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

Second Year Semester III

Scheme of Instructions   Scheme of Examinations

Sr. No.	Subjects	Lect	Pract	Tuto	Theory Time	Marks	T/W Marks	Practical Marks	Oral Marks	Total Marks
1	Applied Mathematics III	4	---	1*	3	100	25	---	---	125
2	Data Structure & Algorithms	4	2	---	3	100	25	50	---	175
3	Electronic Devices & Circuits	4	2	---	3	100	25	--	25	150
4	Digital Logic Design & Application	4	2	---	3	100	25	--	25	150
5	GUI & Database Management	4	2	--	3	100	25	50	25	200
6	Communication & Presentation Techniques	2	---	2	--	--	50	---	---	50
	TOTAL	22	8	3	--	500	175	100	75	850

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

SUB: APPLIED MATGEMATICS III

CLASS S.E. (INFORMATION TECHNOLOGY)
SEMESTER III

Hours per	Lectures	:	04	
Week	Tutorial	:	01	
	Practical	:	--	
			Hours	Marks
Evaluation	Theory		3	100
System :	Practical		-	--
	Oral		-	--
	Term work		-	25

1. **Complex variables :**

   - Functions of complex variables: Continuity and derivability of a function, Analytic functions, Necessary condition for $f(z)$ to be analytic, sufficient conditions(without proof); Cauchy-Riemann equations in polar form, Harmonic functions, Orthogonal trajectories; Analytical and Milne-Thomson method to find $f(z)$ from its real or imaginary parts.
   - Complex Integration, Taylor's and Laurent's series (without proof), Cauchy's residue theorem (statement & application)

2. **Fourier Series:**

   - Orthogonal and Orthogonal functions, Sine and cosine function and their orthogonal properties, Expression for a function in a series of orthogonal functions
   - Fourier series, Dirichlet's conditions, Fourier series of periodic function, Even and Odd functions, Half range sine and cosine series, Parseval's relations.

3. **Laplace Transform :**

   - Laplace Transform of constant, trigonometric, exponential functions, shifting properties, Expressions (with proofs)for i) $L\{t^n f(t)\}$ ii)$L\{f(t)/t\}$ iii) $L\{\int f(u)du\}$ iv) Heaviside unit step functions, Dirac delta functions and their Laplace transforms, Laplace transform of periodic function.
   - Evaluation of inverse Laplace transforms, Partial fraction method, Convolution theorem.
   - Application of solve initial and boundary value problems involving ordinary differential equation with one dependent variable.

4. **Matrices:**

   - Types of matrices, Ad joint of a matrix, Elementary transformations of a matrics, Inverse of matrics using Elementary transformations, Reduction to normal form, rank using normal form Systems of homogeneous and non homogeneous equations, their consistency and solution.

5. **Scilab**

   - Introduction to Scilab: Mathematical Functions, Tools, Arrays & their applications

➢ QUESTIONS ON SCILAB SHOULD NOT BE ASKED IN UNIVERSITY (THEORY) EXAMINATION

TEXT BOOKS:
1. P.N.Wartikar and J. N.Wartikar, "Elements of Applied Mathematics" Volume 1 &2, A.V. Griha Pune
2. S,S.Shastri, "Engineering Mathematics" Vol-2, PHI, 2nd Edition, 1994.
3. Churchil, "Complex Variable",McGraw hill, Tokyo.

REFERENCES:

1. Shantinarayan, "Matrices", S.Chand Publications House, Delhi
2. Shantinarayan, "Theory function of Complex Variable", S.Chand Publications House, Delhi
3. Schaum's Outline Series, McGraw Hill, "Laplace Transforms"
4. T.Veerarajan."Engineering Mathematics",TMH
5. Dr.B.S.Grawal, "Higher Engineering Mathematics", Khanna Publications
6. Erwin Kreyszing, "Advanced Engineering Mathematics", Khanna Publications, Wiley India, 8th Edition..

Books on SCILAB

1) Engineering and scientific computing with SCILAB
By Claude Gomaz
ISBN 978-0-8176-4009-5
A Birkhauser Book
Also available at Kindly Edition
Amazon.com
2) Modeling and Simulation in SCILAB / SCICOS
By Stephen Campbell, Jean-Philippe Chancelier and Ramine Nikoukhah
3) SCILAB- Ahands on introduction
By satish Annigeni
E-book downloadable from www.lulu.com /items /volume-34/419000

TERM WORK

	Marks
1. Attendance (Theory and Practical)	05
2. Assignments & practical using MATLAB / SCILAB	10
3. Text (at least one)	10

The final certification and acceptance of TW ensures the satisfactory performance of Term Work and Minimum Passing in the TW.

