

**SCHEME FOR EXAMINATION
B.TECH (FOUR YEAR) DEGREE COURSE
COMPUTER SCIENCE AND ENGINEERING
SCHOOL OF STUDIES IN ENGINEERING & TECHNOLOGY
GURU GHASIDAS VISHWAVIDYALAYA
THIRD YEAR, SEMESTER - V
W.E.F. SESSION 2020-21**

Branch :- Computer Science & Engg.

Year : III

Sem- V

S. No.	Code no.	Subject	Periods			Evaluation Scheme			Credits
			L	T	P	IA	ESE	Total	
1	CS05TES05	Microprocessor and Interfaces	3	0	0	30	70	100	3
2	CS05TPC08	Relational Data Base Management System	3	0	0	30	70	100	3
3	CS05TPC09	Formal Language and Automata Theory	3	0	0	30	70	100	3
4	CS05TPC10	Parallel Computing	3	0	0	30	70	100	3
5	CS05TPEX	Professional Elective-I	3	0	0	30	70	100	3
6	CS05TMC02	Constitution of India	3	0	0	0	0	0	0
PRACTICAL									
1	CS05PPC05	Relational Data Base Management System Lab	0	0	3	30	20	50	1.5
2	CS05PPC06	Parallel Computing Lab	0	0	3	30	20	50	1.5
3	CS05PPR01	Minor Project- I	0	0	3	30	20	50	1.5
Total									19.5

Professional Elective-I Subject V Sem.			
S. No.	Subject Code	Subject	Credits
1	CS05TPE01	Software Engineering	3
2	CS05TPE02	Information Theory & coding	3
3	CS05TPE03	Mobile Communication	3
4	CS05TPE04	Multimedia System Design	3

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THIRD YEAR, SEMESTER - VI
W.E.F. SESSION 2020-21**

Branch :- Computer Science & Engg. Year : III Sem- VI

S. No.	Code no.	Subject	Periods			Evaluation Scheme			Credits
			L	T	P	IA	ESE	Total	
1	CS06TPC11	Design and Analysis of Algorithms	3	0	0	30	70	100	3
2	CS06TPC12	Java	3	0	0	30	70	100	3
3	CS06TPC13	Computer Graphics	3	0	0	30	70	100	3
4	CS06TPEX	Professional Elective-I	3	0	0	30	70	100	3
5	CS06TPEX	Professional Elective-II	3	0	0	30	70	100	3
6	CS06TOEX	Open Elective-I	3	0	0	30	70	100	3
PRACTICAL									
1	CS06PPC07	Design and Analysis of Algorithms Lab	0	0	3	30	20	50	1.5
2	CS06PPC08	Java Lab	0	0	3	30	20	50	1.5
3	CS06PPR02	Minor Project-II	0	0	3	30	20	50	1.5
Total									22.5

Professional Elective-I & II Subject VI Sem.				Open Elective-I Subject VI Sem.			
S.No	Subject Code	Subject	Credits	S.No	Subject Code	Subject	Credits
1	CS06TPE05	Digital Image Processing	3	1	CS06TOE01	Management Information System	3
2	CS06TPE06	Robotics	3	2	CS06TOE02	E-Commerce	3
3	CS06TPE07	Artificial Intelligence	3	3	CS06TOE03	Human Resource Management	3
4	CS06TPE08	Software Testing and Quality Assurance	3	4	CS06TOE04	Business Intelligence	3

Sub Title: MICROPROCESSOR AND INTERFACES		
Sub Code: CS05TES05	No. of Credits : 3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE:

1. To describe the basic architecture of 8086.
2. To discuss the Instruction set of 8086.
3. Evaluate the different technique of interfacing with memory and IO devices.
4. Develop knowledge about interfacing devices and peripheral devices.
5. To describe the basic architecture of 80386 and co-processor.

UNIT No	Syllabus Content	No of Hours
1	Microprocessor Architecture -8086, Register organization of 8086, Signal descriptions of 8086 chip, Physical Memory organization, Introduction to Maximum and Minimum mode operation, Processor 8088.	8
2	Instruction formats, Addressing modes, Instruction Set of 8086: Data transfer instructions, Arithmetic instructions, Logical instructions, Branch instructions, Shift and rotate instructions, String Manipulation instructions, Machine Control Instruction, Flag Manipulation Instruction, Assembler Directive and Operators Programming with an Assembler, Programming examples.	7
3	Introduction to Stack, Stack Structure of 8086, Interrupt, Interrupt and Interrupt Service Routines, Non Maskable Interrupt, Maskable Interrupt. Subroutine, MACROS: Defining a MACRO, Passing Parameters to MACRO.	7
4	Memory Interfacing, Interfacing I/O Ports, Programmable Interval Timer 8253: Architecture and Signal Description, Operating modes, Programming and Interfacing 8253, DMA Controller 8257: Architecture and Signal Description, Keyboard/Display Controller 8279: Architecture and Signal Description, Mode of Operation, Floppy Disk Controller 8272: Architecture and Signal Description, Commands.	7
5	Multi microprocessor System: Numeric Processor 8087, IO Processor 8089. 80386: Features, Architecture and Signal Description, Register Organization, Real Mode, Protected Mode, Virtual Mode, Paging, Segmentation.	7

COURSE OUTCOMES: The students would have learnt

- CO1: Learn about the basic architecture of 8086.
- CO2: Develop a skill to do Assembly Language Programming.
- CO3: Learn to do interfacing with memory and IO devices.
- CO4: Develop a understanding about the peripheral devices.
- CO5: Learn about the basic of 80386 microprocessor and co-processor

Text Books:

1. Advanced Microprocessors and Peripherals – Architecture, Processing and Interfacing :A.K.Ray, K.M. Bhurchandi
2. Microcomputer System 8086/8088 Family – Architecture Programming and design : Y Liu and G. A. Gibson : Prentice Hall
3. 80386 Microprocessor Handbook C.H. Pappas and W. H. Murray :Osborne McGraw Hill

Reference Books:

1. Microprocessor Architecture Programming and Application: R.C. Gaonkar : Wiley Eastern.
2. Microprocessor8086 , 80386& Pentium , Barry B. Brey

Course Outcomes and their mapping with Programme Outcomes:

CO	PO												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	1	1							3	3	1	1
CO2	3	3	3	2	1							3	3	3	3
CO3	3	3	3	2	1							3	2	1	1
CO4	3	3	3	2	1							3	2	1	1
CO5	3	2	1	1	1							3	3	1	1

Weightage: 1-Sightly; 2-Moderately; 3-Strongly

Sub Title: Relational Data Base Management System		
Sub Code: CS05TPC08	No. of Credits : 3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE:

1. To describe a sound introduction to the discipline of database management systems.
2. To give a good formal foundation on the relational model of data and usage of Relational Algebra.
3. To introduce the concepts of basic SQL as a universal Database language.
4. To enhance knowledge to advanced SQL topics like embedded SQL, procedures connectivity through JDBC.
5. To demonstrate the principles behind systematic database design approaches by covering conceptual design, logical design through normalization.

UNIT No	Syllabus Content	No of Hours
1	Introduction: An overview of database management system, database system Vs file system, Database system concepts and architecture, data models schema and instances, data independence and data base language and interfaces, Data definitions language, DML, Overall Database Structure. Data Modeling using the Entity Relationship Model: ER model concepts, notation for ER diagram, mapping constraints, keys, Concepts of Super Key, candidate key, primary key, Generalization, aggregation, reduction of an ER diagrams to tables, extended ER model, relationships of higher degree.	8
2	Relational Data Model And Language: Relational data model concepts, integrity constraints: entity integrity, referential integrity, Keys constraints, Domain constraints, relational algebra, relational calculus, tuple and domain calculus, Introduction to SQL: Characteristics of SQL. Advantage of SQL. SQL data types and literals. Types of SQL commands. SQL operators and their procedure. Tables, views and indexes. Queries and sub queries. Aggregate functions. Insert, update and delete operations. Joins, Unions, Intersection, Minus, Cursors in SQL.	7
3	Data Base Design & Normalization: Functional dependencies, normal forms, first, second, third normal forms, BCNF, inclusion dependences, loss less join decompositions, normalization using FD, MVD, and JDs, alternative approaches to database design.	7
4	Transaction Processing Concepts: Transaction system, Testing of serializability, Serializability of schedules, conflict & view serializable schedule, recoverability, Recovery from transaction failures, log based recovery, checkpoints, deadlock handling.	7
5	Concurrency Control Techniques: Concurrency control, locking Techniques for concurrency control, Time stamping protocols for concurrency control, validation based protocol, multiple granularity, Multi version schemes, Recovery with concurrent transaction.	7

COURSE OUTCOMES: The students would have learnt

- CO1: Explain the features of database management systems and Relational database.
 CO2: Design conceptual models of a database using ER modeling for real life applications and construct queries in Relational Algebra.
 CO3: Create and populate a RDBMS for a real life application, with constraints and keys, using SQL.
 CO4: Retrieve any type of information from a database by formulating complex queries in SQL.
 CO5: Analyze the existing design of a database schema and apply concepts of normalization to design an optimal database.

