Course code	Course Name	L-T-P Credits	Year of Introduction
CS201	DISCRETE COMPUTATIONAL STRUCTURES	3-1-0-4	2016

Pre-requisite: NIL

Course Objectives

1. To introduce mathematical notations and concepts in discrete mathematics that is essential for computing.
2. To train on mathematical reasoning and proof strategies.
3. To cultivate analytical thinking and creative problem solving skills.

Syllabus

Review of Set theory, Countable and uncountable Sets, Review of Permutations and combinations, Pigeon Hole Principle, Recurrence Relations and Solutions, Algebraic systems (semigroups, monoids, groups, rings, fields), Posets and Lattices, Prepositional and Predicate Calculus, Proof Techniques.

Expected Outcome:

Students will be able to

1. identify and apply operations on discrete structures such as sets, relations and functions in different areas of computing.
2. verify the validity of an argument using propositional and predicate logic.
3. construct proofs using direct proof, proof by contraposition, proof by contradiction and proof by cases, and by mathematical induction.
4. solve problems using algebraic structures.
5. solve problems using counting techniques and combinatorics.
6. apply recurrence relations to solve problems in different domains.

Text Books

1. Trembly J.P and Manohar R, "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw–Hill Pub.Co.Ltd, New Delhi, 2003.
2. Ralph. P. Grimaldi, "Discrete and Combinatorial Mathematics: An Applied Introduction", 4/e, Pearson Education Asia, Delhi, 2002.

References:

1. Liu C. L., "Elements of Discrete Mathematics", 2/e, McGraw–Hill Int. editions, 1988.
2. Bernard Kolman, Robert C. Busby, Sharan Cutler Ross, "Discrete Mathematical Structures", Pearson Education Pvt Ltd., New Delhi, 2003
3. Kenneth H.Rosen, "Discrete Mathematics and its Applications", 5/e, Tata McGraw – Hill Pub. Co. Ltd., New Delhi, 2003.
4. Richard Johnsonbaugh, "Discrete Mathematics", 5/e, Pearson Education Asia, New Delhi, 2002.
5. Joe L Mott, Abraham Kandel, Theodore P Baker, "Discrete Mathematics for Computer Scientists and Mathematicians", 2/e, Prentice-Hall India, 2009.

Course Plan			
Module	**Contents**	**Hours (54)**	**End Sem Exam Marks**
I	**Review of elementary set theory** : Algebra of sets – Ordered pairs and Cartesian products – Countable and Uncountable sets **Relations** :- Relations on sets –Types of relations and their properties – Relational matrix and the graph of a relation – Partitions – Equivalence relations - Partial ordering- Posets – Hasse diagrams - Meet and Join – Infimum and Supremum ***Functions** :-* *Injective, Surjective and Bijective functions - Inverse of a function- Composition*	3 6 1	15 %
II	Review of Permutations and combinations, Principle of inclusion exclusion, Pigeon Hole Principle, **Recurrence Relations**: Introduction- Linear recurrence relations with constant coefficients– Homogeneous solutions – Particular solutions – Total solutions **Algebraic systems**:- Semigroups and monoids - Homomorphism, Subsemigroups and submonoids	3 4 2	15 %
FIRST INTERNAL EXAM			
III	**Algebraic systems (contd…)**:- Groups, definition and elementary properties, subgroups, Homomorphism and Isomorphism, Generators - Cyclic Groups, Cosets and Lagrange's Theorem Algebraic systems with two binary operations- rings, fields-sub rings, ring homomorphism	6 2	15 %
IV	**Lattices and Boolean algebra** :- Lattices –Sublattices – Complete lattices – Bounded Lattices - Complemented Lattices – Distributive Lattices – Lattice Homomorphisms. Boolean algebra – sub algebra, direct product and homomorphisms	7 3	15 %
SECOND INTERNAL EXAM			
V	**Propositional Logic**:- Propositions – Logical connectives – Truth tables Tautologies and contradictions – Contra positive – Logical	2 3	20 %

	equivalences and implications Rules of inference: Validity of arguments.	 3	
VI	**Predicate Logic**:- Predicates – Variables – Free and bound variables – Universal and Existential Quantifiers – Universe of discourse. Logical equivalences and implications for quantified statements – Theory of inference : Validity of arguments. **Proof techniques:** Mathematical induction and its variants – Proof by Contradiction – Proof by Counter Example – Proof by Contra positive.	3 3 3	20 %
END SEMESTER EXAM			

Question Paper Pattern:

1. There will be *five* parts in the question paper – A, B, C, D, E
2. Part A
   a. Total marks : 12
   b. *Four* questions each having 3 marks, uniformly covering module I and II; All *four* questions have to be answered.
3. Part B
   a. Total marks : 18
   b. *Three* questions each having 9 marks, uniformly covering module I and II; T*wo* questions have to be answered. Each question can have a maximum of three subparts
4. Part C
   a. Total marks : 12
   b. *Four* questions each having 3 marks, uniformly covering module III and IV; All *four* questions have to be answered.
5. Part D
   a. Total marks : 18
   b. *Three* questions each having 9 marks, uniformly covering module III and IV; T*wo* questions have to be answered. Each question can have a maximum of three subparts
6. Part E
   a. Total Marks: 40
   b. *Six* questions each carrying 10 marks, uniformly covering modules V and VI; *four* questions have to be answered.
   c. A question can have a maximum of three sub-parts.

7. There should be at least 60% analytical/numerical questions.

Course code	Course Name	L-T-P -Credits	Year of Introduction
CS202	Computer Organization and Architecture	3-1-0-4	2016

Pre-requisite: CS203 Switching theory and logic design

Course Objectives

1. To impart an understanding of the internal organization and operations of a computer.
2. To introduce the concepts of processor logic design and control logic design.

Syllabus

Fundamental building blocks and functional units of a computer. Execution phases of an instruction. Arithmetic Algorithms. Design of the processing unit – how arithmetic and logic operations are performed. Design of the control unit – hardwired and microprogrammed control. I/O organisation – interrupts, DMA, different interface standards. Memory Subsystem – different types.

Expected outcome

Students will be able to:

1. identify the basic structure and functional units of a digital computer.
2. analyze the effect of addressing modes on the execution time of a program.
3. design processing unit using the concepts of ALU and control logic design.
4. identify the pros and cons of different types of control logic design in processors.
5. select appropriate interfacing standards for I/O devices.
6. identify the roles of various functional units of a computer in instruction execution.

Text Books:

1. Hamacher C., Z. Vranesic and S. Zaky, *Computer Organization* ,5/e, McGraw Hill, 2011.
2. Mano M. M., Digital Logic & Computer Design, 4/e, Pearson Education, 2013.

References:

1. Mano M. M., Digital Logic & Computer Design, 4/e, Pearson Education, 2013.
2. Patterson D.A. and J. L. Hennessey, Computer Organization and Design, 5/e, Morgan Kauffmann Publishers, 2013.
3. William Stallings, Computer Organization and Architecture: Designing for Performance, Pearson, 9/e, 2013.
4. Chaudhuri P., Computer Organization and Design, 2/e, Prentice Hall, 2008.
5. Rajaraman V. and T. Radhakrishnan, Computer Organization and Architecture, Prentice Hall, 2011.
6. Messmer H. P., The Indispensable PC Hardware Book, 4/e, Addison-Wesley, 2001

Course Plan

Module	Contents	Hours (51)	Sem.ExamMarks
I	**Basic Structure of computers**–functional units – basic operational concepts –bus structures – software. Memory locations and addresses – memory operations – instructions and instruction sequencing – addressing modes – ARM Example (programs not required). Basic I/O operations – stacks subroutine calls.	6	15%

