, Chi-Square Distribution & its properties, Test of the Goodness of Fit & Independence of Attributes, Contingency Table, Yates Correction

4. Mathematical Programming:

Linear optimization problem, Formulation & Graphical solution, Basic solution & feasible solution, Primal Simplex Method.

5. SCILAB Applications:

Programming of Numerical Methods.

Use of SCILAB for solving system of linear equations.

1. Attendance (Theory & Practical)	05 Marks
2. Laboratory work (Experiments & journal)	10 Marks
3. Test (at least one)	10 Marks

The financial certification and acceptance of TW ensures the satisfactory performance of laboratory Work and Minimum Passing in the term work.

## 2. Principles of Communication Engineering

CLASS S.E. (INFORMATION TECHNOLOGY)  
SEMESTER IV

HOURS PER	LECTURES	:	04
WEEK	TUTORIALS	:	--
	PRACTICALS	:	02

		HOURS	MARKS
EVALUTION SYSTEM	THEORY	3	100
	PRACTICAL	2	--
	ORAL	--	--
	TERM WORK	--	25

### 1. Basic Communication Systems:

- Basic block diagram of communication systems.
- Type of communication channels and their characteristics.
- Frequency / Spectrum allocation and their application areas.
- International standards for communication systems and frequency assignments.
- Wireless communication systems.
- Satellite communication systems.
- Optical fiber communication systems.

### 2. Spectrum and Noise:

- Fourier transforms properties, energy and power density spectrum and applications.
- Sources of noise-Active and passive device noise, Noise parameters like S/N ratio, Noise factor, Noise figure, Noise factor of cascaded network. Noise temperature and Noise bandwidth of system.

### 3. Amplitude Modulation Techniques:

- AM-FC spectrum, bandwidth, power calculation and block diagrams of Low level & High level modulator.(No circuit level description)
- AM-SC spectrum, bandwidth, waveforms, generation methods. Circuit of Balanced modulator and Ring Modulator
- SSB-SC spectrum, bandwidth, waveforms, generation methods like Filter method, Phase shift method and Third method.
- ISB with and without Pilot carrier.

#### 4. AM Receivers:

- a. AM detectors – diode detector, envelop detector and their limitations.
- b. TRF Receiver, Super heterodyne Receiver and Double Conversion Receiver(only Block Diagram approach)
- c. Receivers parameters – sensitivity, selectivity, fidelity, SINAD and types of distortion.
- d. Image frequency and its rejection and double spotting.
- e. Principles of AGC and types of AGC
- f. Product demodulator and Balanced demodulation of DSBSC.

#### 5. FM transmission and reception:

- a. Principles of FM – waveforms, spectrum, bandwidth.
- b. FM generation – Direct FM and Indirect FM.
- c. Principles of AFC.
- d. FM demodulation – Foster seely discriminator, Ratio detector and FM detection using PLL( only using Block diagram with waveforms)
- e. FM super heterodyne Receiver block diagram with waveforms.
- f. Pre emphasis and de emphasis in FM, FM noise triangle
- g. Comparison of AM and FM systems.

#### 6. Pulse Modulation Techniques:

- a. Sampling theorem for low pass signals with proof, anti aliasing filter.
- b. PAM, PWM and PPM techniques(only block diagram and waveforms).
- c. Source coding methods like PCM, DPCM, DM and ADM(only block diagram and waveforms).
- d. Companding in PCM, Companding laws.
- e. Basic Digital Transmission methods – ASK, FSK and PSK with block diagram and waveforms.

#### 7. Multiplexing Techniques:

- a. FDM and FDMA
- b. TDM and TDMA
- c. Standard FDM and TDM systems (only block diagram and waveforms).
- d. Applications in satellite communication, optical communication and wireless communication.

## List of Experiments:

- a. Frequency response of RF Class C Amplifier.
- b. AMFC generation and Demodulation.
- c. AMSC generation and Demodulation
- d. SSBSC generation and Demodulation
- e. FM generation and Demodulation
- f. FM demodulation using PLL.
- g. Sampling of Analog signals.
- h. Pulse Analog Modulation and Demodulation
- i. TDM system
- j. PCM coding and decoding
- k. Delta modulation and Demodulation
- l. ASK, FSK and PSK encoding and decoding

## Text Books:

1. communication systems engineering John G. Proakis, Masond Saleim(Pearson education)
2. digital and analog communication systems Leon.W. Couch, II edition
3. B. P. Lathi, Modern Digital and Analog Communication Systems, Third Edition, Oxford University press

## Term Work:

Term Work shall consist of at least 10 experiments and one written test. Distribution of marks for term work shall be as follows:

	Marks
1. Attendance(Theory and Practical)	05 Marks
2. Laboratory work(Experiments and Journal)	10 Marks
3. Test(at least one)	10 Marks

The final certification and acceptance of TW ensures the satisfactory Performance of laboratory Work and Minimum Passing in the term work.