Text Books:

1. Date C J, "An Introduction To Database System", Addison Wesley
2. Korth, Silbertz, Sudarshan, "Database Concepts", McGraw Hill
3. Elmasri, Navathe, "Fundamentals Of Database Systems", Addison Wesley
4. Leon & Leon, "Database Management System", Vikas Publishing House.

Reference Books:

1. Bipin C. Desai, "An introduction to Database Systems", Galgotia Publication
2. Majumdar & Bhattacharya, "Database Management System", TMH
3. Ramakrishnan, Gehrke, "Database Management System", McGraw Hill
4. Kroenke, "Database Processing: Fundamentals, Design and Implementation", Pearson Education.
5. Maheshwari Jain, "DBMS: Complete Practical Approach", Firewall Media, New Delhi

Course Outcomes and their mapping with Programme Outcomes:

	PO												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	1	3	3	3	3	1	3	1	3	3	3
CO2	3	3	3	3	1	3	3	3	3	1	3	1	3	3	3
CO3	3	3	3	3	1	3	3	3	3	1	3	1	3	3	3
CO4	3	3	3	3	1	3	3	3	3	1	3	1	3	3	3
CO5	3	3	3	3	1	3	3	3	3	1	3	1	3	3	3
CO6	3	3	3	3	1	3	3	3	3	1	3	1	3	3	3

Weightage: 1-Sightly; 2-Moderately; 3-Strongly

Sub Title: FORMALLANGUAGEANDAUTOMATATHEORY		
Sub Code: CS05TPC09	No. of Credits : =3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE:

1. To learn fundamentals of Regular and Context Free Grammars and Languages
2. To understand the relation between Regular Language and Finite Automata and machines.
3. To learn how to design Automata's and machines as Acceptors, Verifiers and Translators.
4. To understand the relation between Contexts free Languages, PDA and TM.
5. To learn how to design PDA as acceptor and TM as Calculators.
6. To learn how to correlate Automata's with Programs and Functions.

UNIT No	Syllabus Content	No of Hours
1	Finite Automata & Regular Expression: Deterministic and Non-deterministic Finite automata, Regular Expression, Two way finite automata, Finite automata with output, Properties of regular set, Pumping lemma, Closure properties.	8
2	Context Free Grammars (CFG): Introduction of CFG, Derivation trees, Simplification of normal forms, CNF, GNF, Regular Grammars, Unrestricted Grammars and Relations between Classes of languages.	7
3	Push Down Automata: Introduction of PDA, Definitions relationship between PDA and Context Free Languages, properties of CGL's, Decision Algorithms.	7
4	Turing Machine: The Turing machine model, Computable languages and functions, Modification of Turing machines, Church's Hypothesis	7
5	Recursive and Recursive Enumerable Languages: Properties of recursive and recursive enumerable languages Universal Turing machine, Undesirability Post correspondence problem, Introduction to Recursive function theory.	7

COURSE OUTCOMES: The students would have learnt

CO1: Understand, design, construct, analyze and interpret Regular languages, Expression and Grammars.

CO2: Design different types of Finite Automata and Machines as Acceptor, Verifier and Translator.

CO3: Understand, design, analyze and interpret Context Free languages, Expression and Grammars

CO4: Design different types of Push down Automata as Simple Parser.

CO5: Design different types of Turing Machines as Acceptor, Verifier, Translator and Basic computing machine.

Text Books:

1. Introduction to Automata Theory Languages and Computation, Hopcroft and Ullman, Narosa.
2. Theory of Computer Science, Mishra and Chandrashekharan, PHI.

Reference Books:

1. Theory of Computer Science, Kohan, John Wiley.
2. Theory of Computer Science, Korral
3. Introduction to Automata Theory Languages and Computation, Hopcroft and Ullman, Addison Wesley
4. Introduction to Languages & Theory of Computation, Martin, , TMH

Course Outcomes and their mapping with Programme Outcomes:

CO	PO												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	3						3	3	3	3
CO2	3	3	3	3	3	3						3	3	3	3
CO3	3	3	3	3	3	3						3	3	3	3
CO4	3	3	3	3	3	3						3	3	3	3
CO5	3	3	3	3	3	3						3	3	3	3

Weightage: 1-Slightly;, 2-Moderately; 3-Strongly;

Sub Title: PARALLEL COMPUTING		
Sub Code: CS05TPC10	No. of Credits : 3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE:

1. To introduce parallel, distributed and cloud computing, the major concept, ideas and various hardware model of parallel and distributed system.
2. To study design the multiprocessor system by various interconnection network like static and dynamic etc.
3. To study various technique for vector pipeline architecture design to achieve parallelism (concurrency)
4. To study about advanced and more power full processor technology
5. To study about parallel algorithm design, programming language and tools like Python, CUDA. To study about architecture design of GPU.

UNIT No	Syllabus Content	No of Hours
1	Introduction Of Parallelism: Introduction -parallelism in Uniprocessor systems, Principles of Scalable Performance, architectural classification schemes, SISD, SIMD, MISD, MIMD architectures, multiprocessor and multicomputer, UMA, NUMA, COMA, NORMA model Parallel algorithms: Various Sorting.	8
2	Parallel Models & Interconnection Network: System Interconnect architecture – static, dynamic, multistage interconnection networks, design considerations throughputs, delay, blocking and non-blocking properties interconnected memory organization - C-Access, S-Access, C-S access.	7
3	Pipeline & Vector Processing: Principal of Pipelining - Over lapped parallelism, principal of Liner pipelining processor, General pipelining and reservation tables, arithmetic pipelining, Design of pipeline Instruction units, arithmetic pipelining design example, hazard detection and resolution, JOB sequencing and collision prevention, vector processing function organization of instructions in IBM 360/91.	7
4	Advanced Processor and Parallelism: Advanced processor technology – RISC & CISC computers, super scalar architecture, principles of multithreading, multithreaded architectures of MP systems. Context switching policies, shared variables, locks, semaphores, monitor, multitasking and Cray multiprocessor.	7

5	<p>Parallel Programming Design Coding And Debugging: CPU parallelism, GPU parallelism- program, Exploiting parallelism in programmed-multidimensional arrays, directed acyclic graphs, distance and direction vectors, data flow computer and data flow graphs.</p> <p>Parallel algorithm structure, analyzing parallel algorithm. Elementary parallel algorithms, Programming: Parallel programming with Synchronous and Asynchronous, Various API of MPS, PYTHON, CUDA, OpenCL.</p>	7
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<p>COURSE OUTCOMES: The students would have learnt</p> <p>CO1: Spontaneously able to design the multiprocessor system with various hardware electronics circuit like CU, ALU, RAM etc.</p> <p>CO2: Design new interconnection network which connects the processors and other devices like input and output devices (I/O)</p> <p>CO3: Spontaneously try and invented a new type of pipeline processor architecture in which throughput can be as better as possible than all other.</p> <p>CO4: How do combine the techniques of parallelism to obtain a more power full architecture as a outcome.</p> <p>CO5: Course outcomes are skills and abilities to make parallel algorithm and program to enhance the speed up of execution of process.</p>

Text Books:

1. Computer Architecture & Parallel processing - Kai Hwang 7 Briggs.(MGH).
2. Advanced Computer Architecture with Parallel Programming", K. Hwang, MGH.
3. Quinn, Parallel computing – theory and practice, Tata McGraw Hill.
4. Sima and Fountain, Advanced Computer Architectures, Pearson Education
5. Ed. Afonso Ferreira and Jose’ D. P. Rolin, Parallel Algorithms for irregular problems - State of the art, Kluwer Academic Publishers

Reference Books:

1. Parallel Computers: Arch.& Prog., Rajaraman & Siva Ram Murthy, PHI.
2. Parallel computing- Theory and practice - Michael J Quinn- Mc Graw Hill
3. Selim G. Akl, The Design and Analysis of Parallel Algorithms, PH International.

Course Outcomes and their mapping with Programme Outcomes:

CO	PO												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	2	2	2								2	2	2
CO2	2	2	2	3	3								1	3	3
CO3	3	1	2	2	2								2	3	3
CO4	1	2	2	3	3								1	3	1
CO5	3	2	3	3	2								3	2	1

Weightage: 1-Slightly;, 2-Moderately; 3-Strongly;

Sub Title: SOFTWARE ENGINEERING		
Sub Code: CS05TPE01	No. of Credits :3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE:

1. To discuss the fundamental concepts of Software Engineering.
2. To discuss the Various Models of Software.
3. Acquire skills and knowledge to advance their career, including continually upgrading professional, communication, analytic, and technical skills.
4. To Learn the ability to work effectively as a team member and/or leader in an ever-changing professional environment
5. Learn to develop a small Software.