Sub: Data Structure and Algorithms

CLASS S.E.(INFORMATION TECHNOLOGY)
SEMESTER III

Hours per	Lectures	:	04		
Week	Tutorial	:	--		
	Practical	:	02		
				Hours	Marks
Evaluation		Theory		3	100
System	:	Practical		3	50
		Oral		-	--
		Term work		-	25

1. **Revisiting Java programming construct**

   Classes types, and objects, Methods, Expressions, Control flow, Arrays, input and output, Packages, Utilities in the java. Lang package

2. **Object Oriented Design & Analysis of Algorithms**

   Inheritance and polymorphism, Exceptions, Interfaces, Abstract Classes, and Casting, Recursion and Other Design patterns, Pseudo-Code, Simple justification Techniques

   Measures algorithmic complexity, Space complexity, Time complexity, Some mathematics needed in measuring complexity, The big O-notation used in measuring complexity

3. **Stacks, Queues, and Recursion**

   Recursion, Stacks, Queues, Linked Lists, Double-ended Queues

4. **Vectors, List, and Sequences**

   Vectors and Array Lists, Lists Sequences, Favorite lists and the move-to Front Heuristic

5. **Trees**

   The tree Abstract Data Type, basic Algorithms on Tree, binary Tree, data Structures for representing Tree

6. **Priority queues**

   The priority queues Abstract data Type, Implementing a Priority queues with a List, Heaps, Adaptable priority queues

7. **Maps and dictionaries**

   The map Abstract data type, Hahs Tables, The dictionary data Type, Skip Lists, Extensions and Applications for dictionaries

8. **Search Trees**

   Binary Search Trees, AVL Trees, Splay Trees, (2,4) Trees, Red-Black Trees, External searching in B-Trees

9. **Sorting Sets, and Selection**

Merge Sort and radix Sort, and A Lower Bound on comparison-based Sorting

BUCKET Sort and radix Sort, the complexity of some sorting algorithms, comparison of Sorting Algorithms, The Set ADT and union / file Structures

10. **Text Processing**

   String operations, Pattering Matching Algorithms, Tries, Text comparison , Text similarity Testing

11. **Graphs**

   The graph Abstract Data Type, Data Structures for Graphs, Graph Traversals
   Directed Graphs, Weighted Graphs, Shortest Paths, Minimum spanning Trees

   Text Book

   1. Micheal Goodrict, Roberto Tamassia,(2007) Data Structure and Algorithm in Java 3RD Edition Wiley India
   2. Langsam Data Structutre using JAVA, Pearson Education
   3. Jhon R.HubbardSchaum's outline of data structures with JAVA McGraw Hill
   4. Hubbard, Data Structure with JAVA, Pearson Education

   Reference book

   - Adam Drozdek (2001) Data Structures and Algorithms in JAVA, 1ST Edition, Singapore: Thomson Asia Pte Ltd (ISBN 0534-37668-1)
   - Nell Dta, Daniel T. Joyce, Chip Weems (2004) Object Oriented Dta Structures Using JAVA, 1ST Edition, New Delhi: Narosa Publising House
   - Kunth, Donald E.(1973). The Art of Computer Programming, Volume 1/Fundamental Algoritn=ms, 3RD Edition, Addison-Wesley.

   Term Work:
   Term Work shall consist of at least 20 debugged programs and one written test.
   Distribution of marks for term work shall be as follows:

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

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

Sub: Electronic Devices and Circuits

CLASS S.E. (INFORMATION TECHNOLOGY)
SEMESTER III

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

Objective of the course: The course intends to provide an overview of the principles, operation and application of the analog building blocks for performing various functions. This first course relies on elementary treatment and qualitative analysis and makes use of simple models and equation to illustrative the concepts involved. Detailed knowledge of the device structure and imperfection are not to be considered.