# Microprocessors & Microcontrollers

CLASS S.E (INFORMATION TECHNOLOGY)  
SEMESTER IV

Semester IV

Hours per Week	Lectures	:	04		
	Tutorial	:	--		
	Practicals	:	02		
			Hours		Marks
Evaluation System	Theory		3		100
	Practical	:	-		--
	Oral		-		--
	Term work		-		25

## 1. Introduction to 8086 Microprocessor & Architecture

Introduction to Microprocessors, Architecture of 8086 family, 8086 Hardware Design, Minimum mode & Maximum mode of Operation. Study of bus controller 8288 & its use in Maximum mode. System Timing diagram.

## 2. 8086 Instruction set & Programming :

Addressing modes, Instruction Set, Assembly Language Programming, Mixed Language Programming, Programs based on Stacks, Strings, Procedures, Macros, Timers, Counters & delay

## 3. Introduction to 8051 Microcontrollers

Microprocessors vs microcontrollers, The 8051 microcontroller architecture, 8051 assembly language programming, jump, loop, and call instructions, i/o port Programming, 8051 addressing modes, arithmetic & logic instructions and Programs, 8051 programming in c

## 4. Hardware interfacing for Microcontrollers

8051 hardware connection and Intel hex file, 8051 timer programming in assembly and c, 8051 serial port programming in assembly and c, interrupts programming in assembly and c, icd and keyboard interfacing, adc, dac, and sensor interfacing, 8051 interfacing to external memory, 8051 interfacing with the 8255, DS12887 RTC interfacing and programming, motor control: relay, pwm, dc, and stepper motors

## 5. Introduction to PIC microcontrollers

Introduction to Microchip PIC family of Microcontrollers and development tools. CPU architecture and instruction set, Harvard Architecture and Pipelining. Program memory considerations, Register file structure and addressing modes, CPU Registers, Instruction set.

### Text Books

1. Microprocessors and Interfacing, Douglas V Hall, Tata Mc Gram Hill
2. The 8051 Microcontroller and Embedded systems By Muhammad Ali Mazidi, Pearson Education Asia LPE
3. 8051 Microcontroller programming and practice By Mike Predcko
4. Microchip Midrang Embedded Microcontrollers Handbook
5. Intel or Atmel MCS 51 family Microcontrollers data Sheets.
6. Design with PIC Microcontrollers By John B. Peatman, Pearson Education Asia LPE
  - a. The 8086/8088 Family, John Yffenbuck, Pearson Media,LPE
  - b. Kenneth Ayala. The 8051 Microcontroller Architecture, Programming and application, Penram International.
  - c. Rajkamal, Embbeded Systems, Tata McGraw Hill

### Term Work

Term Work shall consist of at least of 10 experiments /assignments and one written test. Distribution of marks for term work shall be as follows:

	Marks
1. Attendance (Theory and Tutorials)	05 Marks
2. Assignments	10 Marks
3. Test(at list one)	10 Marks

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### Experiments to be performed

At least 5 programs should be performed interfacing Microprocessor or Microcontroller with peripheral devices while 5 experiments of microprocessor and microcontrollers programming can be performed using assembler & simulator.



## 4. Internet Programming

CLASS S.E. (INFORMATION TECHNOLOGY)

SEMESTER IV

HOURS PER WEEK	LECTURES :	02		
	TUTORIALS :	--		
	PRACTICALS:	04		
		HOURS		MARKS
EVALUTION SYSTEM:	THEORY	03		100
	PRACTICAL	03		25
	ORAL	--		25
	TERM WORK	--		25

### Objectives of the course:

This course gives knowledge to create the web sites by using HTML, JAVA SCRIPT, CGI/ PERL, JAVA SERVLETS, ASP and JSP. This will be first step towards Web Technology and E-Commerce.