UNIT No	Syllabus Content	No of Hours
1	Software Engineering: What is software, Evolution of Software, Characteristics of software, Types of Software, Applications of software, Layered Technology, Software Process Models: Linear Sequential model, Prototype model, RAD model, Incremental model, Spiral Model, Component Based Development Model.	8
2	Managing Software Project The Management Spectrum: People, Product, Process, Project. Software Process and Project Metrics – Measures and Metrics , Software Measurement-Size Oriented Metrics, Function Oriented Metrics, Metrics for Quality-Overview, Measuring Quality, DRE. Software Requirement Specification-Problem Analysis, Requirement Specification. Validation and verification, The Make /Buy Decision.	7
3	System Design: Introduction, design principles, Problem partitioning, abstraction, top-down and bottom-up design, Low level Design:- Modularization, Structure Chart, Flow chart, Functional versus Object oriented approach, design specification, Design verification, monitoring and control.	7

4	<p>Coding: Top-down and bottom-up structured programming, information hiding, programming style, internal documentation, verification, monitoring and control.</p> <p>Software testing: Software Testing fundamentals, white box testing, Basis path testing, Cyclomatic Complexity, A strategic Issues, Unit testing, Integration testing, validation testing, System Testing.</p>	7
5	<p>Software Project Management: Cost estimation, project scheduling, Software configuration management, Quality assurance, Project Monitoring, Risk management.</p>	7

COURSE OUTCOMES: The students would have learnt

- CO1: The Fundamentals Of Software Engineering
CO2: How to apply the software engineering lifecycle
CO3: Understand of different software architectural styles and Process frame work.
CO4: Describe software measurement and software risks.
CO5: To Develop a Project.

Text Books:

1. Software Engg by Bharat bhushan agrawal, Sumit Prakash Tayal,

Reference Books:

1. Software Engg by Pressmen
2. Software Engg by Pankaj Jalote
3. Software Project Management by Manish Kumar Jha.

Course Outcomes and their mapping with Programme Outcomes:

CO	PO												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3	2	3	3	2	3	3	3	3	3	3	3	3
CO2	3	2	3	2	3	3	2	3	3	3	3	3	3	3	3
CO3	3	2	3	2	3	3	2	3	3	3	3	3	3	3	3
CO4	3	2	3	2	3	3	2	3	3	3	3	3	3	3	3
CO5	3	2	3	2	3	3	2	3	3	3	3	3	3	3	3

Weightage: 1-Slightly;, 2-Moderately; 3-Strongly;

Sub Title: RELATIONAL DATA BASE MANAGEMENT SYSTEM LAB	
Sub Code: CS05PPC05	No. of Credits : 1.5=0: 0: 1.5(L-T-P)
Exam Duration : 3 hours	IA+ESE =30+20

Lab OBJECTIVE:

1. To provide a sound introduction to the discipline of database management as a subject in its own right, rather than as a compendium of techniques and product-specific tools.
2. To familiarise the participant with the nuances of database environments towards an information-oriented data-processing oriented framework
3. To give a good formal foundation on the relational model of data
4. To present SQL and procedural interfaces to SQL comprehensively
5. To give an introduction to systematic database design approaches covering conceptual design, logical design and an overview of physical design

Unit No.	Content	Teaching Hours
I, II, III, IV and V	<ul style="list-style-type: none"> • Write the queries for Data Manipulation and Data Definition Language. • Write SQL queries using logical operations and operators. • Write SQL query using group by function. • Write SQL queries for group functions. • Write SQL queries for sub queries, nested queries. • Write programme by the use of PL/SQL. • Write SQL queries to create views. • Write an SQL query to implement JOINS. • Write a query for extracting data from more than one table. • Write a query to understand the concepts for ROLL BACK, COMMIT & CHECK POINTS. 	18

LAB OUTCOMES: The students would have learnt

CO1: Understand, appreciate and effectively explain the underlying concepts of database technologies

CO2: Design and implement a database schema for a given problem-domain Normalize a database

CO3: Populate and query a database using SQL DML/DDI commands.

CO4: Declare and enforce integrity constraints on a database using a state-of-the-art RDBMS

CO5: Programming PL/SQL including stored procedures, stored functions, cursors, packages.

Text Books:

1. An Introduction to Database System, Date C J, Addison Wesley
2. Database Concepts, Korth, Silbertz, Sudarshan, McGraw Hill
3. Fundamentals of Database Systems, Elmasri, Navathe, Addison Wesley
4. Database Management System, Leon & Leon, Vikas Publishing House.

Reference Books:

1. An introduction to Database Systems, Bipin C. Desai, Galgotia Publication
2. Database Management System, Majumdar & Bhattacharya, TMH
3. Database Management System, Ramakrishnan, Gehrke, McGraw Hill
4. Database Processing: Fundamentals, Design and Implementation, Kroenke, Pearson Education.
5. DBMS: Complete Practical Approach, Maheshwari Jain, Firewall Media, New Delhi

Course Outcomes and their mapping with Programme Outcomes:

	PO												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	1	3	3	3	3	1	3	1	3	3	3
CO2	3	3	3	3	1	3	3	3	3	1	3	1	3	3	3
CO3	3	3	3	3	1	3	3	3	3	1	3	1	3	3	3
CO4	3	3	3	3	1	3	3	3	3	1	3	1	3	3	3
CO5	3	3	3	3	1	3	3	3	3	1	3	1	3	3	3
CO6	3	3	3	3	1	3	3	3	3	1	3	1	3	3	3

Weightage: 1-Slightly;, 2-Moderately; 3-Strongly;

Sub Title: PARALLEL COMPUTING LAB	
Sub Code: CS05PPC06	No. of Credits : 1.5=0: 0: 1.5(L-T-P)
Exam Duration : 3 hours	IA+ESE =30+20

Lab OBJECTIVE:

1. To study about various platform and libraries of parallel processing.
2. To study about to create MPI programs to accomplish a computational task
3. To study about of API to carried out MPI
4. To study about to know GPU importance in parallel programming
5. To study about of shared memory in parallel

Unit No.	Content	Teaching Hours
I, II, III, IV and V	<ul style="list-style-type: none"> • Understanding the environment of OMP, MPI, CUDA • Parallel programming environment and platform. • Create and simulate multiple processes and threads on MP system. • Simulate parallel program to synchronization and pooling of processes. • Simulate the loop and function in parallelism manner. • Simulate a parallel algorithm to perform some mathematical calculation and their execution time. • Simulate the parallel sorting algorithm and their execution time. • Simulate the parallel searching algorithm and their execution time. • Simulate parallel some operation on array and list with their execution time. • Optimization technique using shared memory module on MP system. • Heterogeneous calculation using PYTHON (PTK), CUDA, and OPENCL tool kit. 	18

LAB OUTCOMES: The students would have learnt

- CO1: Simulate and create process and threads
CO2: Simulate parallel algorithm using various MPI
CO3: Simulate parallel program for many computational task
CO4: Simulate various memories to carry out optimization.
CO5: Do synchronous and asynchronous of process and pooling.

Text Books:

1. Programming Massively Parallel Processors: A Hands-on Approach Paperback – 20 December 2012 by David B. Kirk , Wen-mei W. Hwu
2. Introduction to Parallel Algorithms 1st Edition by Joseph JaJa.

Reference Books:

1. Python Parallel Programming Cookbook Paperback – August 26, 2015 by Giancarlo Zaccone

Course Outcomes and their mapping with Programme Outcomes:

CO	PO												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	3	2	3								2	2	2
CO2	1	2	2	2	3								1	3	3
CO3	2	2	3	2	1								2	3	3
CO4	2	1	2	2	3								1	3	1
CO5	3	2	2	2	3								3	2	1

Weightage: 1-Slightly;, 2-Moderately; 3-Strongly;

Sub Title: INFORMATION THEORY & CODING		
Sub Code: CS05TPE02	No. of Credits : 3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:36

<p>COURSE OBJECTIVE:</p> <ol style="list-style-type: none"> 1. Introduce the principles and applications of information theory. 2. To teach study how information is measured in terms of probability and entropy, and the relationships among conditional and joint entropies. 3. To teach coding schemes, including error correcting codes. 4. Explain how this quantitative measure of information may be used in order to build efficient solutions to multitudinous engineering problem

UNIT No	Syllabus Content	No of Hours
1	Introduction: Uncertainty, properties of information, Measures of information, Entropy: properties of entropy, information rate, conditional Entropy, Mutual Information.	8
2	Channel Capacity: Introduction, Shannon's Theorem, Continuous Channel, Capacity of Gaussian Channel: Shannon Hartley Theorem Bandwidth and S/N Trade-off.	7
3	Channel Coding: Introduction, Shannon-Fano Coding, Huffman Coding, Block Codes, Tree Codes, Cyclic Code, Hamming Codes, Convolutional Code.	7
4	Compression: Introduction, Types of Compression, Lossless and Lossy Compression, Binary Image Compression Schemes: Runlength Encoding, CCITT Groups, Video Compression.	7
5	Cryptography: Introduction, Types of Cryptosystem: Secret-key cryptosystem, Public-key cryptosystem, Encryption, Decryption, Ciphers and Secret Message, Cryptanalysis.	7

COURSE OUTCOMES: The students would have learnt

CO1: Apply information theory in source coding and channel coding
CO2: Understand how error control coding techniques are applied in communication systems.
CO3: Understand linear block codes for error detection and correction
CO4: Understand various error control encoding and decoding techniques
CO5: Students will understand the basic concepts of cryptography.