1. **Introduction to BJT amplifiers:**

    * Principle of operation of BJT, DC biasing, Fixed Bias, Collector to Base Bias, Voltage Divider Bias circuits
    * Small signal operation and analysis of CE, CB, CC amplifier configuration,
    * SPICE simulation example of amplifier

2. **Differential Amplifiers:**

    * Types of differential amplifier, Differential amplifier with swamping resistors, DC analysis
    * AC analysis, Differential gain, common mode gain, CMRR
    * Constant current bias, current mirror circuits.
    * SPICE simulation example of differential; amplifier

3. **Operational Amplifiers and its general linear applications**:

    * Block diagram representation, Ideal Op-amp, Equivalent circuit, Open loop configuration, Transfer characteristics. Op-amp with negative feedback, Frequency response. Popular Op-amp IC 741 specifications and performance characteristics.
    * Basic op-amp applications : Adder, Scalar, Sub tractor, Differentiator, Instrumentation amplifier using 2 and 3 op-amp stages.
    * SPICE simulation of Op-amp.

4. **Active Filters and Oscillators**:

    * First order low pass Butterworth filter, Second order low pass Butterworth filter, First order high pass Butterworth filter, Second order high pass Butterworth filter, Band pass filter, Band reject filter, All pass filter
    * Oscillator: principle, Phase shift oscillator, Wine bridge oscillator, Quadrature oscillator, amplitude stabilization in oscillators.

- SPICE simulation of Filters and Oscillators.

5. Signal generators and wave shaping circuits:

- Op-amp used as basic comparator, Zero crossing detector, Schmitt trigger comparator and transfer characteristics.
- Precision rectifier circuits, Peak detector, clamping circuit.
- Square wave generators, Triangular wave generator, Saw tooth wave generators
- Astable multivibrator, Monostable multivibrator
- Data converter: Analog to digital converter and Digital to analog converter principles, D-A converter with binary weighted resistors, D-A converter with R-2R Ladders. Successive approximation A-D converter
- SPICE simulation examples.

6. Specialized IC applications

- Timer IC 555 and its use as monostable and astable multivibrator, Specifications and performance characteristics.
- Voltage regulator IC 723 and its use as variable voltage regulator, Specifications and performance characteristics.

Text Books:

1. Ramakant A. Gayakwad, "OP-Amps and Linear Integrated Circuits", Peason Education
2. D. Roy Choudhary and Shail Jain, "Linear Integrated Circuits", New Age International Publishers.
3. Sundaram Natarajan, 'Microelectronics Analysis and Design' Tata McGraw-Hill Publishing Company Limited
4. Adeln S. Sedra and Kennrth C. Smith, 'Microelectronic Circuits' Fifth Edition Oxford University Press
5. David Bell "Electronic Devices and Circuits", Oxford University Press

References:

1. Jacob Millman, Christos C Halkias, Satyabrata JIT, "Millman's Electronic Devices and Circuits", McGraw Hill International Edition.
2. S. Salivahanan, N Suresh Kumar, A Vallavaraj, "Electronic devices and circuits",Tata McGraw-Hill

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
2. Laboratory work (Experiments and Journal)	10
3. Test (at least one)	10

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

Sub: Digital Logic Design and Applications

CLASS S.E. (INFORMATION TECHNOLOGY)
SEMESTER III

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

A basic course in digital electronic logic circuitry. This course will introduce the students to digital logic circuits. Basic logic elements such as AND, OR, NAND
And NOR gates will be introduced and characterized. Combinational and Sequential logic circuits will be designed and analyzed in the lab Implementation of digital circuits with the help of MSI, LSI and VLSI technology is covered.

1. Number Systems: Decimal, Binary, Octal and Hexadecimal number system and conversion, Binary weighted codes and inter-conversion, Binary arithmetic including 1's Compliment and 2's Compliment, Error detection and correction codes

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2. Boolean Algebra and Combinational Logic: Boolean Algebra Theorems, Realization of switching functions using logic gates, canonical logic forms, sum of product & product of sums, Karnaugh maps, Simplification of expressions, Variable Entered Maps, Quine-Mc-Cluskey minimization techniques, Mixed logic combinational circuits and multiple output functions.

3. Analysis and Design of Combinational Logic: Introduction to combinational circuit, Decoder, Encoder, Priority, encoder, Multiplexers as function generators, Binary adder, Subtracter, BCD adder, Binary comparator, Arithmetic and logic units.

