FACULTY OF ENGINEERING

Scheme of Instruction & Examination

(AICTE Model Curriculum for the Academic Year 2019-2020)

and

Syllabi

B.E. III and IV Semester

of

Four Year DegreeProgramme

in

Information Technology

(With effect from the academic year 2019– 2020)

Issued by

Dean, Faculty of Engineering

Osmania University, Hyderabad – 500 007

2020

SCHEME OF INSTRUCTION & EXAMINATION
B.E. (Information Technology) III – SEMESTER

S. No.	Course Code	Course Title	Scheme of Instruction				Scheme of Examination			Credits
			L	T	P/D	Contact Hrs/Wk	CIE	SEE	Duration in Hrs	
Theory Courses										
1	MC111PO	Yoga/Sports/NSS	2	-	-	2	30	70	3	-
2	HS201EG	Effective Technical Communication in English	3	-	-	3	30	70	3	3
3	HS202CM	Finance and Accounting	3	-	-	3	30	70	3	3
4	BS205MT	Mathematics III	3	-	-	3	30	70	3	3
5	ES214EC	Basic Electronics	3	-	-	3	30	70	3	3
6	ES216EC	Digital Electronics	3	-	-	3	30	70	3	3
6	PC221IT	Data Structures	3	-	-	3	30	70	3	3
7	PC222IT	Mathematical Foundations of Information Technology	3	-	-	3	30	70	3	3
Practical/ Laboratory Courses										
8	ES251EC	Basic Electronics Lab	-	-	2	2	25	50	3	1
9	PC252IT	Data Structures Lab	-	-	2	2	25	50	3	1
10	PC253IT	IT Workshop Lab	-	-	2	2	25	50	3	1
			23	**-**	**06**	**29**	**285**	**640**		**24**

Course Code	Course Title						Core/Elective
MC111PO	**Indian Constitution**						**Mandatory**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	**2**	**-**	**-**	**-**	**30**	**70**	**-**

Course Objectives

- To create awareness among students about the IndianConstitution.
- To acquaint the working conditions of union, state, local levels, their powers andfunctions.
- To create consciousness in the students on democratic values and principles articulated in the constitution.
- To expose the students on the relations between federal and provincialunits.
- To divulge the students about the statutoryinstitutions.

Course Outcomes

After completing this course, the student will

1. Know the background of the present constitution ofIndia.
2. Understand the working of the union, state and locallevels.
3. Gain consciousness on the fundamental rights andduties.
4. Be able to understand the functioning and distribution of financial resources between the centre and states.
5. Be exposed to the reality of hierarchical Indian social structure and the ways the grievances of the deprived sections can be addressed to raise human dignity in a democraticway.

UNIT-I

Evolution of the Indian Constitution: 1909 Act, 1919 Act and 1935 Act. Constituent Assembly: Composition and Functions; Fundamental features of the Indian Constitution.

UNIT-II

Union Government: Executive-President, Prime Minister, Council of Minister
State Government: Executive: Governor, Chief Minister, Council of Minister
Local Government: Panchayat Raj Institutions, Urban Government

UNIT-III

Rights and Duties: Fundamental Rights, Directive principles, Fundamental Duties

UNIT-IV

Relation between Federal and Provincial units: Union-State relations, Administrative, legislative and Financial, Inter State council, NITI Ayog, Finance Commission of India

UNIT-V

Statutory Institutions: Elections-Election Commission of India, National Human Rights Commission, National Commission for Women

Suggested Readings:

1. Abhay Prasad Singh & Krishna Murari, Constitutional Government and Democracy in India, Pearson Education, New Delhi,2019
2. D.D. Basu, Introduction to the constitution of India, Lexis Nexis, NewDelhi
3. Subhash Kashyap, Our Parliament, National Book Trust, NewDelhi

4. Peu Ghosh, Indian Government &Politics, Prentice Hall of India, NewDelhi
5. B.Z. Fadia& Kuldeep Fadia, Indian Government &Politics, Lexis Nexis, NewDelhi

Course Code	Course Title						Core/Elective
HS201EG	**Effective Technical Communication in English**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	**3**	**-**	**-**	**-**	**30**	**70**	**3**

Course Objectives

To expose the students to:

- Features of technicalcommunication
- Types of professionalcorrespondence
- Techniques of reportwriting
- Basics of manualwriting
- Aspects of data transfer andpresentations.

Course Outcomes

On successful completion of the course, the students would be able to:

1. Handle technical communicationeffectively
2. Use different types of professionalcorrespondence
3. Use various techniques of reportwriting
4. Acquire adequate skills of manualwriting
5. Enhance their skills of information transfer andpresentations

UNIT I

Definition and Features of Technical communication: Definition and features of technical communication (precision, relevance, format, style, use of visual aids), Differences between general writing and technical writing, Types of technical communication (oral and written)

UNIT II

Technical Writing-I (Official correspondence): Emails, IOM, Business letters, Business proposals.

UNIT III

Technical writing-II (Reports): Project report, Feasibility report, Progress report, Evaluation report.

UNIT IV

Technical writing- III (Manuals): Types of manuals, User manual, Product manual, Operations manual.

UNIT V

Information Transfer and Presentations: Non-verbal (bar diagram, flow chart, pie chart, tree diagram) to verbal (writing), Verbal (written) to non-verbal, Important aspects of oral and visual presentations.

Suggested readings:

1. Raman, Meenakshi & Sharma, Sangeeta. (2015). *Technical communication: Principles andPractice,* 3rd Edition, New Delhi.
2. Rizvi, Ashraf, M. (2017). *Effective Technical Communication* (2nd ed.). New Delhi, Tata McGraw HillEducation.
3. Sharma, R. C., & Mohan, Krishna. (2017). *Business Correspondence and Report Writing: A Practical Approach to Business & Technical Communication* (4th ed.). New Delhi, Tata McGraw HillEducation.

4. Tyagi, Kavita &Misra, Padma. (2011). *Advanced Technical Communication*. New Delhi, PHI Learning.
5. Jungk, Dale. (2004). *Applied Writing for Technicians*. New York, McGraw-Hill HigherEducation.

Course Code	Course Title						Core/Elective
HS202CM	**Finance and Accounting**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	**3**	**-**	**-**	**-**	**30**	**70**	**3**

Course Objectives

The course will introduce the students

- To provide basic understanding of Financial and Accounting aspects of a businessunit
- To provide understanding of the accounting aspects ofbusiness
- To provide understanding of financialstatements
- To provide the understanding of financialsystem
- To provide inputs necessary to evaluate the viability ofprojects
- To provide the skills necessary to analyse the financialstatements

Course Outcomes

After successful completion of the course the students will be able to

1. Evaluate the financial performance of the businessunit.
2. Take decisions on selection ofprojects.
3. Take decisions on procurement offinances.
4. Analyse the liquidity, solvency and profitability of the businessunit.
5. Evaluate the overall financial functioning of anenterprise.

UNIT-I

Basics of Accounting: Financial Accounting–Definition- Accounting Cycle – Journal - Ledger and Trial Balance-Cash Book-Bank Reconciliation Statement (including Problems)

UNIT-II

Final Accounts: Trading Account-Concept of Gross Profit- Profit and Loss Account-Concept of Net Profit-Balance Sheet (including problems with minor adjustments)

UNIT-III

Financial System and Markets: Financial System-Components-Role-Considerations of the investors and issuers- Role of Financial Intermediaries. Financial Markets-Players- Regulators and instruments - Money Markets Credit Market- Capital Market (Basics only)

UNIT-IV

Basics of Capital Budgeting techniques: Time Value of money- Compounding- Discounting- Future Value of single and multiple flows- Present Value of single and multiple Flows- Present Value of annuities-Financial Appraisal of Projects– Payback Period, ARR- NPV, Benefit Cost Ratio, IRR (simple ratios).