Text Books:

1. Information Theory, Coding and Cryptography by Ranjan Bose, Tata McGraw-Hill Education.
2. Communication System by R. P. Singh, S. D. Sapre, Tata McGraw-Hill.
3. Information Theory and Coding Techniques by J.S. Chitode and P.G. Chilveri, Technical Publication.

Reference Books:

1. Elements of Information Theory" by T. M. Cover and J. A. Thomas, John Wiley & Sons, New York.
2. Information Theory, Coding and Cryptography" by R. Bose, TMH.

Course Outcomes and their mapping with Programme Outcomes:

CO	PO												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	2	3	2						3	3	3	3
CO2	3	3	3	1	2	3						3	3	3	3
CO3	3	3	3	1	3	3						3	3	3	3
CO4	3	3	3	3	3	3						3	3	3	3
CO5	3	3	3	3	2	3						3	3	3	3

Weightage: 1-Slightly; 2-Moderately; 3-Strongly;

Sub Title: MOBILE COMMUNICATION		
Sub Code: CS05TPE03	No. of Credits : 3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE:

1. Discuss the evolution of Mobile communication and cell concept to improve capacity of the system.
2. Discuss the radio transmission of Mobile communication.
3. Discuss the concept of GSM, DECT and TETRA.
4. To know about infrastructure and infrastructure less network.
5. Discuss the concept of mobility i.e. Mobile IP and TCP

UNIT No	Syllabus Content	No of Hours
1	Introduction: Applications : Vehicles, Emergencies, Business, Replacement of wired networks, Infotainment, Location dependent services. Mobile and wireless devices, history of wireless communication, Reference Model.	8
2	Wireless Transmission: Frequencies For Radio Transmission, Signal Propagation, Multiplexing, Modulation, Spread Spectrum, Cellular System Medium Access Control Hidden And Exposed Terminals, Near And Far Terminals, SDMA, FDMA, TDMS, CDMA, Comparison Among Multiple Access Protocols.	7
3	Telecommunications Systems: Gsm: Mobile Services, System Architecture, Radio Interface, Protocols, Localization And Calling, Handover, Security, New Data Services. Dect, Tetra	7
4	Wireless Lan: Infrared vs radio transmission, Infrastructure and ad-hoc network, IEEE 802.11: System architecture, protocol architecture, Physical layer, Medium access control layer, MAC management, 802.11b, 802.11a, Newer developments, HIPERLAN, Bluetooth.	7
5	Mobile Communication Layers: Mobile network layer: Mobile IP, Goals, assumptions and requirements, Entities and terminology, IP packet delivery, Agent discovery, Registration, Tunneling and encapsulation, Optimizations, Reverse tunneling, IPv6. DHCP, Mobile Ad-hoc Routing, Mobile TCP, File System	7

COURSE OUTCOMES: The students would have learnt

CO1: Understand the evolution of Wireless communication.

CO2: Understand the concept of cellular system.

CO3: Understand the working of GSM.

CO4: Understand the infrastructure less network like Bluetooth. CO5:

Understand the concept of Mobility in mobile communication.

Text Books:

1. Mobile Communications by J. Schiller, Addison Wesley
2. Mobile IP by Charles Perkins, Addison Wesley.

Reference Books:

1. Ad hoc Networks by Charles Perkins, Addison Wesley.
2. Understanding WAP by M. V. D. Heijden, M. Taylor, Artech House.

Course Outcomes and their mapping with Programme Outcomes:

CO	PO												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	2	2	2								2	2	2
CO2	2	2	2	3	3								1	3	3
CO3	3	1	2	2	2								2	3	3
CO4	1	2	2	3	3								1	3	1
CO5	3	2	3	3	2								3	2	1

Weightage: 1-Slightly; 2-Moderately; 3-Strongly

Sub Title: MULTIMEDIA SYSTEM DESIGN		
Sub Code: CS05TPE04	No. of Credits : 3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:36

<p>COURSE OBJECTIVE:</p> <ol style="list-style-type: none"> 1. Understand technical aspect of Multimedia Systems. 2. Discuss the standards available for different audio, video and text applications. 3. Understand organization of multimedia database. 4. Discuss various multimedia authoring systems. 5. To develop multimedia application and analyse the performance of the same

UNIT No	Syllabus Content	No of Hours
1	Introduction: An introduction, Multimedia elements, Multimedia Applications, Multimedia System Architecture, Evolving Technologies for Multimedia Systems, Defining Objects for Multimedia systems, Multimedia Data Interface Standard, The need for data Compression, Multimedia databases.	8
2	Compression Techniques: Compression and Decompression, Types of compression, Binary Image Compression schemes, Color, Gray Scale, Still-video image Compression, Video Image Compression, Audio Compression, Fractal Compression.	7
3	Formats: Data and Format Standards, Rich-text Format, TIFF File Format, Resource Interchange File Format (RIFF), MIDI File Format, JPEG DIB File Format for still and Motion Images, MPEG standards Pen Input, Video and Image Display systems, Print Output Technologies, Image Scanners, Digital Voice and Audio, Digital Camera, Video Images and Animation, Full-Motion Video.	7
4	Storage: Storage and Retrieval Technologies, Magnetic Media Technology, Optical Media, Hierarchical Storage Management, Cache management for storage systems, Multimedia Application Design, Multimedia application classes, Types of multimedia systems, Components of multimedia systems, Organizing multimedia databases.	7

5	Multimedia Design: Unified Communication, video conferencing and Chat, Multimedia Authoring and User Interface, Multimedia authoring system, Hypermedia application design consideration, User interface design, Object display/playback issues, Multimedia Operating Systems introduction, realtime, Resource management, process management, file systems.	7
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COURSE OUTCOMES: The students would have learnt

- CO1: Various technical aspect of Multimedia Systems. CO2: Various file formats for audio, video and text media.
CO3: Develop various Multimedia Systems applicable in real time.
CO4: Concept of storage management of multimedia system.
CO5: To evaluate multimedia application for its optimum performance

Text Books:

1. Multimedia System Design by Prabhat K. Andleigh & Kiran Thakrar, Prentice PTR, NJ.
2. Multimedia: computing communications and applications by Ralf Steinmetz and KlaraNahrstedt, Innovating technology series by Pearson Edu. Asia.

Reference Books:

1. Multimedia Communications, Directions & Innovations by Jerry D.Gibson, Harcourt IndiaPvt.Ltd.
2. Multimedia computing by Borko, Handbook of CRC Press.
3. Multimedia Applications Development by Mark J.Bunzel Sandra K.Morris, McGraw Hill.

Fundamentals of Multimedia by Ze-Nian Li, Mark S.Drew, by Pearson Edu.

Course Outcomes and their mapping with Programme Outcomes:

CO	PO												PS O		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	3	2	2	1	1	3						3	3	3	3
CO2	3	2	3	2	1	2						3	3	3	3
CO3	3	3	3	3	2	3						3	3	3	2
CO4	3	3	3	3	3	3						3	3	3	2
CO5	3	3	3	3	3	1						3	3	3	2

Weightage: 1-Sightly; 2-Moderately; 3-Strongly

Sub Title: DESIGN AND ANALYSIS OF ALGORITHMS		
Sub Code: CS06TPC11	No. of Credits : 3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE:

1. To Analysis efficiency of algorithms on the basis of their time complexity and space complexity by mathematically foundation (asymptotic notation)
2. To study about design and analysis of divide and conquer and greedy algorithm on the basis of their attributes and also describe when could be used these technique and which situation for which problem
3. To know dynamic programming(DP) paradigm and algorithm for problems on the different data structure like graph and array
4. Know a branch and bound technique and backtracking technique for problems
5. Know the classes of problems like P,NP on their basis of nature (running time complexity)

UNIT No	Syllabus Content	No of Hours
1	Algorithms Analysis: Space and Time Complexity, Asymptotic Notations, mathematical foundations: growth functions, complexity analysis of algorithms, Recursive algorithms, analysis of no-recursive and recursive algorithms, Recurrences equation and their solution. Master method, recursive tree and backward substitution method.	8
2	Divide & Conquer and Greedy Method: Divide and conquer-Finding Maxima and Minima Binary search, Merge Sort, Quick Sort, and selection sort.Stassen's Matrix multiplication Greedy method-introduction, Knapsack problem, travelling sales person problem, Minimum Spanning trees- kruskal's algorithm, prim's algorithm, Single source shortest path-Dijkstra's algorithm, Huffman codes.	7
3	Dynamic Programming and Search Techniques: Dynamic Programming: Introduction, Matrix chain multiplication, Single source shortest path- Bellman-Ford, all pairs shortest path, optimal binary search tree, o/1 knapsack problem, travelling sales person problem, longest common subsequence Search techniques: Techniques for binary trees, techniques for graphs –DES and BFS, connected components, Bi-connected components, and Strongly-connected components, Topological sorting. Heap Data Structure: Min and Max Heap, Fibonacci Heap, Binomial heap, Amortized Analysis, Heap sort.	7