II	**Basic processing unit** – fundamental concepts – instruction cycle - execution of a complete instruction –multiple- bus organization – sequencing of control signals. **Arithmetic algorithms: A**lgorithms for multiplication and division of binary and BCD numbers — array multiplier —Booth's multiplication algorithm — restoring and non-restoring division — algorithms for floating point, multiplication and division.	10	15%
FIRST INTERNAL EXAMINATION			
III	**I/O organization:** accessing of I/O devices – interrupts –direct memory access –buses –interface circuits –standard I/O interfaces (PCI, SCSI, USB)	8	15%
IV	**Memory system :** basic concepts –semiconductor RAMs –memory system considerations – semiconductor ROMs –flash memory –cache memory and mapping functions.	9	15%
SECOND INTERNAL EXAMINATION			
V	**Processor Logic Design:** Register transfer logic – inter register transfer – arithmetic, logic and shift micro operations –conditional control statements. **Processor organization:**–design of arithmetic unit, logic unit, arithmetic logic unit and shifter –status register –processor unit –design of accumulator.	9	20%
VI	**Control Logic Design:** Control organization – design of hardwired control –control of processor unit –PLA control. **Micro-programmed control:** Microinstructions –horizontal and vertical micro instructions – micro-program sequencer –micro programmed CPU organization.	9	20%
END SEMESTER EXAM			

Question Paper Pattern:

1. There will be *five* parts in the question paper – A, B, C, D, E
2. Part A
    a. Total marks : 12
    b. *Four* questions each having 3 marks, uniformly covering module I and II; All *four* questions have to be answered.
3. Part B
    a. Total marks : 18
    b. *Three* questions each having 9 marks, uniformly covering module I and II; T*wo* questions have to be answered. Each question can have a maximum of three subparts
4. Part C
    a. Total marks : 12
    b. *Four* questions each having 3 marks, uniformly covering module III and IV; All *four* questions have to be answered.
5. Part D
    a. Total marks : 18
    b. *Three* questions each having 9 marks, uniformly covering module III and IV; T*wo* questions have to be answered. Each question can have a maximum of three subparts
6. Part E
    a. Total Marks: 40
    b. *Six* questions each carrying 10 marks, uniformly covering modules V and VI; *four* questions have to be answered.
    c. A question can have a maximum of three sub-parts.
7. There should be at least 60% analytical/numerical/design questions..

Course code	Course Name	L-T-P-Credits	Year of Introduction
CS205	Data Structures	3-1-0-4	2016

Pre-requisite: B101-05 Introduction to Computing and Problem Solving

Course Objectives

1. To impart a thorough understanding of linear data structures such as stacks, queues and their applications.
2. To impart a thorough understanding of non-linear data structures such as trees, graphs and their applications.
3. To impart familiarity with various sorting, searching and hashing techniques and their performance comparison.
4. To impart a basic understanding of memory management.

Syllabus

Introduction to various programming methodologies, terminologies and basics of algorithms analysis, Basic Abstract and Concrete Linear Data Structures, Non-linear Data Structures, Memory Management, Sorting Algorithms, Searching Algorithms, Hashing.

Expected Outcome:

Students will be able to

1. compare different programming methodologies and define asymptotic notations to analyze performance of algorithms.
2. use appropriate data structures like arrays, linked list, stacks and queues to solve real world problems efficiently.
3. represent and manipulate data using nonlinear data structures like trees and graphs to design algorithms for various applications.
4. illustrate and compare various techniques for searching and sorting.
5. appreciate different memory management techniques and their significance.
6. illustrate various hashing techniques.

Text Books:

1. Samanta D., Classic Data Structures, Prentice Hall India, 2/e, 2009.
2. Richard F. Gilberg, Behrouz A. Forouzan, Data Structures: A Pseudocode Approach with C, 2/e, Cengage Learning, 2005.

References

1. Horwitz E., S. Sahni and S. Anderson, Fundamentals of Data Structures in C, University Press (India), 2008.
2. Aho A. V., J. E. Hopcroft and J. D. Ullman, Data Structures and Algorithms, Pearson Publication,1983.
3. Tremblay J. P. and P. G. Sorenson, Introduction to Data Structures with Applications, Tata McGraw Hill, 1995.
4. Peter Brass, Advanced Data Structures, Cambridge University Press, 2008
5. Lipschuts S., Theory and Problems of Data Structures, Schaum's Series, 1986.
6. Wirth N., Algorithms + Data Structures = Programs, Prentice Hall, 2004.
7. Hugges J. K. and J. I. Michtm, A Structured Approach to Programming, PHI, 1987.
8. Martin Barrett, Clifford Wagner, And Unix: Tools For Software Design, John Wiley, 2008 reprint.

COURSE PLAN			
Module	**Contents**	**Hours (56)**	**Sem. Exam Marks**
I	Introduction to programming methodologies – structured approach, stepwise refinement techniques, programming style, documentation – analysis of algorithms: frequency count, definition of Big O notation, asymptotic analysis of simple algorithms. Recursive and iterative algorithms.	**9**	**15%**
II	Abstract and Concrete Data Structures- Basic data structures – vectors and arrays. Applications, Linked lists:- singly linked list, doubly linked list, Circular linked list, operations on linked list, linked list with header nodes, applications of linked list: polynomials,.	**9**	**15%**
III	Applications of linked list (continued): Memory management, memory allocation and de-allocation. First-fit, best-fit and worst-fit allocation schemes Implementation of Stacks and Queues using arrays and linked list, DEQUEUE (double ended queue). Multiple Stacks and Queues, Applications.	**9**	**15%**
IV	String: - representation of strings, concatenation, substring searching and deletion. Trees: - m-ary Tree, Binary Trees – level and height of the tree, complete-binary tree representation using array, tree traversals (Recursive and non-recursive), applications. Binary search tree – creation, insertion and deletion and search operations, applications.	**10**	**15%**
V	Graphs – representation of graphs, BFS and DFS (analysis not required) applications. Sorting techniques – *Bubble sort, Selection Sort,* Insertion sort, Merge sort, Quick sort, Heaps and Heap sort. Searching algorithms (Performance comparison expected. Detailed analysis not required)	**09**	**20%**
VI	Linear and Binary search. (Performance comparison expected. Detailed analysis not required) Hash Tables – Hashing functions – Mid square, division, folding, digit analysis, collusion resolution and Overflow handling techniques.	**10**	**20%**

Question Paper Pattern:

1. There will be *five* parts in the question paper – A, B, C, D, E
2. Part A
    a. Total marks : 12
    b. *Four* questions each having *3* marks, uniformly covering module I and II; All *four* questions have to be answered.
3. Part B
    a. Total marks : 18
    b. *Three* questions each having *9* marks, uniformly covering module I and II; T*wo* questions have to be answered. Each question can have a maximum of three subparts
4. Part C
    a. Total marks : 12
    b. *Four* questions each having *3* marks, uniformly covering module III and IV; All *four* questions have to be answered.
5. Part D
    a. Total marks : 18
    b. *Three* questions each having *9* marks, uniformly covering module III and IV; T*wo* questions have to be answered. Each question can have a maximum of three subparts
6. Part E
    a. Total Marks: 40
    b. *Six* questions each carrying 10 marks, uniformly covering modules V and VI; *four* questions have to be answered.
    c. A question can have a maximum of three sub-parts.
7. There should be at least 60% analytical/numerical/design questions.

Course code	Course Name	L-T-P -Credits	Year of Introduction
CS208	Principles of Database Design	2-1-0-3	2016

Pre-requisite: CS205 Data structures

Course Objectives

1. To impart the basic understanding of the theory and applications of database management systems.
2. To give basic level understanding of internals of database systems.
3. To expose to some of the recent trends in databases.

Syllabus:

Types of data, database and DBMS, Languages and users. Software Architecture, E-R and Extended E-R Modelling, Relational Model – concepts and languages, relational algebra and tuple relational calculus, SQL, views, assertions and triggers, HLL interfaces, relational db design, FDs and normal forms, Secondary storage organization, indexing and hashing, query optimization, concurrent transaction processing and recovery principles, recent topics.

Expected outcome.

Students will be able to:

1. define, explain and illustrate the fundamental concepts of databases.
2. construct an Entity-Relationship (E-R) model from specifications and to perform the transformation of the conceptual model into corresponding logical data structures.
3. model and design a relational database following the design principles.
4. develop queries for relational database in the context of practical applications
5. define, explain and illustrate fundamental principles of data organization, query optimization and concurrent transaction processing.
6. appreciate the latest trends in databases.

Text Books:

1. Elmasri R. and S. Navathe, *Database Systems: Models, Languages, Design andApplication Programming*, Pearson Education, 2013.
2. Sliberschatz A., H. F. Korth and S. Sudarshan, *Database System Concepts*, 6/e, McGraw Hill, 2011.