UNIT-V

Financial statement Analysis: Financial Statement Analysis- Importance-Users-Ratio Analysis-liquidity, solvency, turnover and profitability ratios.

Suggested Readings:

1. Satyanarayana. S.V. and Satish. D., Finance and Accounting for Engineering, PearsonEducation
2. Rajasekharan, Financial Accounting, PearsonEducation
3. Sharma. S.K. and Rachan Sareen, Financial Management, SultanChand

4. Jonathan Berk, Fundamentals of Corporate Finance, PearsonEducation
5. Sharan, Fundamentals of Financial Management, PearsonEducation

Course Code	Course Title						Core/Elective
BS205MT	**Mathematics – III**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	**3**	**-**	**-**	**-**	**30**	**70**	**3**

Course Objectives

- To introduce the solution methodologies for second order Partial Differential Equations with applications inengineering
- To provide an overview of probability and statistics toengineers

Course Outcomes

After completing this course, the student will be able to:

1. Solve field problems in engineering involvingPDEs.
2. Theycanalsoformulateandsolveproblemsinvolvingrandomvariablesandapplystatistical methods for analysing experimentaldata.

UNIT - I

Definition of Partial Differential Equations, First order partial differential equations, solutions of first order linear PDEs; Solution to homogenous and non-homogenous linear partial differential equations of second order by complimentary function and particular integral method.

UNIT - II

Second-order linear equations and their classification, Initial and boundary conditions, D'Alembert's solution of the wave equation; Heat diffusion and vibration problems, Separation of variables method to simple problems in Cartesian coordinates. The Laplacian in plane, one dimensional diffusion equation and its solution by separation of variables.

UNIT - III

Discrete random variables, expectation of discrete random variables, moments, variance of a sum, continuous random variables & their properties, distribution- functions, anddensities.

UNIT - IV

Basic Statistics, Measures of Central tendency: Moments, skewness and Kurtosis – Probability distributions: Binomial, Poisson and Normal - evaluation of statistical parameters for these three distributions, Correlation and regression – Rank correlation. Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas and more general curves.

UNIT - V

Test of significance; Large sample test for single proportion, difference of properties, Tests for single mean, difference of means, and difference of standard deviations. Test for ratio of variances – Chi- square test for goodness of fit and independence of attributes.

Suggested Readings:

1. B.S. Grewal, "Higher Engineering Mathematics", Khanna Publishers,2000.
2. Advanced Engineering Mathematics, R.K. Jain & Iyengar, NarosaPublications.
3. Engineering Mathematics, P. Sivaramakrishna Das & C. Vijaya Kumar, Pearson India Education Services Pvt.Ltd.
4. N.P. Bali and M. Goyal, "A text book of Engineering Mathematics", Laxmi Publications,2010.

5. E. Kreyszig, "Advanced Engineering Mathematics", John Wiley & Sons,2006.
6. P. G. Hoel, S. C. Port and C. J. Stone, "Introduction to Probability Theory", Universal Book Stall, 2003.
7. S. Ross, "A First Course in Probability", Pearson Education India,2002.
8. W. Feller, "An Introduction to Probability Theory and its Applications", Vol. 1, Wiley,1968.
9. T. Veerarajan, "Engineering Mathematics", Tata McGraw-Hill, New Delhi,2010.
10. Mathematical Statistics, S.C. Gupta & V.K. Kapoor, S. ChandPub.

Course Code	Course Title						Core/Elective
ES214EC	**Basic Electronics**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	**3**	**-**	**-**	**-**	**30**	**70**	**3**

Course Objectives

The objectives of this course is to impart knowledge of

- To understand the characteristics of diodes and transistorconfigurations
- To understand the design concepts of biasing of BJT andFET
- To understand the design concepts of feedback amplifiers andoscillators
- To study the design concepts of OP Amp and dataconverters

Course Outcomes

After completing this course, the student will be able to:

1. Study and analyse the rectifiers and regulatorcircuits.
2. Study and analyse the performance of BJTs, FETs on the basis of their operation andworking.
3. Ability to analyse& design oscillatorcircuits.
4. Ability to analyse different logic gates & multi-vibratorcircuits.
5. Ability to analyse different data acquisitionsystems

UNIT-I

PN Junction Diode: Characteristics, Half wave rectifier, Full wave rectifier, filters, ripple, regulation, TIF and efficiency, Zener diode and Zener diode regulators. CRT construction and CRO applications

UNIT-II

Transistors: BJT construction and working, modes of operation, configurations of BJT (CB, CE, CC), small signal h-parameter model of CE, CE amplifier analysis. Construction and working of JFET, V-I characteristics of JFET.

UNIT-III

Feedback concepts: Types of negative feedback – modification of gain, bandwidth, input and output impedances, applications.

Oscillators: RC Phase shift, Wein bridge, LC and crystal Oscillators (Qualitative treatment only).

UNIT-IV

Operational Amplifier: OP-AMP Block diagram, Ideal OP-AMP, DC and AC Characteristics, Inverting and Non-Inverting Amplifiers, Adder/Subtractor, Integrator,Differentiator.

Logic gate circuits - Introduction to Digital systems- AND, NAND, NOR, XOR gates, Binary half adder, full adder.

UNIT-V

Data Acquisition Systems: Construction and Operation of transducers- Strain guage LVDT, Thermocouple, Instrumentation systems.

Data Converters: R-2R Ladder DAC, Successive approximation and Flash ADC.

Suggested Readings:

1. Robert Boylestad L. and Louis Nashelsky, *Electronic Devices and Circuit Theory*, PHI,2007

2. HelfrickDandDavidCooper,*ModernElectronicInstrumentationandMeasurementsTechniques,* 1st edition, Prentice Hall of India, 2006.

3. Salivahanan, Suresh Kumar and Vallavaraj, *Electronic Devices and Circuits,* 2nd edition, Tata McGraw-Hill,2010.

Course Code	Course Title						Core/Elective
ES216EC	**Digital Electronics**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	**3**	**-**	**-**	**-**	**30**	**70**	**3**

Course Objectives

- To learn the principles of digital hardware and support given by it to thesoftware.
- To explain the operation and design of combinational and arithmetic logiccircuits.
- To design hardware for real worldproblems.

Course Outcomes

At the end of this course the students will be able to

1. Understand the deign process of digital hardware, use Boolean algebra to minimize the logical expressions and optimize the implementation of logicalfunctions.
2. Understand the number representation and design combinational circuits like adders, MUXetc.
3. Design Combinational circuits using PLDS and write VHDL code for basic gates and combinationalcircuits.
4. Analyse sequential circuits using flip-flops and design registers,counters.
5. Represent a sequential circuit using Finite State machine and apply state minimization techniques to design aFSM

UNIT – I

Design Concepts: Digital Hardware, Design process, Design of digital hardware. Introduction to logic circuits – Variables and functions, Logic gates and networks. Boolean algebra, Synthesis using gates, Design examples. Optimized implementation of logic functions using K-Map and Quine-McCluskey Tabular method

UNIT – II

Number representation: Addition and Subtraction of signed and unsigned numbers.

Combinational circuit building blocks: Half adder, Full adder, Multiplexers. Decoders. Encoders. Code converters, BCD to 7-segment converter, Arithmetic comparator circuits.

UNIT – III

Design of combinational circuits using Programmable Logic Devices (PLDs): General structure of a Programmable Array Logic (PAL), Programmable Logic Arrays(PLAs), Structure of CPLDs and FPGAs, 2-input and 3-input lookup tables (LUTs)

Introduction to Verilog HDL: Verilog code for basic logic gates, adders, decoders

UNIT – IV

Sequential Circuits: Basic Latch, Gated SR Latch, gated D Latch, Master-Slave edge triggered flip-flops, T Flip-flop, JK Flip-flop, Excitation tables. Registers, Counters, Verilog code for flip-flops

UNIT – V

Synchronous Sequential Circuits: Basic Design Steps, Finite State machine(FSM) representation using Moore and Mealy state models, State minimization, Design of FSM for Sequence Generation and Detection, Algorithmic State Machine charts.