4	<p>Back Tracking and Branch and Bound: Backtracking: Back tracking and Recursive back tracking, applications of back tracking paradigm, the 8-queen problem, graph coloring, Hamiltonian cycles.</p> <p>Branch and Bound: introduction, 0/1 knapsack problem, travelling sales person problem, Least Cost (LC) search – the 15-puzzle problem.</p>	7
5	<p>Complexity Class Theory and Pattern Matching : Problem classes, Optimization problem, decision making problem, P VS NP VS NPC VS NPH, Venn diagram and their analysis, deterministic and non-deterministic polynomial time algorithm, Cook Levin theorem, Verification algorithms for some NP Class: subset sum problem, clique problem, vertex cover, independent set problem, Circuit Satisfiability problem, 2-SAT, 3-SAT etc.</p> <p>Pattern matching: Basic concept of pattern reorganization and their algorithms.</p>	7

<p>COURSE OUTCOMES: The students would have learnt</p> <p>CO1: Technique to calculate and obtain the running time complexity and space complexity of any kind of algorithm.</p> <p>CO2: Design divide and conquer and greedy algorithm for problems and at the same time they will be able to know that which data structure are adequate to enhance the running time complexity.</p> <p>CO3: Spontaneously able to describe and analyze the dynamic-programming (DP) algorithm moreover when an algorithmic design situation calls for it and can construct a new DP algorithm for given a particular problem.</p> <p>CO4: Spontaneously able to construct and design branch & bound and backtracking algorithm for a particular problem on the basis of the problem nature analysis and requirement.</p> <p>CO5: Analyzed and write verification algorithm for some NP and NPH class problems.</p>

Text Books:

1. Thomas H. Cormen, Charles E. Leiserson, Ronald Rivest, Clifford Stein, "Introduction to Algorithm", Publisher PHI. ISBN 81-203-2141-3
2. Sanjoy Dasgupta, Christos H. Papadimitriou and Umesh V. Vazirani, Algorithms, Tata McGraw-Hill, 2008
3. Jon Kleinberg and Éva Tardos, Algorithm Design, Pearson, 2005.
4. Michael T Goodrich and Roberto Tamassia, Algorithm Design: Foundations, Analysis, and Internal Examples, Second Edition, Wiley, 2006.

Reference Books:

1. Udi Manber, Algorithms – A Creative Approach, Addison-Wesley, Reading, MA, 1989.
2. Harry R. Lewis and Larry Denenberg, Data Structures and Their Algorithms, Harper Collins, 1997

Course Outcomes and their mapping with Programme Outcomes:

CO	PO												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	3	3	2								2	2	2
CO2	3	2	2	1	3								3	3	3
CO3	2	1	2	2	1								3	3	3
CO4	2	3	2	2	1								2	2	3
CO5	3	3	2	3	3								1	2	3

Weightage: 1-Sightly; 2-Moderately; 3-Strongly

Sub Title: JAVA		
Sub Code: CS06TPC12	No. of Credits : 3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE:

1. To discuss the fundamental concepts of OOPs and Java
2. To discuss the Differences between C/C++ and Java.
3. Knowledge of Multithreading, Packages and Applet.
4. Use of Java on different Platform.
5. Learn to develop a small project using Java

UNIT No	Syllabus Content	No of Hours
1	Java Fundamentals: Basic Concepts of Object-Oriented Programming, Java History, Java Features, How Java Differs from C and C++, Web Browsers, Java Environment, Java Program Structure, Java Tokens, Installing and Configuring Java, Implementing a Java Program, Java Virtual Machine, Command Line Arguments, Programming Style.	8
2	Constants, Variables and Data Types, Declaration of Variables, Giving values to variables, Scope of Variables, Symbolic Constants, Type Casting, Getting Values of Variables, Standard Default Values, Java Operators, Arithmetic Expression, Evaluation of Expressions, Precedence of Arithmetic Operators, Operator Precedence and Associativity, Mathematical Functions, Control Statements (if statement, switch statement and Conditional operator statement), Decision Making and Looping (while construct, do construct, for construct), Jumps in Loops.	7
3	Class, Objects and Methods: Introduction of Class, Defining a Class, Fields Declaration, Creating Objects, Accessing Class Members, Constructors, Methods Overloading, Static Members, Nesting of Methods, Inheritance: Extending a Class, Overriding Methods, Final Variables and Methods, Final Classes, Abstract Methods and Classes, Visibility Control Introduction of Array: One Dimensional Array, Creating an array, Two-Dimensional arrays, Strings, Wrapper Classes. Interfaces: Defining Interfaces, Extending Interfaces, Implementing Interfaces, Accessing Interface Variables, Packages: Java API Packages, Using System Packages, Naming Conventions, Creating Packages, Accessing a Package, Using a Package, Adding a Class to a Package, Hiding Classes, Static Import.	7

4	Introduction to Multithreaded Programming: Difference between Multithreading and Multitasking, Creating threads, Extending the thread class, Stopping and Blocking a thread, Life Cycle of a thread, Using thread Methods, Thread Exception, Thread Priority, Synchronization, Implementing the Runnable Interface, Inter-thread Communication. Managing Errors and Exceptions: Types of Errors, Exceptions, Syntax of	7
5	Introduction of Applet Programming, How Applets Differ from Applications, Preparing to Write Applets, Building Applet Code, Applet Life Cycle, Creating an Executable Applet, Designing a Web Page, Applet Tag, Adding Applet to HTML file, Running the Applet, Passing Parameters to Applets, Aligning the Display, Displaying Numeric values, Getting input from the user, Event handling, Introduction of Graphics Programming, Introduction to AWT package, Managing Input/Output Files in Java: Concept of Streams, Stream Classes, Byte Stream Classes, Character Stream Classes, Other useful I/O classes, Using the file class, Input/Output exceptions.	7

<p>COURSE OUTCOMES: The students would have learnt</p> <p>CO1: Understanding of basic concept of Java Programming</p> <p>CO2: Knowledge of the structure of Java.</p> <p>CO3: The Concept of Exception Handling, Package and Applet</p> <p>CO4: To use the Java programming language for various programming technologies (understanding)</p> <p>CO5: To develop a software in the Java programming language.</p>
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Text Books:

1. E.Balagurusamy, Programming with Java A Primer, Fourth Edition, McGrawHill, 2010.

Reference Books:

1. H.Schildt, Java TM 2: The Complete Reference, Fourth Edition, Tata McGrawHill, 2001.
2. K. A. Mughal and R. W. Rasmussen, A Programmer's Guide to Java TM SCJP
3. Certification A Comprehensive Primer, Third Edition, Addison Wesley, 2008.

Course Outcomes and their mapping with Programme Outcomes:

CO	PO												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	3	2	1						1	3	3	2
CO2	3	3	2	3	2	1						1	3	3	2
CO3	3	3	2	3	2	1						1	3	3	2
CO4	3	3	2	3	3	1						1	3	3	2
CO5	3	3	2	3	3	1						1	3	3	2
CO6	3	3	2	3	3	1						1	3	3	2

Weightage: 1-Slightly, 2-Moderately, 3-Strongly;

Sub Title: COMPUTER GRAPHICS		
Sub Code: CS06TPC13	No. of Credits : 3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE:

1. To introduce the use of the components of a graphics system and become familiar with building approach of graphics system components and algorithms related with them.
2. To learn the basic principles of 3-dimensional computer graphics.
3. Provide an understanding of how to scan convert the basic geometrical primitives, how to transform the shapes to fit them as per the picture definition.
4. Provide an understanding of mapping from a world co-ordinates to device coordinates, clipping, and projections.
5. To be able to discuss the application of computer graphics concepts in the development of computer games, information visualization, and business applications.
6. To comprehend and analyze the fundamentals of animation, virtual reality, underlying technologies, principles, and applications.

UNIT No	Syllabus Content	No of Hours
1	Line Generation Points, lines, Plaines Vector, pixels and frame buffers, Vector and character generation. Graphics Primitives, Display devices, Primitive operation, Display- file structure, Display control text.	8
2	Polygons: Polygons representation, Entering polygons, Filling Polygons. Transformation: Matrices of 2D Transformation, transformation routines Display procedures.	7
3	Segments: Segments table, Creating Deleting and renaming a segment Visibility, Image transformation. Windowing and Clipping: Viewing transforming, Clipping, Generalized clipping, multiple windowing.	7
4	Three Dimensions: 3-D Geometry Primitives, Transformation, Projection, Clipping, Hidden line and SurfacesBack-face Removal Algorithms, Hidden line methods.	7
5	Rendering and Illumination: Introduction to curve generation. Bezier. Hermit and B-spline algorithms and their comparisons.	7

COURSE OUTCOMES: The students would have learnt

- CO1: To list the basic concepts used in computer graphics.
- CO2: To implement various algorithms to scan, convert the basic geometrical primitives, transformations, Area filling, clipping.
- CO3: To describe the importance of viewing and projections.
- CO4: To define the fundamentals of animation, virtual reality and its related technologies.
- CO5: To understand a typical graphics pipeline
- CO6: To design an application with the principles of virtual reality

Text Books:

1. Hearn Baker, "Computer Graphics", PHI.
2. Rogers , "Procedural Elements of Computer Graphics ", McGraw- Hill.
3. Newman & Sproule , "Principles of Interactive Computer Graphics", MGH 1987.