References:

1. Powers S., *Practical RDF*, O'Reilly Media, 2003.
2. Plunkett T., B. Macdonald, *et al.*, *Oracle Big Data Hand Book*, Oracle Press, 2013.

Course Plan

Module	Contents	Hours (42)	Sem.ExamMarks
I	**Introduction:** Data: structured, semi-structured and unstructured data**,** Concept & Overview of DBMS, Data Models, Database Languages, Database Administrator, Database Users, Three Schema architecture of DBMS. Database architectures and classification. (Reading: ElmasriNavathe, Ch. 1 and 2. Additional Reading: Silbershatz, Korth, Ch. 1) **Entity-Relationship Model:** Basic concepts, Design Issues, Mapping Constraints,	06	15%

	Keys, Entity-Relationship Diagram, Weak Entity Sets, Relationships of degree greater than 2 (Reading: ElmasriNavathe, Ch. 7.1-7.8)		
II	**Relational Model:** Structure of relational Databases, Integrity Constraints, synthesizing ER diagram to relational schema (Reading: ElmasriNavathe, Ch. 3 and 8.1, Additional Reading: Silbershatz, Korth, Ch. 2.1-2.4) **Database Languages:** Concept of DDL and DML relational algebra (Reading: Silbershatz, Korth, Ch 2.5-2.6 and 6.1-6.2, ElmasriNavathe, Ch. 6.1-6.5)	**06**	**15%**
FIRST INTERNAL EXAM			
III	**Structured Query Language (SQL**): Basic SQL Structure, examples, Set operations, Aggregate Functions, nested sub-queries (Reading: ElmasriNavathe, Ch. 4 and 5.1) **Views, assertions and triggers** (Reading: ElmasriNavathe, Ch. 5.2-5.3, Silbershatz, Korth Ch. 5.3). **Functions, Procedures and HLL interfaces** (Reading: Silbershatz, Korth Ch. 5.1-5.2).	**07**	**15%**
IV	**Relational Database Design:** Different anomalies in designing a database, normalization, functional dependency (FD), Armstrong's Axioms, closures, Equivalence of FDs, minimal Cover (proofs not required). Normalization using functional dependencies, INF, 2NF, 3NF and BCNF, lossless and dependency preserving decompositions (Reading: Elmasri and Navathe, Ch. 14.1-14.5, 15.1-15.2. Additional Reading: Silbershatz, Korth Ch. 8.1-8.5)	**07**	**15%**
SECOND INTERNAL EXAM			
V	**Physical Data Organization**: index structures, primary, secondary and clustering indices, Single level and Multi-level indexing, B-Trees and B+-Trees (basic structure only, algorithms not needed), Indexing on multiple keys (Reading Elmasri and Navathe, Ch. 17.1-17.4) **Query Optimization**: algorithms for relational algebra operations, heuristics-based query optimization, Cost-based query optimization (Reading Elmasri and Navathe, Ch. 18.1-18.3, 18.6-18.8)	**08**	**20%**
VI	**Transaction Processing Concepts:** overview of concurrency control and recovery acid properties, serial and concurrent schedules, conflict serializability. Two-phase locking, failure classification, storage structure, stable storage, log based recovery, deferred database	**08**	**20%**

	modification, check-pointing, (Reading Elmasri and Navathe, Ch. 20.1-20.5 (except 20.5.4-20.5.5) , Silbershatz, Korth Ch. 15.1 (except 15.1.4-15.1.5), Ch. 16.1 – 16.5) R**ecent topics (preliminary ideas only):** Semantic Web and RDF(Reading: Powers Ch.1, 2), GIS, biological databases (Reading: Elmasri and Navathe Ch. 23.3-23.4) Big Data (Reading: Plunkett and Macdonald, Ch. 1, 2)		
END SEMESTER EXAM			

Question Paper Pattern:

1. There will be *five* parts in the question paper – A, B, C, D, E
2. Part A
   a. Total marks : 12
   b. *Four* questions each having 3 marks, uniformly covering module I and II; All *four* questions have to be answered.
3. Part B
   a. Total marks : 18
   b. *Three* questions each having 9 marks, uniformly covering module I and II; T*wo* questions have to be answered. Each question can have a maximum of three subparts
4. Part C
   a. Total marks : 12
   b. *Four* questions each having 3 marks, uniformly covering module III and IV; All *four* questions have to be answered.
5. Part D
   a. Total marks : 18
   b. *Three* questions each having 9 marks, uniformly covering module III and IV; T*wo* questions have to be answered. Each question can have a maximum of three subparts
6. Part E
   a. Total Marks: 40
   b. *Six* questions each carrying 10 marks, uniformly covering modules V and VI; *four* questions have to be answered.
   c. A question can have a maximum of three sub-parts.
7. There should be at least 60% analytical/numerical/design questions.

Course code	Course Name	L-T-P - Credits	Year of Introduction
HS200	Business Economics	3-0-0-3	2016

Prerequisite: Nil

Course Objectives

- To familiarize the prospective engineers with elementary Principles of Economics and Business Economics.
- To acquaint the students with tools and techniques that are useful in their profession in Business Decision Making which will enhance their employability;
- To apply business analysis to the "firm" under different market conditions;
- To apply economic models to examine current economic scenario and evaluate policy options for addressing economic issues
- To gain understanding of some Macroeconomic concepts to improve their ability to understand the business climate;
- To prepare and analyse various business tools like balance sheet, cost benefit analysis and rate of returns at an elementary level

Syllabus

Business Economics - basic concepts, tools and analysis, scarcity and choices , resource allocation, marginal analysis, opportunity costs and production possibility curve. Fundamentals of microeconomics - Demand and Supply Analysis, equilibrium, elasticity, production and production function, cost analysis, break-even analysis and markets. Basics of macroeconomics - the circular flow models, national income analysis, inflation, trade cycles, money and credit, and monetary policy. Business decisions - investment analysis, Capital Budgeting decisions, forecasting techniques and elementary Balance Sheet and taxation, business financing, international investments

Expected outcome .

A student who has undergone this course would be able to

i. make investment decisions based on capital budgeting methods in alignment with microeconomic and macroeconomic theories.
ii. able to analyse the profitability of the firm, economy of operation, determination of price under various market situations with good grasp on the effect of trade cycles in business.
iii. gain knowledge on Monetary theory, measures by RBI in controlling interest rate and emerging concepts like Bit Coin.
iv. gain knowledge of elementary accounting concepts used for preparing balance sheet and interpretation of balance sheet

Text Books

1. Geetika, Piyali Ghosh and Chodhury, *Managerial Economics*, Tata McGraw Hill, 2015
2. Gregory Mankiw, *Principles of Macroeconomics*, Cengage Learning, 2006.
3. M.Kasi Reddy and S.Saraswathi, *Economics and Financial Accounting*. Prentice Hall of India. New Delhi.

References:

1. Dornbusch, Fischer and Startz, *Macroeconomics*, McGraw Hill, 11th edition, 2010.
2. Khan M Y, *Indian Financial System*, Tata McGraw Hill, 7th edition, 2011.
3. Samuelson, *Managerial Economics*, 6th edition, Wiley
4. Snyder C and Nicholson W, *Fundamentals of Microeconomics*, Cengage Learning (India), 2010.
5. Truett, Managerial Economics: Analysis, Problems, Cases, 8th Edition, Wiley
6. Welch, *Economics: Theory and Practice* 7th Edition, Wiley
7. Uma Kapila, *Indian Economy Since Independence, 26th Edition: A Comprehensive and Critical Analysis of India's Economy*, 1947-2015
8. C Rangarajan, *Indian Economy, Essays on monetary and finance*, UBS Publishers'Distributors, 1998
9. A.Ramachandra Aryasri, *Managerial Economics and Financial Analysis*, Tata McGraw-Hill, New Delhi.
10. Dominick Salvatore, *Managerial Economics in Global Economy*, Thomas Western College Publishing, Singapore.
11. I.M .Pandey, *Financial Management*, Vikas Publishing House. New Delhi.
12. Dominick Salvatore, *Theory and Problems of Micro Economic Theory.* Tata Mac Graw-Hill, New Delhi.
13. T.N.Hajela.*Money, Banking and Public Finance.* Anne Books. New Delhi.
14. G.S.Gupta. *Macro Economics-Theory and Applications.* Tata Mac Graw- Hill, New Delhi.
15. Yogesh, Maheswari, *Management Economics* , PHI learning, NewDelhi, 2012
16. Timothy Taylor , *Principles of Economics*, 3rd edition, TEXTBOOK MEDIA.
17. Varshney and Maheshwari. *Managerial Economics*. Sultan Chand. New Delhi