1. INTRODUCTION TO WEB: History, web system architecture URL, Domain Name System, overview of HTTP, HTTP request-response, generation of dynamic web pages, cookies.
2. MARKUP LANGUAGE HTML: Introduction, Basic HTML, Formatting and Fonts, Commenting Code, Anchors, Backgrounds, Images, Hyperlinks, Lists, Tables, Frames, simple HTML Forms, XHTML.
3. CASCADING STYLE SHEET (CSS): The need for CSS, Introduction to CSS, Basic syntax and structure, using CSS, manipulating text, padding, lists, Positioning using CSS.
4. JAVASCRIPT AND DHTML: What is JavaScript? How to develop JavaScript Simple JavaScript, variables, functions, condition, JavaScript and Objects, JavaScript's own Objects, the DOM and the Web browser Environment, forms and validation.
5. SERVER SIDE PROGRAMMING I: Introduction to Servlets in Java, Active Server Pages (ASP): Objects, Queries & Forms, Java Server Pages (JSP).

6. SERVER SIDE PROGRAMMING II: SESSION TRACKING: Introduction, Traditional session tracking techniques, the servlet / ASP session tracking API.
7. SERVER SIDE PROGRAMMING III: DATABASE CONNECTIVITY: Introduction, Relational database systems, JDBS perspectives, JDBC program example.
8. INTRODUCTION TO WEB EXTENSION: XML, Introduction XSL, XML transformed, XSL elements transforming with XSLT, XML with CSS, web feeds (RSS), Introduction to web services.

Text Book:

1. Ralph Moseley, Middlesex University, Developing Web Applications, Wiley publication.
2. Henry Chan, Raymond Lee, Tharam Dillon, E-Commerce Fundamentals and Applications, Wiley publications.
3. Craig D. Knuckles, David S. Yuen, Web Applications, Wiley publications.

REFERENCES:

1. Steven Holzner,"HTML Black Book" Dremtech press.
2. Tom Negrino and Dori smith," JAVA script for World Wide Web".

Term Work:

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3. Test(at least one)	10 Marks

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INFORMATION TECHNOLOGY  
SECOND YEAR SEMESTER IV

**Sub : Networking Technology for Digital Devices**

HOURS PER WEEK	LECTURES	:	04		
	TUTORIALS	:	--		
	PRACTICALS	:	02		
			HOURS	MARKS	
EVALUATION SYSTEM	THEORY		3	100	
	PRACTICAL		3	25	
	ORAL		--	25	
	TERM WORK		--	25	

### Distributed Computing

Fundamentals, what is Distributed Computing? Evolution of DCS, DC System Models, Advantages and Disadvantages of DCS, Comparison with centralized OS, Network concepts for distributed Computing: Data link layer protocol, Network Layer Protocol, Transport Layer Protocol, Application Layer Protocol, Protocol for Distributed Systems, ATM Technology, Message Passing, Inter Process Communication , Issues in IPC, Synchronization, Buffering, Multigram Messages, Encoding & Decoding of Message Data, Process Addressing, Failure Handling, Remote Procedure Calls, RPC Models, Transparency of RPC, Implementing RPC Mechanism, Stub Generation, RPC Messages Marshalling Arguments & Results, Server Management, Communication Protocol for RPC's, Client Server Binding, Introduction to CORBA, CORBA Overview, BOA & POA Generation, Lifecycle of a CORBA Invocation

#### (II) Management of Networks

Introduction, History of Network Developments, Network Hardware, Network Software, OSI Reference Model(7 Layer), TCP/IP Reference Model, Queuing-Markovian Process.

The Physical Layer. The Theoretical Basis for Data communication: Fourier Analysis, etc. Transmission Media, Narrowband ISDN, Modulation, Multiplexing, Packet Switching, Circuit switching. The Data Link Layer, Data Link Layer design issues, Error detection & correction, Elementary Data Link Protocols, X.25 Protocol, Sliding Window Protocols, Medium Access Sublayer, The Channel Allocation Problem, ALOHA, Carrier Sense Multiple Access Protocols, Ethernet, Token Bus & Token Ring (IEEE Standard 802 for LANs & MANs).