Reference Books:

1. Harringtons S. , "Computer Graphics , " A Programming Approach Second Edition MGH 1987.
2. Rogers & Adams , " Mathematical Elements of Computers Graphics", Second Edition MGH.
3. Henary Baper , "Computer Graphics"

Course Outcomes and their mapping with Programme Outcomes:

CO	PO												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	2	3	3	3	3	3	2	3	3	3	3
CO2	3	3	3	3	2	3	3	3	3	3	2	3	3	3	3
CO3	3	3	3	3	2	3	3	3	3	3	2	3	3	3	3
CO4	3	3	3	3	2	3	3	3	3	3	2	3	3	3	3
CO5	3	3	3	3	2	3	3	3	3	3	2	3	3	3	3

Weightage: 1-Slightly;, 2-Moderately: 3-Strongly;

Sub Title: DIGITAL IMAGE PROCESSING		
Sub Code: CS06TPE05	No. of Credits : 3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE:

1. To discuss the fundamental concepts of digital image processing
2. To discuss the various image transform with respect to basic functions, properties and application.
3. To discuss image enhancement technique in spatial and frequency domain.
4. To discuss image segmentation and restoration technique in spatial and frequency domain.
5. To discuss the simple image processing technique.

UNIT No	Syllabus Content	No of Hours
1	Digital Image Fundamentals: Background, digital image representation, examples of field that use DIP, fundamental steps in digital image processing, Simple image model, basic relationships between pixels: neighborhood of a pixel, Connectivity, Basic transformations: translational, rotational, scaling. Color models and transformations, Pseudo color Image Processing.	8
2	Image Transforms: Introduction to 2D Transforms: Fourier Transform and Properties, DCT and Properties, Hadamard Transform and Properties, WHT and properties Image Compression: Fundamentals, image compression models, elements of Information theory, Image Compression: lossy and non lossy compression, image compression standards.	7
3	Image Enhancement Spatial Domain: Background, Basic gray level transformations, histogram: Computation histogram , histogram specification, histogram equalization, enhancement using arithmetic/logic operations, basics of spatial filtering, smoothing sharpening spatial filters, combining spatial enhancement methods. Edge Detection Methods: Prewit, Sobel and Robert Frequency Domain: Background, introduction to the frequency domain, smoothing and sharpening frequency domain filters, homomorphic filtering, generation of spatial masks from frequency domain specifications.	7
4	Image Segmentation: Detection of discontinuities, edge linking & boundary detection, thresholding, Region based segmentation, morphological water sheds, the use of motion in segmentation	7

5	Image Restoration : Degradation model, Noise models, restoration in the presence of noise only (Spatial and frequency domain filters), Inverse filtering, LMS filtering, Wiener filter, constrained least square restoration, interactive restoration, restoration in the spatial domain	7
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COURSE OUTCOMES: The students would have learnt

CO1: Understanding of basic image processing techniques. CO2: Image analysis using 2-D image transforms

CO2: Image enhancement technique in spatial and frequency domain

CO3: Image processing application such as compression, segmentation and restoration.

CO4: Learn to apply different image processing technique.

Text Books:

1. Digital Image Processing, R C Gonzalez & R E Woods, Pearson Education, 3 edition.
2. Digital Image Processing and Computer Vision, Milan Sonka, Cengage Learning, First edition.

Reference Books:

1. Digital Image Processing, S. Jayaraman, S. Esakkirajan, T. Veerakumar, Tata Mcgraw Hill, 2009.
2. Fundamentals of Digital Image processing, A K Jain, PHI/Pearson Education, 1989.
3. Digital Image Processing, Sid Ahmed, McGraw Hill.

Course Outcomes and their mapping with Programme Outcomes:

CO	PO												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	1	1							3	3	1	1
CO2	3	3	3	2	1							3	3	3	3
CO3	3	3	3	2	1							3	2	1	1
CO4	3	3	3	2	1							3	2	1	1
CO5	3	2	1	1	1							3	3	1	1

Weightage: 1-Slightly; 2-Moderately; 3-Strongly;

Sub Title: ROBOTICS		
Sub Code: CS06TPE06	No. of Credits : 3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE:

1. Learn the basic concepts of Robots.
2. Learn the concepts of Kinematics of Robotics.
3. Learn the concepts of Motions, velocities and dynamic analysis of force.
4. Learn the concepts of Motion and Trajectory planning.
5. Learn the concepts of Potential Functions, Visibility Graphs and Coverage Planning.

UNIT No	Syllabus Content	No of Hours
1	Introduction to Robotics Evolution of robots and robotics, progressive advancement in robots, definitions and classifications, laws of robotics, robot anatomy and related attributes, human arm characteristics, robot control system, manipulation and control, sensors in robotics, robots programming, the future prospects.	8
2	10 Coordinate Frames, Mapping and Transforms Robot specification and notations, Coordinate frames, description of objects in space, transformation of vectors, inverting a homogeneous transform, fundamental rotation matrices, yaw pitch and roll, yaw pitch and roll transformation, equivalent angle.	7
3	Symbolic Modelling of Robots – Direct Kinematic Model Mechanical structure and notations, description of links and joints, kinematic modelling of the manipulator, Denavit – Hartenberg notation, kinematic relationship between adjacent links,manipulator, transformation matrix, introduction to inverse kinematic model, Artificial Intelligence in robotics.	7
4	Robotic Sensors and Vision The meaning of sensing, sensors in robotics, kinds of sensors used in robotics, robotic vision, industrial applications of vision-controlled robotic systems, process of imaging, architecture of robotic vision systems, image acquisition, description of other components of vision system, image representation, image processing.	7
5	Robot Applications Industrial applications, material handling, processing applications, assembly applications, inspection, application, principles for robot application and application planning, justification of robots, robot safety, non-industrial applications, robotic application for sustainable development & social issues.	7

COURSE OUTCOMES: The students would have learnt

CO1: Apply the basic concepts of Robots.

CO2: Apply and evaluate the concepts of Kinematics of Robotics. CO3:

Apply the Motions, velocities and dynamic analysis of force.CO4: Apply and evaluate Motion and Trajectory planning.

CO5: Apply the concepts of Potential Functions, Visibility Graphs and Coverage Planning.

Text Books:

1. Robotics & Control – R.K. Mittal & I.J. Nagrath – TMH Publications
2. Robotics for engineers –Yoram Korean- McGrew Hill Co.
3. Industrial Robotics Technology programming and Applications –M.P.Groover, M.Weiss,
4. Robotics Control Sensing, Vision and Intelligence –K.S.Fu, R.C.Gonzalex, C.S.G.Lee- McGrew Hill Book co.

Reference Books:

1. Kinematics and Synthesis of linkages –Hartenberg and Denavit– McGrew Hill Book Co
2. Kinematics and Linkage Design – A.S. Hall – Prentice Hall

Kinematics and Dynamics of Machinar

Course Outcomes and their mapping with Programme Outcomes:

CO	PO												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	1	1							3	3	1	1
CO2	3	2	1	1	1							3	3	3	3
CO3	3	2	1	1	1							3	2	1	1
CO4	3	2	1	1	1							3	2	1	1
CO5	3	2	1	1	1							3	3	1	1

Weightege: 1-Slightly: 2-Moderately: 3-Strongly;

Sub Title: ARTIFICIAL INTELLIGENCE		
Sub Code: CS06TPE07	No. of Credits : 3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE:

1. To create appreciation and understanding of both the achievements of AI and the theory underlying those achievements.
2. To introduce the concepts of a Rational Intelligent Agent and the different types of Agents that can be designed to solve problems
3. To review the different stages of development of the AI field from human like behavior to Rational Agents.

UNIT No	Syllabus Content	No of Hours
1	Introduction of Artificial Intelligence(AI), Difference between Intelligence and Artificial Intelligence, Definitions of AI, Strong AI and Weak AI, Application areas of AI, Comparison of Conventional and AI Computing, History of AI, Turing Test, Branches of AI, Intelligent Agents, State Space Representation, Production System, Heuristic Search, Search Methods (Uninformed Search and Informed Search), Breadth First Search, Depth First Search, Difference between Breadth First Search and Depth First Search, Hill Climbing, Best First Search.	8
2	Role of Knowledge Representation in AI, Types of Knowledge, Properties of Knowledge Representation System, Categories of Knowledge Representation Scheme, First Order Predicate Calculus, Well Formed Formula in Predicate Logic, Conversion to Clausal Form, Resolution in Predicate Logic, Semantic Nets, Properties of Semantic Nets, Frames, Scripts, Advantages and Disadvantages of Scripts.	7
3	Introduction of Expert System, Comparison between Human Expert and Expert System, Comparison between Expert System and Software System, Difference between Knowledgebase and Database, Basic Components of an Expert System, Characteristics of Expert System, Life Cycle Development of Expert System, Advantages of Expert System, Limitation of Expert System, Expert System Tools, Existing Expert Systems (DENDRAL and MYCIN).	7