Course Plan

Module	Contents	Hours	Sem. Exam Marks
I	**Business Economics** and its role in managerial decision making-meaning-scope-relevance-economic problems-scarcity Vs choice (2 Hrs)-Basic concepts in economics-scarcity, choice, resource allocation- Trade-off-opportunity cost-marginal analysis- marginal utility theory, Law of diminishing marginal utility -production possibility curve (2 Hrs)	4	15%
II	**Basics of Micro Economics I** Demand and Supply analysis-equillibrium-elasticity (demand and supply) (3 Hrs.) -Production concepts-average product-marginal product-law of variable proportions- Production function-Cobb Douglas function-problems (3 Hrs.)	6	15%
FIRST INTERNAL EXAMINATION			
III	**Basics of Micro Economics II** Concept of costs-marginal, average, fixed, variable costs-cost curves-shut down point-long run and short run (3 Hrs.)- Break Even Analysis-Problem-Markets-Perfect Competition, Monopoly and Monopolistic Competition, Oligopoly-Cartel and collusion (3 Hrs.).	6	15%
IV	**Basics of Macro Economics** - Circular flow of income-two sector and multi-sector models- National Income Concepts-Measurement methods-problems-Inflation, deflation (4 Hrs.)-Trade cycles-Money-stock and flow concept-Quantity theory of money-Fischer's Equation and Cambridge Equation -velocity of circulation of money-credit control methods-SLR, CRR, Open Market Operations-Repo and Reverse Repo rate-emerging concepts in money-bit coin (4 Hrs.).	8	15%

SECOND INTERNAL EXAMINATION			
V	**Business Decisions I**-Investment analysis-Capital Budgeting-NPV, IRR, Profitability Index, ARR, Payback Period (5 Hrs.)- Business decisions under certainty-uncertainty-selection of alternatives-risk and sensitivity- cost benefit analysis-resource management (4 Hrs.).	9	20%
VI	**Business Decisions II** Balance sheet preparation-principles and interpretation-forecasting techniques (7 Hrs.)-business financing-sources of capital- Capital and money markets-international financing-FDI, FPI, FII-Basic Principles of taxation-direct tax, indirect tax-GST (2 hrs.).	9	20%
END SEMESTER EXAM			

Question Paper Pattern

Max. marks: 100, Time: 3 hours

The question paper shall consist of three parts

Part A
4 questions uniformly covering modules I and II. Each question carries 10 marks
Students will have to answer any three questions out of 4 (3X10 marks =30 marks)

Part B
4 questions uniformly covering modules III and IV. Each question carries 10 marks
Students will have to answer any three questions out of 4 (3X10 marks =30 marks)

Part C
6 questions uniformly covering modules V and VI. Each question carries 10 marks
Students will have to answer any four questions out of 6 (4X10 marks =40 marks)

Note: In all parts, each question can have a maximum of four sub questions, if needed.

Course code	Course Name	L-T-P-Credits	Year of Introduction
HS210	LIFE SKILLS	2-0-2	2016

Prerequisite : Nil

Course Objectives

- To develop communication competence in prospective engineers.
- To enable them to convey thoughts and ideas with clarity and focus.
- To develop report writing skills.
- To equip them to face interview & Group Discussion.
- To inculcate critical thinking process.
- To prepare them on problem solving skills.
- To provide symbolic, verbal, and graphical interpretations of statements in a problem description.
- To understand team dynamics & effectiveness.
- To create an awareness on Engineering Ethics and Human Values.
- To instill Moral and Social Values, Loyalty and also to learn to appreciate the rights of others.
- To learn leadership qualities and practice them.

Syllabus

Communication Skill: Introduction to Communication, The Process of Communication, Barriers to Communication, Listening Skills, Writing Skills, Technical Writing, Letter Writing, Job Application, Report Writing, Non-verbal Communication and Body Language, Interview Skills, Group Discussion, Presentation Skills, Technology-based Communication.

Critical Thinking & Problem Solving: Creativity, Lateral thinking, Critical thinking, Multiple Intelligence, Problem Solving, Six thinking hats, Mind Mapping & Analytical Thinking.

Teamwork: Groups, Teams, Group Vs Teams, Team formation process, Stages of Group, Group Dynamics, Managing Team Performance & Team Conflicts.

Ethics, Moral & Professional Values: Human Values, Civic Rights, Engineering Ethics, Engineering as Social Experimentation, Environmental Ethics, Global Issues, Code of Ethics like ASME, ASCE, IEEE.

Leadership Skills: Leadership, Levels of Leadership, Making of a leader, Types of leadership, Transactions Vs Transformational Leadership, VUCA Leaders, DART Leadership, Leadership Grid & leadership Formulation.

Expected outcome

The students will be able to

- Communicate effectively.
- Make effective presentations.
- Write different types of reports.
- Face interview & group discussion.
- Critically think on a particular problem.
- Solve problems.
- Work in Group & Teams
- Handle Engineering Ethics and Human Values.
- Become an effective leader.

Resource Book:

Life Skills for Engineers, Complied by ICT Academy of Kerala, McGraw Hill Education (India) Private Ltd., 2016

References:

- Barun K. Mitra; (2011), *"Personality Development & Soft Skills*", First Edition; Oxford Publishers.
- Kalyana; (2015) "*Soft Skill for Managers*"; First Edition; Wiley Publishing Ltd.
- Larry James (2016); "*The First Book of Life Skills*"; First Edition; Embassy Books.
- Shalini Verma (2014); *"Development of Life Skills and Professional Practice"*; First Edition; Sultan Chand (G/L) & Company
- John C. Maxwell (2014); "The 5 Levels of Leadership", Centre Street, A division of Hachette Book Group Inc.

Course Plan

Module	Contents	Hours L-T-P L	P	Sem. Exam Marks
I	Need for Effective Communication, Levels of communication; Flow of communication; Use of language in communication; Communication networks; Significance of technical communication, Types of barriers; Miscommunication; Noise; Overcoming measures, Listening as an active skill; Types of Listeners; Listening for general content; Listening to fill up information; Intensive Listening; Listening for specific information; Developing effective listening skills; Barriers to effective listening skills. **Technical Writing:** Differences between technical and literary style, Elements of style; Common Errors, **Letter Writing:** Formal, informal and demi-official letters; business letters, **Job Application**: Cover letter, Differences between bio-data, CV and Resume, **Report Writing:** Basics of Report Writing; Structure of a report; Types of reports. **Non-verbal Communication and Body Language:** Forms of non-verbal communication; Interpreting body-language cues; Kinesics; Proxemics; Chronemics; Effective use of body language **Interview Skills**: Types of Interviews; Ensuring success in job interviews; Appropriate use of non-verbal communication, **Group Discussion**: Differences between group discussion and debate; Ensuring success in group discussions, **Presentation Skills**: Oral presentation and public speaking skills; business presentations, **Technology-based Communication:** Netiquettes: effective e-mail messages; power-point presentation; enhancing editing skills using computer software.	2 3	2 4 4	See evaluation scheme