The Network Layer, Network Layer Design issues, Routing, Types of Routing, Shortest Path Routing, General Principles of Congestion control, Network Layer in The Internet, The IP Protocol , IP Addresses, Subnets, Internet Control Protocols, OSPF, BGP

The transport Layer, The TCP Service model, The TCP Protocol, The TCP Segment Header, TCP Connection Management, TCP Transmission Policy, TCP Congestion Control, Timer Management, The Application Layer, DNS, SNMP, SNMPv2

Network Management, Functions of Networks, Network Environments, Design Considerations, Performance, Monitoring, Fault Management, Maintenance, Security, Administration.

Recent Development in Network, Mobile Communication, Satellite Communication, Fiber optics as a Communication Media ATM, Types of Services in ATM, Hubs, Gateways, Bridges etc.

#### Text Book

1. Computer Networks, Andrew s. Tanenbaum, Pearson Education
2. Distributed Operating Systems, P. K. Sinha, IEEE Press
3. Youlu Zheng/ Shakil Akhtar, Networks for computer scientists, Oxford University Press
4. Distributed Operating Systems, Andrew S. Tanenbaum, Pearson Education
5. Stallings, "Data and Computer Communication", Pearson Education
6. Douglas E. Comer, "Computer Networks and Internets" 4<sup>TH</sup> ed, Pearson
7. Bertsekas and Gallager, "Data Networks" Pearson Education

#### Term Work

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Distribution of Marks for term work shall be as follows:

Marks	
1. Attendance (Theory and Practical)	05 Marks
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3. Test (at least one)	10 Marks

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#### List of Experiments

1. program for client-server socket
2. program on Remote procedure call
3. Program for creating UDP Client/Server and use it
4. program for Error detection & correction
5. program for finding shortest path using Dijkstra's Algorithm
6. Implementation of Bellman ford algorithm
7. Case study on SNMP
8. Report (case study) CORBA technology
9. Implementation of Diffie-Hellman & RSA algorithm.
10. Report on any advanced protocol.

# Financial Accounting & Management of Technology innovation

## CLASS S.E (INFORMATION TECHNOLOGY) SEMESTER IV

HOURS PER	LECTURES	:	04
WEEK	TUTORIALS	:	01
	PRACTICALS	:	--

		HOURS	MARKS
EVALUATION	THEORY	3	100
SYSTEM:	PRACTICAL	--	--
	ORAL	--	--
	TERM WORK	--	25

### Part I

#### Introduction to accounting

Nature of accounting, financial accounting and management accounting, users account, types of accounts, accounting context

#### Financial accounting techniques

Introduction to financial accounting , language accounting , double entry Book keeping, Profit and loss account , Balance Sheet, Preparing financial statements, partnership and limited companies, cash flow statement.

#### Accounting for Business Transactions

Voucher system, balancing an account, trial balance

#### Fixed Assets and Depreciation

Acquisition cost of fixed assets, revaluation of assets, deletion cost, and depreciation expenses, depreciation methods, selection of depreciation methods

#### Inventory Valuation

Objective of inventory management, controlling inventories, costing inventories

#### Regulatory and conceptual frame works

Measurement Systems, Annual reports, creative accounting, International accounting

#### Management accounting practices

Introduction to management accounting, relation with financial accounting, costing, cost accounting, activity based costing, Budgeting as a planning and control measure, short term costing, Management accounting, strategic management accounting

## Part II

Innovation /wealth creation process, three critical trajectories impacting the innovation process creative transformations, the importance of technological Innovation, The impact of technological innovation on society

Industry dynamics of technological innovation-transcending creativity into innovation, innovation as a collaborative effort

Type and patterns of innovation –Technology S curves, formulation of technological innovation strategy, choosing innovative projects, collaborative strategies, implementing technological innovation strategies, Managing new product development

The role of technology in the creation of wealth, historical perspective, long-wave cycle, evolution of production technology, technology and national economy

Management of technology, the conceptual frame work, technology and society, knowledge and technology, technology and business

## Textbook

1. Michael Jones, Accounting for Non –Specialists, Wiley India
2. Paresh Shah, Basic financial Accounting, xford University press
3. Melissa A. Schilling, strategic management of technological Innovation, New York University, McGraw-Hill
4. Tarek M. Khalil, Management of technology, Mcgraw Hill

## Term Work:

Term Work shall consist of at least of 10 experiments /assignments and one written test. Distribution of marks for term work shall be as follows:

	Marks
4. Attendance (Theory and Tutorials)	05 Marks
5. Assignments	10 Marks
6. Test(at list one)	10 Marks

The final certification and acceptance of TW ensures the satisfactory performance of laboratory work and Minimum passing in the term work.