4	Introduction to LISP : Syntax and Numeric Functions, Working with GNU CLISP, Basic Data Objects in GNU CLISP, Basic List Manipulation Functions in GNU CLISP (setq, car, cdr, cons, list, append, last, member, reverse), User Defined Functions in GNU CLISP, Predicates (atom, equal, evenp, 69odell, oddp, zerop, >=, <=, listp, null) and Conditionals (cond and if) in GNU CLISP, Logical Functions (not, or, and) in GNU CLISP, Input / Output and Local Variables (read, print, princ, terpri, format, let, prog) in GNU CLISP, Recursion and Iteration(do) in GNU CLISP, Arrays in GNU CLISP	7
5	Introduction to PROLOG, Term, Ground Term, Function, Predicate, Features of PROLOG, Program Clause, Unit Clause, Logic Program, Goal Clause, Empty Clause, Simple Query, Conjunctive Query, Structure of PROLOG Program, Working with SWI-Prolog General Syntax of PROLOG, Execution of a Query in Logic Program (Ground Query and Non-Ground Query), Law of Universal modus ponens, Ground Reduction, PROLOG Control Strategy, Search Tree and Proof Tree, Relational and Arithmetic Operators, Recursion in PROLOG, Lists manipulation in PROLOG, Iterative programming in PROLOG.	7

COURSE OUTCOMES: The students would have learnt

- CO1: Demonstrate knowledge of the building blocks of AI as presented in terms of intelligent agents.
- CO2: Analyze and formalize the problem as a state space, graph, design heuristics and select amongst different search or game based techniques to solve them.
- CO3: Develop intelligent algorithms for constraint satisfaction problems and also design intelligent systems for Game Playing
- CO4: Attain the capability to represent various real life problem domains using logic based techniques and use this to perform inference or planning.
- CO5: Formulate and solve problems with uncertain information using Bayesian approaches.
- CO6: Apply concept Natural Language processing to problems leading to understanding of cognitive computing

Text Books:

1. E. Rich and K. Knight, Artificial Intelligence, Forty Sixth Edition, Tata McGrawHill, 2007.
2. D.W. Patterson, Introduction to Artificial Intelligence and Expert Systems, Tenth Edition, Prentice Hall of India, 2001.

Reference Books:

1. S. Kaushik, Logic and Prolog Programming, New Age International Limited, 2006.

Course Outcomes and their mapping with Programme Outcomes:

CO	PO												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	2	3	1	1	1	1	1	1	2	2	3	1
CO2	2	1	2	2	2	1	1	1	1	1	1	1	2	2	1
CO3	3	2	2	1	2	1	1	1	1	1	1	2	3	3	1
CO4	3	2	2	3	2	1	1	1	1	1	1	3	2	2	1
CO5	2	3	3	2	2	1	1	1	1	1	1	2	3	2	1
CO6	2	3	3	3	2	1	1	1	1	1	1	2	2	2	1

Weightage: 1-Slightly; 2-Moderately; 3-Strongly;

Sub Title: SOFTWARE TESTING AND QUALITY ASSURANCE		
Sub Code: CS06TPE08	No. of Credits : 3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE:

1. To discuss the fundamental concepts of Software Quality
2. Finding defects which may get created by the programmer while developing the software.
3. To make sure that the end result meets the business and user requirements.
4. To gain the confidence of the customers by providing them a quality product.
5. Gaining confidence in and providing information about the level of quality.

UNIT No	Syllabus Content	No of Hours
1	Software Quality: Ethical Basis for software Quality , Total quality Management Principles, Software Processes and Methodologies , Quality Standards , Practices & conventions	8
2	Software Management: Reviews and Audits . Enterprise Resource Planning Software , Measurement Theory , Software Quality Metrics, designing Software Measurement Programs , Organizational Learning.	7
3	Improving Quality with Methodologies: Structured information Engineering , Object-Oriented Software , Reverse Engineering , Measuring Customer Satisfaction Defect Prevention , Reliability Models , Reliability Growth Models .	7
4	Software Quality Engineering: Defining Quality Requirements Management, Complexity Metrics and Models, Management issues for software Quality , Project Tracking and Oversight , Use of CASE tool Technology , Role of Groupware , data Quality Control.	7
5	Project Configuration Management: Configuration Management Concepts, Configuration Management Process, Document Control, Configuration Management plan of the WAR Project. Software Testing: Unit, Integration & System testing, Benchmarking and Certification.	7

COURSE OUTCOMES: The students would have learnt

- CO1: Understanding of basic Concept of Software Testing and Quality Assurance
 CO2: Define the scope of SW T&QA projects
 CO3: Efficiently perform T&QA activities using modern software tools
 CO4: Estimate cost of a T&QA project and manage budgets
 CO5: Prepare test plans and schedules for a T&QA project

Text Books:

1. Mark Paulik, The capability Maturity Model-guidelines for Improving the software Process, Addison Wesley
2. Wilson, Rodney C, Software RX secrets of Engineering Quality Software, Prentice Hall.

Reference Books:

1. Stephan Kan, Metrics and Models in Software quality, Addison Wesley.
2. Ginac, Frank P, Customer Oriented Software Quality Insurance, Prentice Hall

Course Outcomes and their mapping with Programme Outcomes:

CO	PO												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	1	1							1	3	1	1
CO2	3	3	3	2	1							1	3	3	3
CO3	3	3	3	2	1							1	2	1	1
CO4	3	3	3	2	1							1	2	1	1
CO5	3	2	1	1	1							1	3	1	1

Weightage: 1-Slightly: 2-Moderately: 3-Strongly;

Sub Title: MANAGEMENT INFORMATION SYSTEM		
Sub Code: CS06TOE01	No. of Credits : 3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE:

1. To describe the role of information technology and decision support systems in business and record the current issues with those of the firm to solve business problems.
2. To introduce the fundamental principles of computer-based information systems analysis and design and develop an understanding of the principles and techniques used.
3. To enable students understand the various knowledge representation methods and different expert system structures as strategic weapons to counter the threats to business and make business more competitive.
4. To enable the students to use information to assess the impact of the Internet and Internet technology on electronic commerce and electronic business and understand the specific threats and vulnerabilities of computer systems.
5. To provide the theoretical models used in database management systems to answer business questions.

UNIT No	Syllabus Content	No of Hours
1	Information System: Introduction of Information System, Fundamentals of Information System, Strategic Role of Information in Organization and Management, Three dimensions of Information System, Information System and Organization, Business Process Re-Engineering, Traditional and Computer based information system.	8
2	Decision Support System: Integration of Information, Types of Decision making in Organization, Decision Making Process, Models and Decision Support, Decision in business Areas, Strategic Analysis	7
3	Information System Planning: Types of Controlling Information System, Development of MIS Methodology and Tools/Techniques for Systematic Identification, Evaluation, Modification of MIS, Information System Success and Failure Implementation	7
4	Information System for Business Operations: Cross Functional Information System, A study of major Financial, Production, Human Resource Information System and Marketing Information System.	7

5	Security and Auditing of Information System: Management of Information System and End-User Computing, Security and Ethical issues of Information System, Major issues in Information System, Auditing of Information System.	7
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<p>COURSE OUTCOMES: The students would have learnt</p> <p>CO1: Relate the basic concepts and technologies used in the field of management information systems;</p> <p>CO2: Compare the processes of developing and implementing information systems.</p> <p>CO3: Outline the role of the ethical, social, and security issues of information systems.</p> <p>CO4: Translate the role of information systems in organizations, the strategic management processes, with the implications for the management.</p> <p>CO5: Apply the understanding of how various information systems like DBMS work together to accomplish the information objectives of an organization.</p>
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Text Books:

1. Management Information System: A Contemporary Perspective, Kenneth C. Laudon and Jane Price Loudon, Maxwell Macmillan International Editions.

Reference Books:

1. Management Information System: Solving Business Problems with Information Technology, Gerald V., Post and David L. Anderson, Tata McGraw – Hill Edition
2. Management Information System: Managing Information Technology in the Internet worked Enterprise, James A. O’Brien Tata McGraw –Hill Edition, Fourth Edition.