II	Need for Creativity in the 21st century, Imagination, Intuition, Experience, Sources of Creativity, Lateral Thinking, Myths of creativity Critical thinking Vs Creative thinking, Functions of Left Brain & Right brain, Convergent & Divergent Thinking, Critical reading & Multiple Intelligence. Steps in problem solving, Problem Solving Techniques, Problem Solving through Six Thinking Hats, Mind Mapping, Forced Connections. Problem Solving strategies, Analytical Thinking and quantitative reasoning expressed in written form, Numeric, symbolic, and graphic reasoning, Solving application problems.	2 2	2 2	
III	Introduction to Groups and Teams, Team Composition, Managing Team Performance, Importance of Group, Stages of Group, Group Cycle, Group thinking, getting acquainted, Clarifying expectations. Group Problem Solving, Achieving Group Consensus. Group Dynamics techniques, Group vs Team, Team Dynamics, Teams for enhancing productivity, Building & Managing Successful Virtual Teams. Managing Team Performance & Managing Conflict in Teams. Working Together in Teams, Team Decision-Making, Team Culture & Power, Team Leader Development.	3 3	2 2	
IV	Morals, Values and Ethics, Integrity, Work Ethic, Service Learning, Civic Virtue, Respect for Others, Living Peacefully. Caring, Sharing, Honesty, Courage, Valuing Time, Cooperation, Commitment, Empathy, Self-Confidence, Character Spirituality, Senses of 'Engineering Ethics', variety of moral issued, Types of inquiry, moral dilemmas, moral autonomy, Kohlberg's theory, Gilligan's theory, Consensus and controversy, Models of Professional Roles, Theories about right action, Self-interest, customs and religion, application of ethical theories. Engineering as experimentation, engineers as responsible experimenters, Codes of ethics, Balanced outlook on. The challenger case study, Multinational corporations, Environmental ethics, computer ethics,	3 3 3	2 2	

	Weapons development, engineers as managers, consulting engineers, engineers as expert witnesses and advisors, moral leadership, sample code of Ethics like ASME, ASCE, IEEE, Institution of Engineers(India), Indian Institute of Materials Management, Institution of electronics and telecommunication engineers(IETE), India, etc.	3		
V	Introduction, a framework for considering leadership, entrepreneurial and moral leadership, vision, people selection and development, cultural dimensions of leadership, style, followers, crises. Growing as a leader, turnaround leadership, gaining control, trust, managing diverse stakeholders, crisis management Implications of national culture and multicultural leadership Types of Leadership, Leadership Traits. Leadership Styles, VUCA Leadership, DART Leadership, Transactional vs Transformational Leaders, Leadership Grid, Effective Leaders, making of a Leader, Formulate Leadership	4 2 2	2 2	
END SEMESTER EXAM				

EVALUATION SCHEME

Internal Evaluation

(Conducted by the College)

Total Marks: 100

Part – A

(To be started after completion of Module 1 and to be completed by 30th working day of the semester)

1. Group Discussion – Create groups of about 10 students each and engage them on a GD on a suitable topic for about 20 minutes. Parameters to be used for evaluation is as follows;

(i)	Communication Skills	–	10 marks
(ii)	Subject Clarity	–	10 marks
(iii)	Group Dynamics	-	10 marks
(iv)	Behaviors & Mannerisms	-	10 marks

(Marks: 40)

Part – B

(To be started from 31st working day and to be completed before 60th working day of the semester)

2. Presentation Skills – Identify a suitable topic and ask the students to prepare a presentation (preferably a power point presentation) for about 10 minutes. Parameters to be used for evaluation is as follows;

(i)	Communication Skills*	-	10 marks
(ii)	Platform Skills**	-	10 marks
(iii)	Subject Clarity/Knowledge	-	10 marks

(Marks: 30)

* Language fluency, auditability, voice modulation, rate of speech, listening, summarizes key learnings etc.

** Postures/Gestures, Smiles/Expressions, Movements, usage of floor area etc.

Part – C

(To be conducted before the termination of semester)

3. Sample Letter writing or report writing following the guidelines and procedures. Parameters to be used for evaluation is as follows;

(i)	Usage of English & Grammar	-	10 marks
(ii)	Following the format	-	10 marks
(iii)	Content clarity	-	10 marks

(Marks: 30)

External Evaluation

(Conducted by the University)

Total Marks: 50 Time: 2 hrs.

Part – A

Short Answer questions

There will be one question from each area (five questions in total). Each question should be written in about maximum of 400 words. Parameters to be used for evaluation are as follows;

(i) Content Clarity/Subject Knowledge
(ii) Presentation style
(iii) Organization of content

(Marks: 5 x 6 = 30)

Part – B

Case Study

The students will be given a case study with questions at the end the students have to analyze the case and answer the question at the end. Parameters to be used for evaluation are as follows;

(i) Analyze the case situation
(ii) Key players/characters of the case
(iii) Identification of the problem (both major & minor if exists)
(iv) Bring out alternatives
(v) Analyze each alternative against the problem
(vi) Choose the best alternative
(vii) Implement as solution
(viii) Conclusion
(ix) Answer the question at the end of the case

(Marks: 1 x 20 = 20)

Course code	Course Name	L-T-P-Credits	Year of Introduction
IT201	Digital System Design	3-1-0-4	2016

Prerequisite : Nil

Course Objectives

1. To impart an understanding of the basic concepts of Boolean algebra and digital circuit design.
2. To provide familiarity with the design and implementation of different types of practically used combinational and sequential circuits.
3. To provide an introduction to Hardware Description Language
4. To expose the students to basics of arithmetic algorithms

Syllabus

Introduction to Number Systems, Boolean Algebra, Canonical Forms, Logic Gates, Digital Circuit Design - Combination Logic Circuit Design, Sequential Circuit Design, Registers, Counter, Memory modules, Programmable Logical Arrays, Hardware Description Language for Circuit Design, Case study with VHDL, Arithmetic algorithms

Expected Outcomes

Student will be able to:-

1. Apply the basic concepts of Boolean algebra for the simplification and implementation of logic functions using suitable gates namely NAND, NOR etc.
2. Design simple Combinational Circuits such as Adders, Subtractors, Code Convertors, Decoders, Multiplexers, Magnitude Comparators etc.
3. Design Sequential Circuits such as different types of Counters, Shift Registers, Serial Adders, Sequence Generators.
4. Use Hardware Description Language for describing simple logic circuits.
5. Apply algorithms for addition/subtraction operations on Binary, BCD and Floating Point Numbers.

Text Books:

1. Mano M. M., *Digital Logic & Computer Design*, 4/e, Pearson Education, 2013.
2. Charles H Roth ,Jr, Lizy Kurian John, *Digital System Design using VHDL*,2/e, Cengage Learning

References:

1. Tokheim R. L., *Digital Electronics Principles and Applications*, 7/e, Tata McGraw Hill, 2007.
2. Mano M. M. and M. D Ciletti, *Digital Design*, 4/e, Pearson Education, 2008.
3. Rajaraman V. and T. Radhakrishnan, *An Introduction to Digital Computer Design*, 5/e, Prentice Hall India Private Limited, 2012.
4. Leach D, Malvino A P, Saha G, *Digital Principles and Applications, 8/e, McGraw Hill Education, 2015.*
5. Floyd T. L., *Digital Fundamentals*, 10/e, Pearson Education, 2009
6. M. Morris Mano, *Computer System Architecture*, 3/e, Pearson Education, 2007.
7. Harris D. M. and, S. L. Harris, Digital *Design and Computer Architecture*, 2/e, Morgan Kaufmann Publishers, 2013

COURSE PLAN			
Module	**Contents**	**Contact Hours**	**Sem. Exam Marks**
I	Number systems – Decimal, Binary, Octal and Hexadecimal – conversion from one system to another –representation of negative numbers – representation of BCD numbers – character representation – character coding schemes – ASCII – EBCDIC etc Addition, subtraction, multiplication and division of binary numbers (no algorithms). Addition and subtraction of BCD, Octal and Hexadecimal numbers Representation of floating point numbers – precision –addition, subtraction, multiplication and division of floating point numbers	10	**15%**
II	Introduction — Postulates of Boolean algebra – Canonical and Standard Forms — logic functions and gates Methods of minimization of logic functions — Karnaugh map method and Quine- McClusky method Product-of-Sums Simplification — Don't-Care Conditions.	09	**15%**
III	Combinational Logic: combinational Circuits and design procedure — binary adder and subtractor — multi—level NAND and NOR circuits — Exclusive-OR and Equivalence Functions. Implementation of combination logic: parallel adder, carry look ahead adder, BCD adder, code converter, magnitude comparator, decoder, multiplexer, demultiplexer, parity generator.	09	**15%**
IV	Sequential logic circuits: latches and flip-flops – edge triggering and level-triggering — RS, JK, D and T flipflops — race condition — master-slave flip-flop. Clocked sequential circuits: state diagram — state reduction and assignment — design with state equations	07	**15%**
V	Registers: registers with parallel load - shift registers universal shift registers – application: serial adder.	08	**20%**