Suggested Readings:

1. Moris Mano and Michael D CIletti, Digital Design, Pearson, fourthedition,2008
2. ZviKohavi, Switching and Finite Automata Theory, 3rd ed., Cambridge University Press-New Delhi, 2011.
3. R. P Jain, Modern Digital Electronics,4th ed., McGraw Hill Education (India) Private Limited,2003
4. Ronald J.Tocci, Neal S. Widmer &Gregory L.Moss, "Digital Systems: Principles and Applications," PHI, 10/e,2009.
5. Samir Palnitkar, "Verilog HDL A Guide to Digital Design and Synthesis," 2nd Edition, Pearson Education,2006.

Course Code	Course Title						Core/Elective
PC221IT	**Data Structures**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	**3**	**-**	**-**	**-**	**30**	**70**	**3**

Course Objectives

- To develop proficiency in the specification, representation, and implementation of abstract data types and datastructures.
- To discuss the linear and non-linear data structures and theirapplications.
- To introduce the creation, insertion and deletion operations on binary search trees and balanced binary search trees.
- To introduce various internal sorting, searching techniques and their timecomplexities

Course Outcomes

After completing this course, the student will be able to:

1. Implement linear, non-linear data structures and balanced binarytrees
2. Understand the basic data structures arrays and linkedlists.
3. Analyse time complexity of both iterative and recursivefunctions.
4. Define ADT necessary for solving problems based on Stacks andQueues.
5. Develop solutions using binary trees, advanced search trees, tries andgraphs.
6. Use hash functions and handlecollisions.
7. Understand various kinds of sorting techniques and apply appropriate techniques for solving a given problem.

UNIT-I

Introduction to C++ and Algorithms: Object oriented Design, Data Abstraction and Encapsulation, Basics of C++: Program organization in C++, Input/output in C++, Classes and Constructors, Access Modifiers, Dynamic Memory Allocation in C++, Templates in C++, Exception Handling.

Algorithms: Introduction, Algorithm Specifications, Recursive Algorithms, Performance Analysis of an algorithm- Time and Space Complexity, Asymptotic Notations.

UNIT-II

Arrays: Abstract Data Types and the C++ Class, Array as an Abstract Data Type, Polynomial Abstract Data Type, Sparse Matrices, Representation of Arrays, String Abstract Data Type.

Stacks and Queues: Templates in C++, Stack Abstract Data Type, Queue Abstract Data type, Sub typing and Inheritance in C++, Evaluation ofExpressions.

UNIT-III

Linked Lists: Singly Linked Lists and Chains, Representing Chains in C++, Template Class Chain, Circular Lists, Available Space Lists, Linked Stacks and Queues, Polynomials, Doubly Linked Lists.

Hashing: Static Hashing, Hash Tables, Hash Functions, Overflow Handling, Theoretical Evaluation of Overflow Techniques

UNIT-IV

Trees: Introduction, Binary Trees, Binary Tree Traversal and Tree Iterators, Copying Binary Trees, Threaded Binary Trees, Heaps, Efficient Binary Search Trees: AVLTrees.

UNIT-V

Sorting and Searching: Insertion sort, Quick sort, Best computing time for Sorting, Merge sort, Heap sort, shell sort, Sorting on Several Keys, List and Table Sorts, Summary of Internal Sorting, Linear and Binary Search algorithms

Graphs: Graph Abstract Data Type, Elementary Graph operations (DFS and BFS), Minimum Cost Spanning Trees (Prim's and Kruskal's Algorithms).

Suggested readings:

1. Ellis Horowitz, Dinesh Mehta, S. Sahani. Fundamentals of Data Structures in C++, Universities Press.2007.
2. Data Structures with C++ by John R. Hubbard (Schaum's Outlines Series)2001
3. Mark Allen Weiss, Data Structures and Algorithm Analysis in C++, Pearson Education2006.
4. Michael T. Goodrich, Roberto Tamassia, David Mount, Data Structures and Algorithms in C++, Wiley India Pvt. Ltd,2004.

Course Code	Course Title						Core/Elective
PC222IT	**Mathematical Foundations of Information Technology**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	**3**	**-**	**-**	**-**	**30**	**70**	**3**

Course Objectives

- To explain with examples, the basic terminology of functions, relations, andsets.
- To perform the operations associated with sets, functions, andrelations.
- To relate practical examples to the appropriate set, function, or relation model, and interpret the associated operations and terminology incontext.
- To describe the importance and limitations of predicatelogic.
- To relate the ideas of mathematical induction to recursion and recursively definedstructures.
- To use Graph Theory for solvingproblems.

Course Outcomes

After completing this course, the student will be able to:

1. Illustrate by examples the basic terminology of functions, relations, and sets and demonstrate knowledge of their associatedoperations.
2. Understand basics of counting, apply permutations and combinations to handle different types ofobjects.
3. Describe and use recursively-defined relationships to solve problems using generatingfunctions.
4. Analyse semi group, monoid group and abelian group with suitable examples and appreciate group theory applications in computerarithmetic.
5. Demonstrate in practical applications the use of basic counting principles of permutations, combinations, inclusion/exclusion principle and the pigeonholemethodology.
6. Represent and Apply Graph theory in solving computer scienceproblems

UNIT-I

Mathematical Logic: Statements and notations, Connectives, Well-formed formulas, Truth Tables, tautology, equivalence implication, Normal forms, Quantifiers, universal quantifiers. Predicates: Predicative logic, Free & Bound variables, Rules of inference, Consistency, proof of contradiction, Automatic Theorem Proving.

UNIT-II

Relations: Properties of Binary Relations, equivalence, transitive closure, compatibility and partial ordering relations, Lattices, Hasse diagram. Functions: Inverse Function Composition of functions, recursive Functions, Lattice and its Properties, Algebraic structures: Algebraic systems Examples and general properties, Semi groups and monads, groups sub groups' homomorphism, Isomorphism.

UNIT-III

Elementary Combinatorics: Basis of counting, Combinations & Permutations, with repetitions, Constrained repetitions, Binomial Coefficients, Binomial Multinomial theorems, the principles of Inclusion – Exclusion. Pigeon hole principles and itsapplication.

UNIT-IV

Recurrence Relation: Generating Functions, Function of Sequences Calculating Coefficient of generating function, Recurrence relations, Solving recurrence relation by substitution and Generating funds. Characteristics solution of in homogeneous Recurrence Relation.

UNIT-V

Graph Theory: Representation of Graph, DFS, BFS, Spanning Trees, planar Graphs. Graph Theory and Applications, Basic Concepts Isomorphism and Sub graphs, Multi graphs and Euler circuits, Hamiltonian graphs, Chromatic Numbers.

Suggested Readings:

1. Elements of Discrete Mathematics- A Computer Oriented Approach- C L Liu, D P Mohapatra. Third Edition, Tata McGrawHill.
2. Discrete Mathematics for Computer Scientists & Mathematicians, J.L. Mott, A. Kandel, T.P. Baker, PHI.
3. Discrete Mathematics and its Applications, Kenneth H. Rosen, Fifth Edition.TMH.
4. Discrete Mathematical Structures Theory and Application-Malik & Sen,Cengage.
5. Discrete Mathematics with Applications, Thomas Koshy,Elsevier
6. Logic and Discrete Mathematics, Grass Man & Trembley, PearsonEducation

Course Code	Course Title						Core/Elective
ES251EC	**Basic Electronics Lab**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	**-**	**-**	**-**	**2**	**25**	**50**	**1**

Course Objectives

- To understand the characteristics of diodes and transistorconfigurations
- To understand the design concepts of biasing of BJT andFET
- To understand the design concepts of feedback amplifiers andoscillators
- To study the design concepts of OP Amp and dataconverters

Course Outcomes

After completing this course, the student will be able to:

1. Ability to design diode circuits & understand the application of Zenerdiode.
2. Ability to analyse characteristics of BJTs &FETs.
3. Ability to understand the different oscillatorcircuits.
4. Ability to understand operation of HWR & FWR circuits with & withoutfilters.
5. Ability tom design Analog-to-Digital converters & Digital-to-Analogconverters.