4. Sequential Logic : Sequential circuits, Flip-flop, Clocked and edge triggered flip-flops, Timing specifications, Asynchronous and synchronous counters, Counter design with state equations, Registrars, Bidirectional Shift registers

5. .Programmable Logic Devices: PLAs, PALs, CPLD, fpga Architectures, Finite state machines-Mealy and Moore design, Introduction to VHDL, Examples of system design applications like Washing machine, Candy Vending machine, traffic lights

6. CAD Tools: Introduction to Computer Aided Synthesis and Optimization, Circuit models, Synthesis, Optimization, Computer Aided Simulation, Verification, Testing, and Design for Testability

RECCOMENDED BOOKS

1. Raj Kamal."Digital Systems Principle and Design", Pearson Education
2. Balbaniam, Carison,"Digital Logic Design Principles"Wiley Publications
3. Morris Mano, "Digital Design", Thired Edition, Pearson edition
4. R p Jain "Morden Digital Electronis", McGraw Hill
5. D.P. Leach, A.P.Malvino "Digital Principles and Applications", TMH.
6. Tocci, Digital systems: Principles and applications, Pearson
7. J. Bhasker Yalamanchili, "A VHDL Primer", Thired Edition.
8. Sudhakar Yalamachili, "Introductory VHDL" John M. Yarbrough, Pearson ED.

TERM WORK

1. Term work should consist of at least 10 practical experiments.
2. A minimum of 4 experiments should be performed on VHDL and other stimulation Packages such as Tinapro, Multisim, Spice etc.

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

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Suggested Experiments

1. Study of basic logic gates on IC's
2. 2's compliment subtraction using IC's 7483
3. Study of ALU IC 74181 (Active high and Active low)
4. 4 bit magnitude comparator using 7485
5. Study of flip flops using IC 74746.
6. Mod-100 counter using IC 7490 and IC 7493
7. Study of bidirectional shift register IC 74194/7495
8. Basic logic gates on VHDL and implementation on CPLD /FPGA
9. Design of BCD adder on any simulation package
10. Implementation of Combinational circuits on VHDL
11. Implementation of Sequential circuits on VHDL
12. Study of basic system design e.g. Traffic light control

Sub: GUI AND DATABASE MANAGEMENT

CLASS S.E. (INFORMATION TECHNOLOGY)
SEMESTER III

Hours per	Lectures	:	04		
Week	Tutorial	:	--		
	Practical	:	02		
				Hours	Marks
Evaluation	Theory			3	100
System :	Practical			3	50
	Oral			-	25
	Term work			-	25

1. Data base concepts and Systems

Introduction – Purpose of Database Systems, Views of data, Data Models, Database language, Transaction Management, Storage Management, Database Administrator, Database Users, Overall System Structure, Different types of Database Systems.

2. E-R Model
Basic concepts, Design Issues, Mapping Constraints, Keys, E-R Diagram, Weak Entity set, Extended E-R features, Design of an E-R Database Schema, Reduction of an E-R Schema to Tables

3. Relational Model

Structure of Relational Database, The Relational Algebra, Views SQL-Background, Basic Structure, SET operations, Aggregate functions, Null Values, Nested Sub queries, Derived Relations, Views, Modification of Database, joined Relations, DDl, Other SOL features.

4. Transaction

Transaction Concepts, State, Implementations of Atomicity and durability, Concurrent Executions, Seriability, Recoverability, Transaction Definition in SQL.

5. Concurrency Control Lock based protocol, Timestamp based protocol, Validation based protocol, Deadlock Handling, Insert and Delete operations, Concurrency in index structure.

6. Recovery system

Failure classification, Recovery and Atomicity, Log based recovery, Shadow paging.

7. Murphy's Law of GUI Design, Features of GUI, Icons and graphics, Identifing visual cues, clear communication, color selection, GUI standard, planning GUI Design Work.

8. Visual programming

Sharing data and code

Working with Projects, Introduction to Basic language, Using inbuilt controls and ActiveX controls, creating and using classes, Introduction to Collections, Using and creating ActiveX Compliments, dynamic data exchange, object linking and embedding

Creating visual software entities

Working with text, graphics, working with files, file management, serial communication, multimedia control interfaces.