	Counters: asynchronous counters — binary and BCD ripple counters — timing sequences — synchronous counters — up-down counter, BCD counter, Johnson counter, Ring counter		
VI	Memory and Programmable Logic: Random-Access Memory (RAM)—Memory Decoding—Error Detection and Correction — Read only Memory (ROM), Programmable Logic Array (PLA). *HDL:* fundamentals, combinational logic, adder, multiplexer. Case Study : Implementation of 4-bit adder and 4-bit by 4-bit multiplier using VHDL Arithmetic algorithms: Algorithms for addition and subtraction of binary and BCD numbers, algorithms for floating point addition and subtraction , Booth's Algorithm	**10**	**20%**

QUESTION PAPER PATTERN (End semester examination)

Maximum Marks : 100 Exam Duration: 3 hours

Part A –(Modules I and II) 2 out of 3 questions (uniformly covering the two modules) are to be answered. Each question carries 15 marks and can have a maximum of 4 sub divisions

Part B – (Modules III and IV) 2 out of 3 questions (uniformly covering the two modules) are to be answered. Each question carries 15 marks and can have a maximum of 4 sub divisions

Part C – (Modules V and VI) 2 out of 3 questions (uniformly covering the two modules) are to be answered. Each question carries 20 marks and can have a maximum of 4 sub divisions

Course No.	Course Name	L-T-P - Credits	Year of Introduction
IT202	Algorithm Analysis & Design	4-0-0-4	2016

Prerequisite: CS205 Data structures

Course Objectives

- To develop an understanding about basic algorithms and different problem solving strategies.
- To improve creativeness and the confidence to solve non-conventional problems and expertise for analysing existing solutions.

Syllabus

Properties of an Algorithm- Asymptotic Notations – 'Oh', 'Omega', 'Theta', Worst, Best and Average Case Complexity-Recurrence Relations – Solving Recurrences using Iteration and Recurrence Trees.- Divide and Conquer- Greedy Strategy -Dynamic Programming -Backtracking -Branch and Bound Techniques -Sophisticated Algorithms- Approximation Algorithms -String Matching Algorithms -Lower Bound Theory-randomized algorithm

Expected outcome .

The students will be able to

- Describe the performance analysis of algorithms and asymptotic notations.
- Solve recurrence equations using iteration and recursion tree methods.
- Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it.
- Discuss greedy and dynamic programming in algorithm design and recite algorithms that employ this paradigm.
- Explain backtracking and branch and bound technique used in algorithms
- Interpret the approximation algorithms, randomized algorithms and string matching algorithms

Text Book:

1 Fundamentals of Computer Algorithms – Horowitz and Sahni, Galgotia

References:

1. Computer Algorithms – Introduction to Design and Analysis – Sara Baase & Allen Van Gelder, Pearson Education
2. Data Structures algorithms and applications – Sahni, Tata McGrHill
3. Foundations of Algorithms – Richard Neapolitan, Kumarss N., DC Hearth & Company
4. Introduction to algorithm- Thomas Coremen, Charles, Ronald Rivest -PHI

Course Plan

Module	Contents	Hours	Sem. Exam Marks
I	Introduction and Complexity What is an algorithm – Properties of an Algorithm, Development of an algorithm, Pseudo-code Conventions, Recursive Algorithms – Performance Analysis - Space and Time Complexity –Asymptotic Notations – 'Oh',	10	15%

	'Omega', 'Theta', Worst, Best and Average Case Complexity, Running Time Comparison, Common Complexity Functions - Recurrence Relations – Solving Recurrences using Iteration and Recurrence Trees – Example Problems Profiling - Amortized Complexity.		
II	**Divide and Conquer** - Control Abstraction, Finding Maximum and Minimum,Binary Search, Divide and Conquer Matrix Multiplication, Stressen's Matrix Multiplication, Quick Sort, Merge Sort.	8	15%
FIRST INTERNAL EXAMINATION			
III	**Greedy Strategy**- Control Abstraction, General Knapsack Problem, Minimum Cost Spanning Trees – PRIM's Algorithm, Kruskal's Algorithm, Job sequencing with deadlines.	8	15%
IV	**Backtracking**– State Space Tree - Fixed Tuple and Variable Tuple Formulation - Control Abstraction – Generating Function and Bounding Function - Efficiency of the method - Monte Carlo Method – N-Queens Problem, Sum of Subsets. **Branch and Bound Techniques**– FIFO, LIFO, and LC Control Abstractions, 15-puzzle.	9	15%
SECOND INTERNAL EXAMINATION			
V	**Dynamic Programming**- Principle of Optimality, Multistage Graph Problem, Forward Approach, Backward Approach, All-Pairs Shortest Paths, Traveling Salesman Problem. Sophisticated Algorithms- Approximation Algorithms – Planar Graph Coloring, Vertex cover	10	20%
VI	String Matching Algorithms – Rabin Karp algorithm - Topological Sort - Deterministic and Non-Deterministic Algorithms. Lower Bound Theory- Comparison Trees for Searching and Sorting, lower bound on comparison based algorithms, Sorting, Selection & Merging; Oracles and Adversary Arguments – Merging,Basic concepts of randomized algorithm-Las Vagas algorithm for search.	9	20%
END SEMESTER EXAM			

QUESTION PAPER PATTERN (End semester examination)

Maximum Marks : 100 Exam Duration: 3 Hrs

Part A –(Modules I and II) 2 out of 3 questions (uniformly covering the two module) are to be answered. Each question carries 15 marks and can have a maximum of 4 sub divisions

Part B – (Modules III and IV) 2 out of 3 questions (uniformly covering the two module) are to be answered. Each question carries 15 marks and can have a maximum of 4 sub divisions

Part C – (Modules V and VI) 2 out of 3 questions (uniformly covering the two module) are to be answered. Each question carries 20 marks and can have a maximum of 4 sub divisions

Course code	Course Name	L-T-P	Credits	Year of Introduction
IT203	Data Communication	3-0-0	3	2016

Prerequisite : Nil

Course Objectives

- Build an understanding of the fundamental concepts of data transmission.
- Familiarize the student with the basics of encoding of analog and digital data
- Preparing the student for understanding advanced courses in computer networking

Syllabus

Communication model-. Time Domain and Frequency Domain concepts-- Transmission Impairments- Channel capacity- Transmission media- Synchronous and Asynchronous transmission. Sampling theorem - Encoding digital data into digital signal- Encoding analog data into digital signals-- Encoding analog data into analog signals- Multiplexing- Spread spectrum -Purpose of encoding- Construction of basic source codes:- Error Detecting and correcting codes-encoding and decoding of codes -Basic principles of switching - circuit switching, packet switching, message switching. - Basics of wireless communication

Expected Outcome

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

- Explain Data Communications concepts and its components.
- Identify the different types of Transmission media and their functions within a network.
- Independently understand encoding, decoding , error correction and error detection in data communication
- To understand switching principles and basics of wireless communication

References

1. Stallings W., Data and Computer Communications, 8/e, Prentice Hall, 2007.
2. Forouzan B. A., Data Communications and Networking, 4/e, Tata McGraw Hill, 2007. 9
3. Tanenbaum A. S and D. Wetherall, Computer Networks, Pearson Education, 2013.
4. Schiller J., Mobile Communications, 2/e, Pearson Education, 2009.
5. Ranjan Bose ,Information Theory, Coding and Cryptography 2nd Edition:, Tata McGraw-Hill, New Delhi, 2008
6. Simon Haykin,Communication Systems: John Wiley & Sons. Pvt. Ltd.
7. Taub & Schilling, Principles of Communication Systems: Tata McGraw-Hill
8. Das, Mullick & Chatterjee, Principles of Digital Communication: Wiley Eastern Ltd.