List of Experiments:

1. CRO-Applications, Measurements of R, L and C using LCR meter, Colour code method and solderingpractice.
2. Characteristics of Semiconductors diode (Ge, Si andZener)
3. Static Characteristics of BJT-CommonEmitter
4. Static Characteristics of BJT-CommonBase
5. Static Characteristics ofFET
6. RC-Phase ShiftOscillator
7. Hartley and ColpittsOscillators
8. Common EmitterAmplifier
9. AstableMultivibrator
10. Full-wave rectifier with and without filters usingBJT
11. Operational AmplifierApplications
12. Strain GaugeMeasurement
13. Analog-to-Digital and Digital to AnalogConverters

SuggestedReading:

1. MaheshwariandAnand,*LaboratoryExperimentsandPSPICESimulationsinAnalogElectronics,* 1st edition, Prentice Hall of India, 2006.
2. David Bell A., *Laboratory Manual for Electronic Devices and Circuits,* Prentice Hall of India,2001.

Course Code	Course Title						Core/Elective
PC252IT	**Data Structures Lab**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	**-**	**-**	**-**	**2**	**25**	**50**	**1**

Course Objectives

- To develop skills to design and analyse simple linear and nonlinear data structures, such as stacks, queues and lists and theirapplications.
- To gain programming skills to implement sorting and searchingalgorithms.
- To Strengthen the ability to identify and apply the suitable data structures for the given real world problem
- To Gain knowledge in practical applications of datastructures

Course Outcomes

After completing this course, the student will be able to:

1. Implement various data structures using arrays, linkedlists.
2. Develop ADT necessary for solving problems based on Stacks andQueues.
3. Implement binary trees, general tree structures, advanced search trees, heaps,graphs.
4. Implement hash functions and handlecollisions.
5. Implement various kinds of sorting techniques and apply appropriate techniques for solving a given problem.

List of Programs:

1. Write a C++ program for the implementation of ArrayADT
2. Write a C++ program for the implementation of StringADT
3. Write a C++ program to implement the following usingarray
   a) StackADT b) QueueADT
4. Write a C++ program to implement the following using a single linkedlist
   a) StackADT b) QueueADT
5. Write a C++ program for evaluation of Infix to postfix conversion, evaluation of postfixexpression.
6. Write a C++ program to implement polynomial arithmetic using linkedlist.
7. Write a C++ program to perform followingoperations:
   a) Insert an element into a binary searchtree
   b) Delete an element from a binary searchtree
   c) Search for a key element in a binary searchtree
8. Write a C++ program to implement all the functions of a dictionary(ADT) usinghashing
9. Write C++ program for the implementation of tree traversals on BinaryTrees
10. Write C++ program to perform followingoperations
    a) Insertion intoB-tree b) Deletion into B-tree
11. Write C++ program to perform followingoperations
    a) Insertion intoAVLtree b) Deletion into AVLtree
12. Write C++ program for the implementation of bfs and dfs for a givenGraph
13. Write C++ program to implement Kruskal's algorithm to generate a minimum spanningtree.
14. Write C++ program to implement Prim's algorithm to generate a minimum spanningtree
15. Write C++ program to implement searchingalgorithms.
16. Write C++ program for implementing the following sortingmethods
    a) Selection sort b) Quick sort c) shell sort d) Merge sort e) Heapsort

Course Code	Course Title						Core/Elective
PC253IT	**IT Workshop Lab**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	**-**	**-**	**-**	**2**	**25**	**50**	**1**

Course Objectives

- To learn programming of python with a focus of basicstructure.
- To gain programming skills of python using function and OOPconcept.
- To gain practical knowledge of MATLAB toolkit along with operations in matrices and plotting 2D graph.

Course Outcomes

After completing this course, the student will be able to:

1. Implement basic syntax inpython.
2. Analyse and implement different kinds of OOP concept in real worldproblems.
3. Implement MATLAB operations and graphicfunctions.

List of Programming Exercises:

1. Python Variables, Executing Python from the Command Line, Editing Python Files, Python ReservedWords.
2. Comments, Strings and Numeric Data Types, Simple Input andOutput.
3. Control Flow and Syntax, Indenting, if Statement, Relational Operators, Logical Operators, Bit Wise Operators, while Loop, break and continue, for Loop, Lists, Tuples, Sets,Dictionaries.
4. Functions: Passing parameters to a Function, Variable Number of Arguments, Scope, Passing Functions to a Function, Mapping Functions in a Dictionary, Lambda, Modules, StandardModules.
5. OOP concepts: Classes, File Organization, Special Methods, Inheritance, Polymorphism, Special Characters, Character Classes, Quantifiers, Dot Character, Greedy Matches, Matching at Beginning or End, Match Objects, Compiling RegularExpressions.
6. MATLAB Menus, Toolbars, Computing with MATLAB, Script Files and the Editor/Debugger, MATLAB helpSystem.
7. MATLAB controls: Relational Logical Variables. Conditional Statements: if – else – elseif, switch2 10. Loops: for – while – break, continue. User-Defined Functions.
8. Arrays, Matrices and Matrix Operations Debugging MATLAB Programs. Working with Data Files, and Graphing Functions: XY Plots –Sub-plots.

Suggested Readings:

1. Mark Summerfield," Programming inPython
2. A Complete introduction to the Python Language", Addison-Wesley Professional,2009.
3. Martin C. Brown," PYTHON: The Complete Reference", McGraw-Hill,2001.
4. W.J. Palm III, Introduction to MATLAB 7 for Engineers, McGraw-Hill International Edition,2005.
5. Wesley J Chun," Core Python Applications Programming", Prentice Hall,2012.
6. Allen B Downey," Think Python", O'Reilly,2012.
7. Stormy Attaway, "MATLAB: A Practical Introduction to Programming and Problem Solving".3rd Edition.

SCHEME OF INSTRUCTION & EXAMINATION
B.E. (Information Technology) IV – SEMESTER

S. No.	Course Code	Course Title	Scheme of Instruction				Scheme of Examination			Credits
			L	T	P/D	Contact Hrs/Wk	CIE	SEE	Duration in Hrs	
Theory Courses										
1	MC112CE	Environmental Sciences	2	-	-	2	30	70	3	-
2	HS204ME	Operations Research	3	-	-	3	30	70	3	3
3	BS206BZ	Biology for Engineers	3	-	-	3	30	70	3	3
4	ES215EC	Signals and Systems	3	-	-	3	30	70	3	3
5	PC231IT	JAVA Programming	3	-	-	3	30	70	3	3
6	PC232IT	Database Systems	3	-	-	3	30	70	3	3
7	PC233IT	Computer Organization and Microprocessor	3	-	-	3	30	70	3	3
8	PC234IT	Data Communications	3	-	-	3	30	70	3	3
Practical/ Laboratory Courses										
9	PC261IT	Microprocessor Lab	-	-	2	2	25	50	3	1
10	PC262IT	JAVA Programming Lab	-	-	2	2	25	50	3	1
11	PC263IT	Database Systems Lab	-	-	2	2	25	50	3	1
			23	**-**	**06**	**29**	**315**	**710**		**24**

Course Code	Course Title						Core/Elective
MC112CE	**Environmental Science**						**Mandatory**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	**2**	**-**	**-**	**-**	**30**	**70**	**-**

Course Objectives

- To create awareness and impart basic knowledge about the environment and its alliedproblems.
- To know the functions ofecosystems.
- To understand importance of biologicaldiversity.
- To study different pollutions and their impact onenvironment.
- To know social and environment related issues and their preventivemeasures.