Programming for the Internet
Using ActiveX controls on the web-the internet transfer control for HTTP, FTP

Database programming

Data base basics, Visual Basic's database tools, Database designing and programming. DAO, RDO, ODBC, ADO, OLE DB, Relational databases, the Data Objects Models, form and fields validation, Client Server Programming, COM-DCOM

Text Book

1. An Introduction to Database System, C.J. Pearson Education
2. Database System and concepts, Henry F. Korth, Sliberschatz, Sudarshan, McGraw Hill
3. GUI Design for dummies,IDG books.
4. Visual Basic 2005, How to program (3RD Edition) Deitel & Deitel, Pearson Education
5. Microsoft SQL Server 2000 Bible, Wiley
6. BATER, MS SQL SERVER 2005 EXPRESS IN 24 HOURS, Pearson Education

Reference:
1. Beginning SQL Server 2000 for Visual Basic Developers Willis theraron Shroff publishers and distributors
2. Fundamental of Database Systems, Elmasri & Navathe Pearson Education.
3. Database Management Systems Mujumdar / A.K. Bhatacharya, Tata Mc. Graw Hill.

Term Work:

Term work shall consist of one mini project using Microsoft Visual Basic as Front End and Microsoft SQL Server as Backend. For e.g.

1. Library Management System
2. Income Tax Calculation System
3. Payroll System
4. Merit List Management System
5. Inventory Management System
6. Inventory Management System

The software shall have following attributes

a. Multiple forms and MDI form
b. Menus, pull down menu and pop up menu
c. Database connectivity using command objects and connection objects
d. One list box populated by program code

Distribution of marks for term work shall be as follows:

	Marks
1. Attendance (Theory and Practical)	05
2. Assignments & practical using SCILAB	10
3. Test (at least one)	10

The final certification and acceptance of TW ensures the satisfactory performance of Term Work and Minimum Passing in the TW.

Sub: Communication & Presentation skills

CLASS S.E. (INFORMATION TECHNOLOGY)
SEMESTER III

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

1. Communication in a business organization:

Internal & external communication, Types of meetings, strategies for conducting successful business meetings, documentation (notice, agenda, minutes, resolution) of meeting, Introduction to modern communication techniques.

(E-mail, internet, video-conferencing, etc) Legal and ethical issues in communication (Intellectual property rights: patents, TRIPS, Geographical indications).

2. Advanced technical writing:

Report writing: Definition and importance of reports, qualities of reports, language & Style in reports, types of reports, formats (letter, memo, project-reports). Methods of compiling data for preparing report.

A computer-aided presentation of a technical project report based on survey-based or reference based topic. The topics are to be assigned to a group of 8-10 students. The written report should not exceed 20 printed pages.

Technical paper-writing, writing business proposals.

3. Interpersonal skills:

Introduction to emotional intelligence, motivation, Negotiation and conflict resolution, Assertiveness, team-building, decision-making, time-management, persuasion

4. Presentation skills:

Elements of an effective presentation, Structure of a presentation, Presentation tools, Audience analysis, Language: Articulation, Good pronunciation, Voice quality, Modulation, Accent and Intonation.

5. Career skills:

Preparing resumes and cover letters. Types of Resumes, Interview techniques: Preparing for job interviews, facing an interview, verbal and non-verbal communication during interviews, observation sessions and role- play techniques to be used to demonstrate interview strategies (mock interviews).

6. Group discussion:

Group discussions as part of selection process. Structure of group discussion. Dynamic of group behavior, techniques for effective participation, Term work and use of body language.

Term work: Part-I (25 Marks): Assignments;

2 assignments on communication topics
3 assignments on report-writing
3 assignments on interpersonal skills
2 assignments on career skills
At least one class test (written)

Distribution of term work marks will be as follows:

Assignments: 10 marks

Written test: 10 marks

Attendance (Theory & Practical) : 05

Term work: Part-II (25 Marks): Presentation;

Distribution of term work marks will be as follows:

Project report presentation: 15 marks

Group discussion: 10 marks

The final certification and acceptance of term-work ensures the satisfactory Performance of laboratory Work and minimum passing in the term-work.

Books recommended:

1. Fred Luthans: Organization behavior, McGraw Hill
2. Lesikar and Petit, Report writing for business, Tata McGraw Hill
3. Huckin & Olsen, Technical writing and professional communication, McGraw Hill
4. Wallace & Masters, Personal development for Life & work, Thomson Learning.
5. Heta Murphy, Effective Business Communication, McGraw Hill
6. Raman and Sharma, Report writing.