9. Error Control Coding Fundamentals and Applications: Prentice Hall Inc.

Module	Course Plan	Hours	End-Semester Exam marks
I	Communication model Simplex, half duplex and full duplex transmission. Time Domain and Frequency Domain concepts - Analog & Digital data and signals - Transmission Impairments - Attenuation, Delay distortion, Noise - Different types of noise Channel capacity -Shannon's Theorem - Transmission media- twisted pair, Coaxial cable, optical fiber, terrestrial microwave, satellite microwave.	**7**	**15%**
II	Synchronous and Asynchronous transmission. Sampling theorem - Encoding digital data into digital signal - NRZ, Biphase, Multilevel binary - Encoding digital data into analog signals - ASK, FSK, PSK	**7**	**15%**
FIRST INTERNAL EXAM			
III	Encoding analog data into digital signals - PCM, PM, DM - Encoding analog data into analog signals - AM, FM, PM. Multiplexing - TDM, FDM, WDM & DWDM Encoding techniques, . Spread spectrum-The concept of spread spectrum – frequency hopping spread spectrum – direct sequence spread spectrum – code division multiple access	7	15%
IV	Purpose of encoding, Instantaneous codes, Construction of instantaneous codes. Construction of basic source codes. Huffman coding, Arithmetic coding, ZIP coding. Error Detecting and correcting codes. Error detection - parity check, Forward Error Correction. Block codes, Convolution codes.	**7**	**15%**
SECOND INTERNAL EXAM			
V	Cyclic codes: - Generator polynomial, Generator and Parity check matrices, Encoding of cyclic codes, Syndrome computation and error detection -CRC, VRC. Decoding of cyclic codes, BCH codes, RS codes, Burst error correction.	**7**	**20%**

VI	Hamming codes, Encoding and decoding of systematic and unsystematic codes Basic principles of switching - circuit switching, packet switching, message switching. Basics of wireless communication, Introduction to WiFi, WiMax, GSM, GPRS.	**7**	**20%**
END SEMESTER EXAM			

QUESTION PAPER PATTERN (End semester examination)

Maximum Marks : 100 Exam Duration: 3 Hrs

Part A –(Modules I and II) 2 out of 3 questions (uniformly covering the two module) are to be answered. Each question carries 15 marks and can have a maximum of 4 sub divisions

Part B – (Modules III and IV) 2 out of 3 questions (uniformly covering the two module) are to be answered. Each question carries 15 marks and can have a maximum of 4 sub divisions

Part C – (Modules V and VI) 2 out of 3 questions (uniformly covering the two module) are to be answered. Each question carries 20 marks and can have a maximum of 4 sub divisions

Course No.	Course Name	L-T-P	Credits	Year of Introduction
IT204	Object Oriented Techniques	3-0-0	3	2016

Prerequisite : Nil

Course Objectives

- To build an understanding of basic concepts of object oriented programming techniques
- To develop programming skills in C++ programming language
- To implement object oriented techniques using C++ language features.
- To develop software using object oriented programming paradigms

Syllabus

Characteristics of Object-Oriented Languages- Objects and Classes - Arrays and Strings - Operator Overloading – Overloading Unary Operators - Overloading Binary Operators - Arrays as Class Member Data - Inheritance – Derived Class and Base Class - Class Hierarchies - Public and Private Inheritance - Levels of Inheritance - Multiple Inheritance - Pointers - The Address-of Operator - Pointers and Arrays - Pointers and Functions - Memory Management - Pointers to Objects - Virtual Functions - Late Binding - Friend Functions - Static Functions - Assignment and Copy Initialization - The this Pointer - Streams and Files - Stream Classes - File Pointers - Templates and Exceptions - Function Templates - Class Templates - Exceptions

Expected Outcome

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

- Explain Object Oriented Programming concepts.
- To understand the special features of C++ Programming language
- To upgrade existing procedure oriented softwares to object oriented based ones

References

1. Lafore R., Object Oriented Programming in C++, Galgotia Publications, 2001.
2. Schildt H., Teach Yourself C++, Tata McGraw Hill, 2000.
3. Hubbard J. R., Schaum’s Outline of Programming with C++, McGraw Hill, 2000.
4. Balagurusamy, Object Oriented Programming with C++, Tata McGraw Hill, 2008.
5. Stephen D. R., C. Diggins, J. Turkanis and J. Cogswell, C ++ Cook book, O'Reilly Media, 2013.
6. Oualline S., Practical C++ Programming, 2/e, O'Reilly Media, 2002.
7. Meyers S., Effective C++, Addison Wesley, 2011. Error Control Coding Fundamentals and Applications: Prentice Hall Inc.

Module	Course Plan	Hours	% of Marks in End-Semester Examination
I	Why Do We Need Object-Oriented Programming? - Procedural Languages - The Object-Oriented Approach - Characteristics of Object-Oriented Languages – Objects – Classes – Inheritance – Reusability - Creating New Data Types - Polymorphism and Overloading - C++ and C Objects and Classes - A Simple Class - Classes and Objects - Defining the Class - Using the Class - Calling Member Functions - C++ Objects as Physical Objects - C++ Objects as Data Types – Constructors – Destructors - Objects as Function Arguments - Overloaded Constructors - Member Functions Defined Outside the Class - Objects as Arguments - The Default Copy Constructor - Static Class Data - const and Classes	**7**	**15**
II	Arrays and Strings - Array Fundamentals - Arrays as Class Member Data - Arrays of Objects - The Standard C++ string Class Operator Overloading - Overloading Unary Operators - Overloading Binary Operators - Data Conversion	**6**	**15**
FIRST INTERNAL EXAM			
III	Inheritance - Derived Class and Base Class - Derived Class Constructors - Overriding Member Functions - Which Function Is Used? Class Hierarchies - Public and Private Inheritance - Levels of Inheritance - Multiple Inheritance	7	15
IV	Pointers - Addresses and Pointers - The Address-of Operator & - Pointers and Arrays Pointers and Functions - Memory Management: new and delete - Pointers to Objects	**8**	**15**
SECOND INTERNAL EXAM			
V	Virtual Functions - Friend Functions - Static Functions - Assignment and Copy Initialization - The this Pointer Streams and Files - Stream Classes - Stream Errors - Disk File I/O with Streams - File Pointers - File I/O with Member	**8**	**20**

	Functions		
VI	Templates and Exceptions - Function Templates - Class Templates Exceptions - Exception Syntax - Multiple Exceptions - Exceptions with Arguments	**7**	**20**
END SEMESTER EXAM			

QUESTION PAPER PATTERN (End semester examination)

Maximum Marks : 100 Exam Duration: 3 Hrs

Part A –(Modules I and II) 2 out of 3 questions (uniformly covering the two module) are to be answered. Each question carries 15 marks and can have a maximum of 4 sub divisions

Part B – (Modules III and IV) 2 out of 3 questions (uniformly covering the two module) are to be answered. Each question carries 15 marks and can have a maximum of 4 sub divisions

Part C – (Modules V and VI) 2 out of 3 questions (uniformly covering the two module) are to be answered. Each question carries 20 marks and can have a maximum of 4 sub divisions

Course No.	Course Name	L-T-P - Credits	Year of Introduction
MA201	LINEAR ALGEBRA AND COMPLEX ANALYSIS	3-1-0-4	2016

Prerequisite : Nil

Course Objectives

COURSE OBJECTIVES

- To equip the students with methods of solving a general system of linear equations.
- To familiarize them with the concept of Eigen values and diagonalization of a matrix which have many applications in Engineering.
- To understand the basic theory of functions of a complex variable and conformal Transformations**.**

Syllabus

Analyticity of complex functions-Complex differentiation-Conformal mappings-Complex integration-System of linear equations-Eigen value problem

Expected outcome .