Course Outcomes

After completing this course, the student will be able to:

1. Adopt environmental ethics to attain sustainabledevelopment.
2. Develop an attitude of concern for theenvironment.
3. Conservation of natural resources and biologicaldiversity.
4. Creating awareness of Green technologies for nation'ssecurity.
5. Imparts awareness for environmental laws andregulations.

UNIT-I

The Multidisciplinary Nature of Environmental Studies: Definition, scope and importance, need for public awareness.

Natural Resources: Water Resources – Use and over utilization of surface and ground water, flood, drought, conflicts over water, Dams: Benefits and Problems. Food Resources –World Food Problems, effects of modern agriculture, fertilizer-pesticides problems, water logging, salinity, Forest Resources –Use and over exploitation, deforestation & its effect on tribal people. Land Resources –Land Degradation, environmental effect of mining, man induced landslides, soil erosion and desertification**.** Energy Resources –Growing energy needs, Renewable and Non-renewable energyresources.

UNIT-II

Ecosystems: Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers, Energy flow in ecosystem, food chains, ecological pyramids, ecological succession, types of ecosystems (marine, pond, river, forest, grassland, desert)

UNIT-III

Biodiversity: Levels of Biodiversity, Bio-geographical classification of India, Value of biodiversity, Threats to biodiversity, endangered and endemic species of India, Conservation of biodiversity, global and national efforts.

UNIT-IV

Environmental Pollution: Definition, Causes, effects and control measures of air pollution, water pollution, soil pollution, noise pollution, thermal pollution, solid waste management.

Environment Protection Act: Air, water, forest and wildlife Acts, issues in the enforcement of environmental legislation.

UNIT-V

Social Issues and the Environment: Watershed management and environmental ethics. Climate change, global warming, acid rain, ozone layer depletion.

Environmental Disaster Management: Types of disasters, impact of disasters on environment, infrastructure, and development. Basic principles of disaster mitigation, disaster management, and methodology. Disaster management cycle and disaster management in India.

Field Work:

- Visit to a local area to document environmental issues- agricultural area/ pond/lake/terrestrial ecosystem
- Visit to a local polluted area- market/slum area/Industrial area/trafficarea

Suggested Readings:

1. A.K. De, *Environmental Chemistry,* Wiley EasternLtd.
2. E.P. Odum, *Fundamentals of Ecology,* W.B. Sunders Co.,USA.
3. M.N. Rao and A.K. Datta, *Waste Water Treatment,* Oxford and IBKPublications.
4. Benny Joseph, *Environmental Studies,* Tata McGraw Hill,2005.
5. V.K. Sharma, *Disaster Management,* National Centre for Disaster Management,IIPE,1999.

Course Code	Course Title						Core/Elective
HS204ME	**Operations Research**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	**3**	**-**	**-**	**-**	**30**	**70**	**3**

Course Objectives

- Use variables for formulating complex mathematical models in management science, industrial engineering and transportationmodels.
- Use the basic methodology for the solution of linear programmingproblems.
- Understand the mathematical tools that are needed to solve optimization problems like Transportation models and Assignmentmodels.
- Understand the replacement models with change in money value considering with time and without time.
- Model a system as a queuing model and compute important performancemeasures

Course Outcomes

After completing this course, the student will be able to:

1. Prepare the students to have the knowledge of Linear Programming Problem inOperations
2. Research at the end students would be able to understand the concept and develop the models for differentapplications.
3. Make students understand the concept Replacement models at the end students would able to explain various features and applications of replacement models in real timescenario.
4. Prepare the students to understand theory of Game in operations research at the end students would able to explain application of Game theory in decision making for aconflict
5. Prepare the students to have the knowledge of Sequencing model at the end student would able to develop optimum model for job scheduling.
6. Prepare students to understand Queuing theory concepts and various optimization techniques at the end students would able to develop models for waiting linecases.

UNIT-I

Introduction: Definition and Scope of Operations Research.

Linear Programming: Introduction, Formulation of linear programming problems, graphical method of solving LP problem, simplex method, maximization and minimization, Degeneracy in LPP, Unbounded and, Infeasible solutions.

UNIT-II

Duality: Definition, Relationship between primal and dual solutions, Economic Interpretation, Post optimal of sensitivity analysis, Dual Simplex Method.

UNIT-III

Transportation Models: Finding an initial feasible solution - North West corner method, least cost method, Vogel's Approximation method, Finding the optimal solution, optimal solution by stepping stone and MODI methods, Special cases in Transportation problems - Unbalanced Transportation problem.

Assignment Problems: Hungarian method of Assignment problem, Maximization in Assignment problem, unbalanced problem, problems with restrictions, travelling salesman problems.

UNIT-IV

Replacement Models: Introduction, replacement of items that deteriorate ignoring change in money value, replacement of items that deteriorate considering change in money value with time, replacement of items that fail suddenly - Individual replacement policy, Group replacement policy.

Game Theory: Introduction, 2 person zero sum games, Maximin - Minimax principle, Principle of Dominance, Solution for mixed strategy problems, Graphical method for 2 x n and m x 2 games.

UNIT-V

Sequencing Models: Introduction, General assumptions, processing n jobs through 2 machines, processing 'n' jobs through m machines, Processing 2 jobs through m machines

Queuing Theory: Introduction, single channel - Poisson arrivals - exponential service times with infinite population & finite population, Multi channel - poison arrivals - Exponential service times with infinite population.

Introduction to Optimization Techniques: Single objective & Multi objective optimization Techniques like G.A, NSGA, P.Q.O & MPSOTechniques.

Suggested Readings:

1. Hamdy, A. Taha, Operations Research-An Introduction, Sixth Edition, Prentice Hall of India Pvt. Ltd.,1997.
2. S.D. Sharma, Operations Research, Kedarnath, Ramnath & Co., Meerut,2009.
3. Hrvey M. Wagner, Principles of Operations Research, Second Edition, Prentice Hall of India Ltd., 1980.
4. V.K. Kapoor, Operations Research, S. Chand Publishers, New Delhi,2004.
5. R. Paneer Selvam, Operations Research, Second Edition, PHI Learning Pvt. Ltd., New Delhi,2008.
6. Data Reconciliation by Prof. ShankerNarasimha

Course Code	Course Title						Core/Elective
BS206BZ	**Biology for Engineers**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	**3**	**-**	**-**	**-**	**30**	**70**	**3**

Course Objectives

Gain vivid knowledge in the fundamentals and uses of biology, human system and plant system.

Course Outcomes

After completing this course, the student will be able to:

1. Apply biological engineering principles, procedures needed to solve real-worldproblems.
2. Understand the fundamentals of living things, their classification, cell structure and biochemical constituents.
3. Apply the concept of plant, animal and microbial systems and growth in real lifesituations.
4. Comprehend genetics and the immunesystem.
5. Know the cause, symptoms, diagnosis and treatment of commondiseases.
6. Apply basic knowledge of the applications of biological systems in relevantindustries.

UNIT-I

Introduction to Life: Characteristics of living organisms, Basic classification, cell theory, structure of prokaryotic and eukaryotic cell, Introduction to Biomolecules: definition, general classification and important functions of carbohydrates, lipids, proteins, vitamins andenzymes.

UNIT-II

Biodiversity: Plant System: basic concepts of plant growth, nutrition, photosynthesis and nitrogen fixation. Animal System: Elementary study of digestive, respiratory, circulatory, excretory systems and their functions. Microbial System: History, types of microbes, economic importance and control ofmicrobes.

UNIT-III

Genetics and Evolution: Theories of evolution and Evidences; cell division–mitosis and meiosis; evidence of laws of inheritance; variation and speciation; nucleic acids as a genetic material; central dogma; Mendel laws, gene and chromosomes.

UNIT-IV

Human Diseases: Definition, causes, symptoms, diagnosis, treatment and prevention of diabetes, cancer, hypertension, influenza, AIDS and Hepatitis. Immunity immunization, antigen – antibody immune response.