At the end of the course students will be able to
(i) solve any given system of linear equations
(ii) find the Eigen values of a matrix and how to diagonalize a matrix
(iii) identify analytic functions and Harmonic functions.
(iv)evaluate real definite Integrals as application of Residue Theorem
(v) identify conformal mappings(vi) find regions that are mapped under certain Transformations

Text Book:

Erwin Kreyszig: Advanced Engineering Mathematics, 10th ed. Wiley

References:

1.Dennis g Zill&Patric D Shanahan-A first Course in Complex Analysis with Applications-Jones&Bartlet Publishers
2.B. S. Grewal. Higher Engineering Mathematics, Khanna Publishers, New Delhi.
3.Lipschutz, Linear Algebra,3e **(** Schaums **Series)**McGraw Hill Education India 2005
4.Complex variables introduction and applications-second edition-Mark.J.Owitz-Cambridge Publication

Course Plan

Module	Contents	Hours	Sem. Exam Marks
I	Complex differentiation Text 1[13.3,13.4] Limit, continuity and derivative of complex functions	3	
	Analytic Functions	2	
	Cauchy–Riemann Equation(Proof of sufficient condition of analyticity & C R Equations in polar form not required)-Laplace's Equation	2	
	Harmonic functions, Harmonic Conjugate	2	15%
II	Conformal mapping: Text 1[17.1-17.4] Geometry of Analytic functions Conformal Mapping,	1	
	Mapping $w = z^2$ conformality of $w = e^z$.	2	15%

	The mapping $w = z + \frac{1}{z}$ Properties of $w = \frac{1}{z}$ Circles and straight lines, extended complex plane, fixed points Special linear fractional Transformations, Cross Ratio, Cross Ratio property-Mapping of disks and half planes Conformal mapping by $w = \sin z$ & $w = \cos z$ (Assignment: Application of analytic functions in Engineering)	1 3 3	
FIRST INTERNAL EXAMINATION			
III	Complex Integration. Text 1[14.1-14.4] [15.4&16.1] Definition Complex Line Integrals, First Evaluation Method, Second Evaluation Method Cauchy's Integral Theorem(without proof), Independence of path(without proof), Cauchy's Integral Theorem for Multiply Connected Domains (without proof) Cauchy's Integral Formula- Derivatives of Analytic Functions(without proof)Application of derivative of Analytical Functions Taylor and Maclaurin series(without proof), Power series as Taylor series, Practical methods(without proof) Laurent's series (without proof)	2 2 2 2 2	15%
IV	Residue Integration Text 1 [16.2-16.4] Singularities, Zeros, Poles, Essential singularity, Zeros of analytic functions Residue Integration Method, Formulas for Residues, Several singularities inside the contour Residue Theorem. Evaluation of Real Integrals (i) Integrals of rational functions of $\sin\theta$ and $\cos\theta$ (ii)Integrals of the type $\int_{-\infty}^{\infty} f(x)dx$ (Type I, Integrals from 0 to ∞) (Assignment : Application of Complex integration in Engineering)	2 4 3	15%
SECOND INTERNAL EXAMINATION			
V	Linear system of Equations Text 1(7.3-7.5) Linear systems of Equations, Coefficient Matrix, Augmented Matrix Gauss Elimination and back substitution, Elementary row operations, Row equivalent systems, Gauss elimination-Three possible cases, Row Echelon form and Information from it.	1 5	20%

	Linear independence-rank of a matrix Vector Space-Dimension-basis-vector space$\mathbf{R^3}$ Solution of linear systems, Fundamental theorem of non-homogeneous linear systems(Without proof)-Homogeneous linear systems (Theory only	2 1	
VI	Matrix Eigen value Problem Text 1.(8.1,8.3 &8.4) Determination of Eigen values and Eigen vectors-Eigen space Symmetric, Skew Symmetric and Orthogonal matrices –simple properties (without proof) Basis of Eigen vectors- Similar matrices Diagonalization of a matrix-Quadratic forms- Principal axis theorem(without proof) (Assignment-Some applications of Eigen values(8.2))	3 2 4	20%
END SEMESTER EXAM			

QUESTION PAPER PATTERN:

Maximum Marks : 100 Exam Duration: 3 hours

The question paper will consist of 3 parts.

Part A will have 3 questions of 15 marks each uniformly covering modules I and II. Each question may have two sub questions.

Part B will have 3 questions of 15 marks each uniformly covering modules III and IV. Each question may have two sub questions.

Part C will have 3 questions of 20 marks each uniformly covering modules V and VI. Each question may have three sub questions.

Any two questions from each part have to be answered.

Course No.	Course Name	L-T-P - Credits	Year of Introduction
MA202	Probability distributions, Transforms and Numerical Methods	3-1-0-4	2016

Prerequisite: Nil

Course Objectives

- To introduce the concept of random variables, probability distributions, specific discrete and continuous distributions with practical application in various Engineering and social life situations.
- To know Laplace and Fourier transforms which has wide application in all Engineering courses.
- To enable the students to solve various engineering problems using numerical methods.

Syllabus

Discrete random variables and Discrete Probability Distribution.
Continuous Random variables and Continuous Probability Distribution.
Fourier transforms.
Laplace Transforms.
Numerical methods-solution of Algebraic and transcendental Equations, Interpolation.
Numerical solution of system of Equations. Numerical Integration, Numerical solution of ordinary differential equation of First order.

Expected outcome .

After the completion of the course student is expected to have concept of
(i) Discrete and continuous probability density functions and special probability distributions.
(ii) Laplace and Fourier transforms and apply them in their Engineering branch
(iii) numerical methods and their applications in solving Engineering problems.

Text Books:

1. Miller and Freund's "Probability and statistics for Engineers"-Pearson-Eighth Edition.
2. Erwin Kreyszig, "Advanced Engineering Mathematics", 10th edition, Wiley, 2015.

References:

1. V. Sundarapandian, "Probability, Statistics and Queuing theory", PHI Learning, 2009.
2. C. Ray Wylie and Louis C. Barrett, "Advanced Engineering Mathematics"-Sixth Edition.
3. Jay L. Devore, "Probability and Statistics for Engineering and Science"-Eight Edition.
4. Steven C. Chapra and Raymond P. Canale, "Numerical Methods for Engineers"-Sixth Edition-Mc Graw Hill.

Course Plan

Module	Contents	Hours	Sem. Exam Marks
I	**Discrete Probability Distributions.** (Relevant topics in section 4.1,4,2,4.4,4.6 Text1)		
	Discrete Random Variables, Probability distribution function, Cumulative distribution function.	2	
	Mean and Variance of Discrete Probability Distribution.	2	
	Binomial Distribution-Mean and variance.	2	
	Poisson Approximation to the Binomial Distribution. Poisson distribution-Mean and variance.	2	15%

II	**Continuous Probability Distributions.** (Relevant topics in section 5.1,5.2,5.5,5.7 Text1) Continuous Random Variable, Probability density function, Cumulative density function, Mean and variance. Normal Distribution, Mean and variance (without proof). Uniform Distribution.Mean and variance. Exponential Distribution, Mean and variance.	 2 4 2 2	15%
FIRST INTERNAL EXAMINATION			
III	**Fourier Integrals and transforms. (**Relevant topics in section 11.7, 11.8, 11.9 Text2) Fourier Integrals. Fourier integral theorem (without proof). Fourier Transform and inverse transform. Fourier Sine & Cosine Transform, inverse transform.	 3 3 3	15%
IV	**Laplace transforms. (**Relevant topics in section 6.1,6.2,6.3,6.5,6.6 Text2**)** Laplace Transforms, linearity, first shifting Theorem. Transform of derivative and Integral, Inverse Laplace transform, Solution of ordinary differential equation using Laplace transform. Unit step function, second shifting theorem. Convolution Theorem (without proof). Differentiation and Integration of transforms.	 3 4 2 2 2	15%
SECOND INTERNAL EXAMINATION			
V	**Numerical Techniques**.(Relevant topics in section.19.1,19.2,19.3 Text2) Solution Of equations by Iteration, Newton- Raphson Method. Interpolation of Unequal intervals-Lagrange's Interpolation formula. Interpolation of Equal intervals-Newton's forward difference formula, Newton's Backward difference formula.	 2 2 3	20%
VI	**Numerical Techniques**. (Relevant topics in section 19.5,20.1,20.3, 21.1 Text2) Solution to linear System- Gauss Elimination, Gauss Seidal Iteration Method. Numeric Integration-Trapezoidal Rule, Simpson's 1/3 Rule. Numerical solution of firstorder ODE-Euler method, Runge-Kutta Method (fourth order).	 3 3 3	20%
END SEMESTER EXAM			

QUESTION PAPER PATTERN:

Maximum Marks : 100 Exam Duration: 3 hours

The question paper will consist of 3 parts.

Part A will have 3 questions of 15 marks each uniformly covering modules I and II. Each question may have two sub questions.

Part B will have 3 questions of 15 marks each uniformly covering modules III and IV. Each question may have two sub questions.

Part C will have 3 questions of 20 marks each uniformly covering modules V and VI. Each question may have three sub questions.

Any two questions from each part have to be answered.