UNIT-V

Biology and its Industrial Applications: Transgenic plants and animals, stem cell and tissue engineering, bioreactors, bio pharming, recombinant vaccines, cloning, drug discovery, biological neural networks, bioremediation, biofertilizer, biocontrol, biofilters, biosensors, biopolymers, bioenergy, biomaterials, biochips, basic biomedical instrumentation.

Suggested readings:

1. A Text book of Biotechnology, R.C. Dubey, S. Chand Higher Academic Publications,2013
2. Diseases of the Human Body, Carol D. Tamparo and Marcia A. Lewis, F.A. Davis Company,2011.
3. Biomedical instrumentation, Technology and applications, R. Khandpur, McGraw Hill Professional, 2004

4. Biology for Engineers, Arthur T. Johnson, CRC Press, Taylor and Francis,2011
5. Cell Biology and Genetics (Biology: The unity and diversity of life Volume I), Cecie Starr, Ralph Taggart, Christine Evers and Lisa Starr, Cengage Learning,2008
6. Biotechnology Expanding horizon, B.D. Singh, Kalyani Publishers,2012.

Course Code	Course Title						Core/Elective
ES215EC	**Signals and Systems**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	**3**	**-**	**-**	**-**	**30**	**70**	**3**

Course Objectives

- To explain signals and systems representations/classifications and also describe the time and frequency domain analysis of continuous time signals with Fourier series, Fourier transforms and Laplacetransforms.
- To understand Sampling theorem, with time and frequency domain analysis of discrete time signals with DTFS, DTFT andZ-Transform.
- To present the concepts of convolution and correlation integrals and also understand the properties in the context of signals/systems and lay down the foundation for advancedcourses.

Course Outcomes

1. Define and differentiate types of signals and systems in continuous and discretetime
2. Apply the properties of Fourier transform for continuous timesignals
3. Relate Laplace transforms to solve differential equations and to determine the response of the Continuous Time Linear Time Invariant Systems to knowninputs
4. Apply Z-transforms for discrete time signals to solve Differenceequations
5. Obtain Linear Convolution and Correlation of discrete time signals with graphicalrepresentation

UNIT-I

Some useful operations on signals: Time shifting, Time scaling, Time inversion. Signal models: Impulse function, Unit step function, Exponential function, Even and odd signals. Systems: Linear and Non-linear systems, Constant parameter and time varying parameter systems, Static and dynamic systems, Causal and Non-causal systems, Lumped Parameter and distributed parameter systems, Continuous-time and discrete-time systems, Analog and digital systems.

UNIT-II

Fourier series: Signals and Vectors, Signal Comparison: correlation, Signal representation by orthogonal signal set, Trigonometric Fourier Series, Exponential Fourier Series, LTI system response to periodic inputs.

UNIT-III

Continuous-Time Signal Analysis: Fourier Transform: Aperiodic signal representation by Fourier integral, Fourier Transform of some useful functions, Properties of Fourier Transform, Signal transmission through LTI Systems, ideal and practical filters, Signal energy. Laplace transform: Definition, some properties of Laplace transform, solution of differential equations using Laplacetransform.

UNIT-IV

Discrete-time signals and systems: Introduction, some useful discrete-time signal models, Sampling continuous-time sinusoids and aliasing, Useful signal operations, examples of discrete-time systems. Fourier analysis of discrete-time signals, periodic signal representation of discrete-time Fourier series, aperiodic signal representation by Fourierintegral.

UNIT-V

Discrete-time signal analysis: Z-Transform, some properties of Z-Transform, Solution to Linear difference equations using Z-Transform, System realization. Relation between Laplace transform and Z-Transform. DTFT: Definition, Properties of DTFT, comparison of continuous-time signal analysis with discrete-time signal analysis.

Suggested Readings:

1. B. P. Lathi, *Linear Systems and Signals,* Oxford University Press, 2nd Edition,2009
2. Alan V O P Penheim, A. S. Wlisky, *Signals and Systems,* 2nd Edition, PrenticeHall
3. Rodger E. Ziemer, William H Trenter, D. Ronald Fannin, *Signals and Systems,* 4th Edition, Pearson 1998.
4. Douglas K. Linder, *Introduction to Signals and Systems,* McGraw Hill,1999
5. P. Ramakrishna Rao, *Signals and Systems,*TMH.

Course Code	Course Title						Core/Elective
PC231IT	**JAVA Programming**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	**3**	**-**	**-**	**-**	**30**	**70**	**3**

Course Objectives

- To understand fundamentals of object-oriented programming in Java which includes defining classes, invoking methods, difference between applet and application programs, using classlibraries
- To create Java application programs using sound OOP practices such as interfaces, exception handling,multithreading.
- Use Collection framework, AWT and event handling to solve real worldproblems.
- Exploring Swing, and implementingServlets.

Course Outcomes

1. Achieve proficiency in object-oriented concepts and also learns to incorporate the same into the Java programminglanguage.
2. Create Java application programs using sound OOP practices e.g. Inheritance, interfaces and proper program structuring by using packages, access controlspecifiers.
3. Understand and Implement the concepts of Exception Handling injava.
4. Develop the ability to solve real-world problems through software development in high-level programming language using Large APIs of Java as well as the Java standard classlibrary.
5. Understand File, Streams, Input and Output Handling injava.
6. Create graphical user interface and Applets in java as well as apply the knowledge of Event Handling.

UNIT- I

Object Oriented Programming: Principles, Benefits of Object Oriented Programming.

Introduction to Java: Java buzzwords, bytecode. Java Programming Fundamentals: Applet and Application program using simple java program, data types, variables, arrays, operators, expressions, control statements, type conversion and casting, concepts of classes, objects, constructors, methods, access control, this keyword, garbage collection, overloading methods and constructors, introducing access control, static, final, nested and inner classes, exploring string class, using command-linearguments.

Inheritance: Inheritance concept, types of inheritance, Member access rules, use of super and final. Polymorphism - dynamic binding, method overriding, abstract classes and methods.

UNIT - II

Interfaces: Defining an interface, implementing interfaces, extending interface.

Packages: Defining, Creating and Accessing a Package, importing packages

Exception handling: Benefits of exception handling, classification, checked exceptions and unchecked exceptions, usage of try, catch, throw, throws and finally, rethrowing exceptions, built in exceptions, creating own exception sub classes

Multithreading: Java Thread Model, The Main Thread, creating a Thread, creating multiple threads, using is Alive() and join(), thread priorities, synchronization, inter thread communication,deadlock

UNIT- III

Collections: Overview of Java Collection frame work, commonly used Collection classes – Array List, Linked List, Hash Set, Tree Set, Collection Interfaces – Collection, List, Set. Accessing Collection via

iterator, working with Map. Legacy classes and interfaces – Vector, Hashtable, Stack, Dictionary, Enumeration interface.

Other Utility classes: String Tokenizer, Date, Calendar, Gregorian Calendar, Scanner

Java Input/Output: exploring java.io, Java I/O classes and interfaces, File, Stream classes, byte stream, character stream, serialization.

UNIT- IV

GUI Programming with java: The AWT class hierarchy, MVC architecture. Applet Revisited: Basics, architecture and skeleton, simple applet program.

Event Handling: Delegation Event Model, Event Classes, Source of Events, Event Listener Interfaces. Handling mouse and keyboard events, Adapter classes.

Database Programming using JDBC: Introduction to JDBC, JDBC Drivers & Architecture, CURD operation Using JDBC, Connecting to non-conventional Databases.

UNIT V

Exploring Swing: JLabel, ImageIcon, JTextField, the Swing buttons, JTabbedpane, JScrollPane, JList, JComboBox.

Servlet: Life cycle, using tomcat, simple servlet, servlet API, javax.servlet package, reading servlet parameters, javax.servlet.http package, handling HTTP requests and responses

Suggested Readings:

1. Herbert Scheldt, "The Complete Reference Java, 7th Edition, Tata McGraw Hill,2006.
2. James M Slack, Programming and Problem Solving with JAVA, Thomson Learning,2002.
3. C Thomas Wu, An Introduction to Object Oriented Programming with Java 5th Edition, McGraw Hill Publishing,2010.
4. H. M. Dietel and P. J. Dietel, Java How to Program, Sixth Edition, Pearson Education /PHI.

Course Code	Course Title						Core/Elective
PC232IT	**Database Systems**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	**3**	**-**	**-**	**-**	**30**	**70**	**3**

Course Objectives

- To get familiar with fundamental concepts of database management which includes database design, database languages, and database-systemimplementation.
- To get familiar with data storage techniques andindexing.
- To impart knowledge in transaction Management, concurrency control techniques and recovery techniques.
- To master the basics of SQL and construct queries usingSQL.
- To become familiar with database storage structures and accesstechniques.

Course Outcomes

1. Developtheknowledgeoffundamentalconceptsofdatabasemanagementand Designingadatabase using ER modellingapproach.
2. Implement storage of data, indexing, andhashing.
3. Applytheknowledgeabouttransactionmanagement,concurrencycontrolandrecoveryofdatabase systems.
4. Ability to design entity relationship model and convert entity relationship diagrams into RDBMS and formulate SQL queries on thedata.
5. Apply normalization for the development of applicationsoftware.

UNIT-I

Introduction to Database: File System Organization: Sequential - Pointer - Indexed – Direct. Purpose of Database System - Database Characteristics - Users of Database System - Advantages of DBMS Approach - Schemas and Instances - Three Schema Architecture and Data Independence - The Database System Environment - Relational Algebra.

UNIT-II

Logical Database Design: Relational DBMS - Codd's Rule - Entity-Relationship model - Extended ER Normalization - Functional Dependencies - Anomaly - 1NF to 5NF - Domain Key Normal Form – Denormalization.

UNIT-III

Indexing: Types of Single Level Ordered Indexes - Multilevel Indexes - Dynamic Multilevel Indexes. **Transaction Processing and Concurrency Control**: Transaction Concepts - ACID Properties - Transaction States - Concurrency Control Problems - Serializability - Recoverability - Pessimistic and Optimistic Concurrency Control Schemes.

UNIT-IV

Introduction to the Relational Model – Integrity Constraint Over relations – Enforcing Integrity constraints – Querying relational data – Logical data base Design – Introduction to Views – Destroying /altering Tables and Views.

Relational Algebra – Selection and projection set operations – renaming – Joins – Division – Examples of Algebra overviews – Relational calculus – Tuple relational Calculus – Domain relational calculus – Expressive Power of Algebra and calculus.

UNIT-V

Form of Basic SQL Query – Examples of Basic SQL Queries – Introduction to Nested Queries – Correlated Nested Queries Set – Comparison Operators – Aggregative Operators – NULL values – Comparison using Null values – Logical connectivity's – AND, OR and NOT – Impact on SQL Constructs – Outer Joins – Disallowing NULL values – Complex Integrity Constraints in SQL Triggers and Active Data bases.

Advanced Topics: Overview: Parallel Database - Multimedia Database - Mobile Database - Web Database - Multidimensional Database. Data Warehouse - OLTP Vs OLAP - NoSQL Database.

Suggested Readings:

1. Abraham Silberchatz, Henry F Korth and Sudarshan S, "Database System Concepts", Tata McGraw-Hill, New Delhi,2010.
2. RamezElmasri and Shamkant B Navathe, "Fundamentals of Database Systems", Addison Wesley, USA,2010.
3. Raghu Ramakrishnan and Johannes Gehrke, "Database Management Systems", Tata McGraw-Hill, New Delhi,2008.
4. Gupta G K, "Database Management System", Tata McGraw-Hill, New Delhi,2011.
5. Atul Kahate, "Introduction to Database Management Systems", Pearson Education, New Delhi,2009

Course Code	Course Title						Core/Elective
PC233IT	**Computer Organization and Microprocessor**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	**3**	**-**	**-**	**-**	**30**	**70**	**3**

Course Objectives

- To provide in depth knowledge to the students about the design and organization of a digital computer, operation of various functional units, instruction set design and factors that influence the performance of acomputer.
- To enable the students with the understanding of basic computer architecture with instruction set and programming of 8085 inparticular.
- To learn the functionality and interfacing of various peripheraldevices.

Course Outcomes

1. To understand the architecture of modern computer, Busstructures.
2. Analyse the Different memories and evaluate the mappingtechniques.
3. Discuss the architecture, the instruction set and addressing modesof8085 processor
4. AnalyseStacks,Subroutine,Interruptsof8085,different PPI techniques, the uses of interfaces 8259, RS 232C, USART (8251), and DMAcontroller
5. Design the applications of interfacing circuits 8254/8253timer, A/D and D/A converter, Keyboard/Displaycontroller.

UNIT-I

Basic Structure of Computers: Computer Types, Functional Units, Basic Operational Concepts, Bus Structures, Performance, Multiprocessors and Multicomputers, Historical perspective.

Input/output Organization: Accessing I/O devices, Interrupts, Processor examples, Direct memory access, parallel interface and serial interface.

UNIT-II

The Memory System: Basic concepts, Semiconductor RAM memories, Read-Only memories, Speed, Size and Cost, Cache memories, Performance considerations, Virtual Memories, Memory management requirements, Secondary Storage.

UNIT-III

8085 Architecture: Introduction to microprocessors and microcontrollers, 8085 Processor Architecture, Internal operations, Instructions and timings. Programming the 8085 - Introduction to 8085 instructions, Addressing modes and Programming techniques with Additional instructions.

UNIT-IV

Stacks and subroutines, interfacing peripherals - Basic interfacing concepts, interfacing output displays, Interfacing input keyboards. Interrupts - 8085 Interrupts, Programmable Interrupt Controller (8259A). Direct Memory Access (DMA) - DMA Controller (Intel 8257), Interfacing 8085 with Digital to Analog and Analog to Digital converters.

UNIT-V

Programmable peripheral interface (Intel 8255A), Programmable communication interface (Intel 8251), Programmable. Interval timer (Intel 8253 and 8254), Programmable Keyboard /Display controller (Intel 8279). Serial and parallel bus standards RS 232 C, IEEE 488.

Suggested Readings:

1. Carl Hamacher, ZvonkoVranesic, SafwatZaky, Computer Organization, 5th Edition, McGraw Hill, 2002.
2. Ramesh S Gaonkar, Microprocessor Architecture, Programming, and Applications with the 8085, 5/E Prentice Hall,2002.
3. Pal Chouduri, Computer Organization and Design, Prentice Hall of India,1994.
4. M. M. Mano, Computer System Architecture, 3rd Edition, PrenticeHall.

Course Code	Course Title						Core/Elective
PC234IT	**Data Communications**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	**3**	**-**	**-**	**-**	**30**	**70**	**3**

Course Objectives

- Tounderstandthebasicsofdatatransmission,transmissionmedia,datacommunicationssystemand itscomponents.
- To describe various encoding and modulation schemes, various data link protocols for flow control, error detection andcorrection.
- To understand different types of multiplexing, spread spectrum techniques, Ethernet, services of WLANs and Bluetooth.

Course Outcomes

1. Demonstrate systematic understanding of Data CommunicationTechniques.
2. Apply various encodingschemes.
3. Understand multiplexingtechniques.
4. Get acquainted with the concepts of virtual circuitnetworks.
5. Understand various types of switchingtechniques.
6. Understand concepts of wirelessLANs.

UNIT-I

Introduction: Communication model and Modulation Techniques (AM, FM and PM), Data Communication networking, Protocols and Architecture, Standards.

Data Transmission: Concepts and Terminology, Analog and Digital Transmission, Transmission Impairments, Transmission media.

Data Encoding: Digital Data Digital Signals, Digital Data-Analog Signals, Analog Data- Digital Signals, Analog Data-Analog Signals.

UNIT-II

Data Communication Interface: Asynchronous and Synchronous Transmission, Line Configuration, Interfacing.

Data Link Control: Flow Control, Error Detection, Error Control, HDLC, Other Data link Control Protocols, Performance Issues**.**

UNIT-III

Multiplexing & Switching: Frequency Division Multiplexing, Wavelength Division Multiplexing, Synchronous Time Division Multiplexing, Statistical Time Division Multiplexing. Asymmetric Digital Subscriber Line, xDSL. Circuit Switching, Packet Switching & Frame Relay. ATM: Architecture, Logical Connection, ATM Cells, Transmission of ATM cells.

UNIT-IV

Ethernets: Traditional Ethernet Topologies and Transmission Media, LAN protocol architecture, MAC sub layer, CSMA/CD, Physical Layer, Bridged, Switched and Full Duplex Ethernets. Fast Ethernet: MAC sub Layer, Physical layer, Gigabit Ethernet: MAC sub Layer, Physical Layer

UNIT-V

Cellular Wireless Networks: Principles of Cellular Networks, First Generation Analog, Second Generation CDMA and Third Generation Systems.

Wireless LANs: Overview, Wireless LAN Technology, IEEE 802.11 Architecture and Services, IEEE 802.11 Medium Access Control, IEEE 802.11 Physical Layer.

Bluetooth & Zigbee: Architecture, Layers and Protocols.

Suggested Readings:

1. William Stallings, "Data and Computer Communication", 8th Edition, Pearson Education, Asia-2004.
2. Behrouz A. Forouzan, "Data Communications and Networking", 4th Edition, Tata McGraw Hill, 2006.
3. Simon Haykins "Communication Systems", 2nd Edition, John Wiley &Sons
4. Drew Gislason "Zigbee Wireless Networking" Elsevier Published: August2008

Course Code	Course Title						Core/Elective
PC261IT	**Microprocessor Lab**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	**-**	**-**	**-**	**2**	**25**	**50**	**1**

Course Objectives

The objectives of the course are to impart knowledge of the:

- To become familiar with the architecture and Instruction set of Intel 8085microprocessor.
- To provide practical hands on experience with Assembly LanguageProgramming.
- Tofamiliarizethestudentswithinterfacingofvariousperipheraldeviceswith8085microprocessors.

Course Outcomes

After the completion of the course, the student will be able to:

1. Interpret the principles of Assembly Language Programming, instruction set in developing microprocessor basedapplications.
2. Develop Applications such as: 8-bit Addition, Multiplication, Division, array operations, swapping, negative and positivenumbers.
3. Analyse the interfaces like serial ports, digital-to-analog Converters and analog-to-digital converters etc.
4. Build interfaces of Input-output and other units like stepper motor with8085.
5. Analyse the function of traffic lightcontroller.

List of Experiments

1. Tutorials on 8085Programming.
2. Interfacing and programming of 8255. (E.g. traffic lightcontroller).
3. Interfacing and programming of8254.
4. Interfacing and programming of8279.
5. A/D and D/A converterinterface.
6. Stepper motorinterface.
7. Displayinterface

Note: Adequate number of programs covering all the instructions of 8085 instruction set should be done on the 8085 microprocessor trainer kit

Course Code	Course Title						Core/Elective
PC262IT	**JAVA Programming Lab**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	**-**	**-**	**-**	**2**	**25**	**50**	**1**

Course Objectives

- To build software development skills using java programming for real worldapplications.
- To implement frontend and backend of anapplication
- To implement classical problems using javaprogramming.

Course Outcomes

After completing this course, the student will be able to:

1. Develop Java applications using the concepts of Inheritance, interfaces, packages, access control specifiers.
2. Implement the concepts of Exception Handling in javaApplications.
3. Read and write data using different Java I/Ostreams.
4. Create graphical user interfaces and Applets by applying the knowledge of EventHandling.
5. Create robust applications using Java standard class libraries and retrieve data from a database with JDBC.
6. Ability to solve real-world problems by designing user friendly GUI with befitting backend through the APIs ofJava.

List of Experiments

1) Write a Java program to illustrate the concept of class with methodoverloading
2) Write a Java Program that reads a line of integers, and then displays each integer, and the sum of all the integers (Use String Tokenizer class of java.util)
3) Write a Java program to illustrate the concept of Single level and Multi levelInheritance.
4) Write a Java program to demonstrate the Interfaces & AbstractClasses.
5) Write a Java program to implement the concept of exceptionhandling.
6) Write a Java program to illustrate the concept of threading using Thread Class and runnable Interface.
7) Write a Java program to illustrate the concept of Threadsynchronization.
8) Write a Java program that correctly implements producer consumer problem using the concept of inter threadcommunication.
9) Write a Java program to illustrate collection classes like Array List, LinkedList, Tree map and Hash map.
10) Write a Java program to illustrate Legacy classes like Vector, Hashtable, Dictionary & Enumeration interface
11) Write a Java program to implement iteration over Collection using Iterator interface and List Iterator interface
12) Write a Java program that reads a file name from the user, and then displays information about whether the file exists, whether the file is readable, whether the file is writable, the type of file and the length of the file inbytes.
13) Write a Java program to illustrate the concept of I/OStreams
14) Write a Java program to implement serializationconcept
15) Write a Java applet program to implement Colour and Graphicsclass
16) Write a Java applet program for handling mouse & keyevents
17) Write a Java applet program to implement Adapterclasses

18) Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -, *, % operations. Add a text field to display theresult.
19) Write an example for JDBC prepared statement withResultSet
20) Program to get primary key value (auto-generated keys) from inserted queries usingJDBC
21) Program to create a simpleJList
22) java Program to create a simple checkbox usingJCheckBox
23) Program to create a checkbox and ItemListener toit.
24) 1. Write Servlet application to print current date &time
    2. Html & ServletCommunication
    3. Auto refresh apage
    4. Demonstrate sessiontracking
    5. Select record fromdatabase
    6. Application for loginpage
    7. Insert record intodatabase
    8. Count the visits on webpage
    9. Insert teacher record inDatabase

Course Code	Course Title						Core/Elective
PC263IT	**Database Systems Lab**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	**-**	**-**	**-**	**2**	**25**	**50**	**1**

Course Objectives

The objectives of the course are to impart knowledge of:

- To practice various DDL commands inSQL
- To write simple and Complex queries inSQL
- To familiarizePL/SQL

Course Outcomes

After the completion of the course, the student will be able to:

1. Design and implement a database schema for a givenproblem
2. Develop the query statements with the help of structured querylanguage.
3. Populate and query a database using SQL andPL/SQL
4. Develop multi-user databaseapplication
5. Design GUI using forms and implement databaseconnectivity.

List of Programs

1. Creation of database (exercising the commands forcreation)
2. Simple condition query creation using SQLPlus
3. Complex condition query creation using SQLPlus
4. Usage of Triggers and StoredProcedures.
5. Creation of Forms for student Information, library information, Pay rolletc.
6. Writing PL/SQL procedures for datavalidation
7. Generation using SQLreports
8. Creating Password and Security features forapplications.
9. Usage of File locking table locking, facilities inapplications.
10. Creation of small full pledged database application spreading over to 3sessions.

Note: The creation of sample database for the purpose of the experiments is expected to be pre-decided by the instructor.

Suggested Readings:

1. Nilesh Shah, Database System Using Oracle, PHI,2007.
2. Rick F Vander Lans, Introduction to SQL, Fourth edition, PearsonEducation,2007.
3. Benjamin Rosenzweig, Elena Silvestrova, Oracle PL/SQL by Example, Third edition, Pearson Education,2004.
4. Albert Lulushi, Oracle Forms Developer's Handbook, Pearson Education,2006.