Course Outcomes and their mapping with Programme Outcomes:

CO	PO												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3	3	2	3						3	3	3	3
CO2	3	3	3	2	3	3						3	3	3	3
CO3	3	3	3	2	2	3						3	3	3	3
CO4	3	2	3	3	3	3						3	3	3	3
CO5	3	3	3	3	2	3						3	3	3	3

Weightage: 1-Slightly; 2-Moderately; 3-Strongly;

Sub Title: DESIGN AND ANALYSIS OF ALGORITHMS LAB	
Sub Code: CS06PPC07	No. of Credits : 1.5=0: 0: 1.5(L-T-P)
Exam Duration : 3 hours	IA+ESE =30+20

Lab OBJECTIVE:

1. Understand the recursive type algorithm with their data structure
2. Understand the divide and conquer (with recursive function) and greedy algorithm like merge sort, quick sort and single source shortest path
3. Understand the dynamic programming paradigm and analysis the single source and all pair shortest path algorithm
4. Understand the branch and bound technique ,heap and Fibonacci data structure to implement optimization and sorting problem
5. Analysis about some NP class problems

Unit No.	Content	Teaching Hours
I, II, III, IV and V	<ul style="list-style-type: none"> • Simulate the Stack data structure (recursion) and do the posteriori analysis. • Simulate BFS, DFS on Graph and estimate the running time. • Simulate Prim's and Kruskal's Algorithm and do the posteriori analysis • Simulate Dijkstra's algorithm and do the posteriori analysis • Simulate all pair shortest path problem and do the posteriori analysis • Simulate Bellman algorithm and do the posteriori analysis • Simulate of Huffman Tree and do the posteriori analysis • Simulate of check whether a given graph is connected or not using DFS method and do the posteriori analysis • Simulate of Heap Tree and heap sort and do the posteriori analysis • Simulate of N Queen's problem using Back Tracking and do the posteriori analysis • Simulate 0/1 Knapsack problem using Dynamic Programming and do the posteriori analysis • Simulate TSP problem using Dynamic Programming and do the posteriori analysis • Simulate fractional Knapsack problem and do the posteriori analysis • Simulate to find a subset sum of a given set of integer number and do the posteriori analysis • Simulate to detect the circle in graph by using DFS algorithm and do the posteriori analysis 	18

LAB OUTCOMES: The students would have learnt

- CO1: Implement recursive algorithm with array and stack data structure
 CO2: Various tools to simulate divide and conquer algorithm and greedy using graph and link list.
 CO3: Dynamic programming to optimization type and decision type problems.
 CO4: Implement some problems like data compression algorithm and sorting algorithm using tree, array etc.
 CO5: Simulate and optimize some NP class problem like SAT, clique and TSP etc.

Text Books:

1. Introduction to Algorithm, Thomas H. Cormen, Charles E. Leiserson, Ronald Rivest, Clifford Stein, Publisher PHI, ISBN 81-203-2141-3
2. Algorithms, Sanjoy Dasgupta, Christos H. Papadimitriou and Umesh V. Vazirani, Tata McGraw-Hill, 2008.
3. Python Algorithms Mastering Basic Algorithms in the Python Language by Magnus Lie Hetland.
4. Algorithm Design, Jon Kleinberg and Éva Tardos, Pearson, 2005.

Reference Books:

1. Fundamentals of computer Algorithms, Horowitz, Sahani, Galgotia. 2nd Edition, 1998. ISBN 81-7515-257-5
2. Data Structures and Algorithms Using Python Rance D. Necaise

Course Outcomes and their mapping with Programme Outcomes:

CO	PO												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	1	1	3								3	3	1
CO2	3	3	3	2	2								3	2	2
CO3	3	3	1	1	2								1	2	2
CO4	3	2	1	1	2								3	2	1
CO5	1	3	2	3	3								3	3	3

Weightage: 1-Slightly: 2-Moderately: 3-Strongly;

Sub Title: JAVALAB	
Sub Code: CS06PPC08	No. of Credits : 1.5=0: 0: 1.5(L-T-P)
Exam Duration : 3 hours	IA+ESE =30+20

Lab OBJECTIVE:

1. To provide the knowledge of Basics of Java.
2. To learn the Concept of package and Applet in Java.
3. To develop an awareness of modern programming language.
4. Provide practical Knowledge and Skills for developing a program with java.
5. Develop ability to design a small software using java.

Unit No.	Content	Teaching Hours
I, II, III, IV and V	<ul style="list-style-type: none"> • Write a program to find a factorial of a given number . • Write a program to show all relational and Logical operator • Write a program using Constructors • Write any program using the concept of method overloading. • Write a program to show the concept of Inheritance. • Write a program to using 10 string operations • Write a program using packages • Write a program to show the concept of Synchronization in Multithreading. • Write a program to show exception handling in java • Write a program to show human face using Applets 	18

LAB OUTCOMES: The students would have learnt

CO1: The basic Concept of JAVA.

CO2: Use an integrated development environment to write, compile, run, and test simple object-oriented Java programs. ☐

CO3: About Concept of Multithreading, Packages and Applet.

CO4: Read and make elementary modifications to Java programs that solve real world problems

CO5: To develop small Software using JAVA.

Text Books:

1. Programming with Java A Primer, E.Balagurusamy, , Fourth Edition, McGrawHill, 2010.

Reference Books:

1. Java TM 2: The Complete Reference, H.Schildt, Fourth Edition, Tata McGrawHill, 2001.
2. A Programmer’s Guide to Java TM SCJP Certification A Comprehensive Primer, K. A. Mughaland R. W. Rasmussen, Third Edition, Addison Wesley, 2008.

Course Outcomes and their mapping with Programme Outcomes:

CO	PO												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	1	3							1	3	3	1
CO2	3	3	3	2	2							1	3	2	2
CO3	3	3	1	1	2							1	1	2	2
CO4	3	2	1	1	2							1	3	2	1
CO5	3	3	2	3	3							1	3	3	3

Weightage: 1-Slightly, 2-Moderately: 3-Strongly;

Sub Title: E-COMMERCE		
Sub Code: CS06TOE02	No. of Credits : 3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE:

1. Discuss fundamentals of e-commerce, types and applications.
2. Evaluate the role of the major types of information systems in a business environment and their relationship to each other
3. Assess the impact of the Internet and Internet technology on business electronic commerce and electronic business
4. Identify the major management challenges for building and using information systems and learn how to find appropriate solutions to those challenges.
5. Learn strategies for e-commerce, Mobile Commerce, Wireless Application Protocol, WAP technology and Mobile Information devices.

UNIT No	Syllabus Content	No of Hours
1	Introduction: Introduction to e-Commerce, e-Commerce Framework, e-Commerce and Media Convergence, Anatomy of e-Commerce Applications, e-Commerce Consumer Applications, e-Commerce Organization Applications	8
2	Network Infrastructure for E- Commerce: Internet and Intranet based E-commerce- Issues, problems and prospects, Network Infrastructure, Network Access Equipments, Broadband telecommunication (ATM, ISDN, FRAME RELAY). Mobile Commerce: Introduction, Wireless Application Protocol, WAP technology, Mobile Information device.	7
3	Web Security: Client-Server Network Security, Emerging Client-Server Security Threats, Firewalls and Network Security, Data and Message Security, Encrypted Documents and Electronic Mail, Challenge Response System.	7
4	Encryption: Encryption techniques, Symmetric Encryption: Keys and data encryption standard, Triple encryption, Secret key encryption; Asymmetric encryption: public and private pair key encryption, Digital Signatures, Virtual Private Network.	7
5	Electronic Payments: Overview, The SET protocol, Payment Gateway, certificate, digital Tokens, Smart card, credit card, magnetic strip card, E-Checks, Credit/Debit card based EPS, online Banking.EDI Application in business, E- Commerce Law, Forms of Agreement, Govt. policies and Agenda.	7

COURSE OUTCOMES: The students would have learnt

CO1: Understand the basic concepts and technologies used in the field of management information systems

CO2: Understand the processes of developing and implementing information systems CO3: Be aware of the ethical, social, and security issues of information systems and

CO4: Develop an understanding of how various information systems work together to accomplish the information objectives of an organization

CO5: Understand the role of information systems in organizations, the strategic management processes, and the implications for the management and learn about the importance of managing organizational change associated with information systems implementation

Text Books:

1. Frontiers of Electronic Commerce by Ravi Kalakota & Andrew B. Whinston, Pearson Education.
2. E-Commerce – The Cutting Edge of Business by Bajaj, Tata McGraw-Hill

Reference Books:

1. Electronic Commerce by David Kosiur, Published by Microsoft Press.
2. E-business roadmap for success by Dr. Ravi Kalakota & Marcia Robinson.

Course Outcomes and their mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3	2	1	1			1	1	0	3	3	2	2
CO2	3	2	3	3	3	1				2	0	3	3	3	2
CO3	3	2	3	2	1	1		1	1	2	2	3	3	2	2
CO4	3	2	3	2	1	1		3	1	1	0	3	3	2	2
CO5	1	1	3	1	3	1		1	1	1	2	3	1	2	2

Weightage: 1-Slightly;, 2-Moderately; 3-Strongly;

Sub Title: HUMAN RESOURCE MANAGEMENT		
Sub Code: CS06TOE03	No. of Credits : 3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE:

1. To enable the students to understand the HR Management and system at various levels in general and in certain specific industries or organizations.
2. To help the students focus on and analyse the issues and strategies required to select and develop manpower resources
3. To develop relevant skills necessary for application in HR related issues
4. To Enable the students to integrate the understanding of various HR concepts along with the domain concept in order to take correct business decisions

UNIT No	Syllabus Content	No of Hours
1	Introduction: Introduction: Introduction to Human Resource Management and its definition, functions of Human Resource Management & its relation to other managerial functions. Nature, Scope and Importance of Human Resource Management in Industry, Role & position of Personnel function in the organization	8
2	Procurement and Placement: Need for Human Resource Planning; Process of Human Resource Planning; Methods of Recruitment; Psychological tests and interviewing; Meaning and Importance of Placement and Induction, Employment Exchanges (Compulsory Notification of vacancies) Act 1959, The Contract Labour (Regulation & Abolition) Act 1970. Training & Development: Difference between training and Development; Principles of Training; Employee Development; Promotion-Merit v/s seniority Performance Appraisal, Career Development & Planning	7
3	Job Analysis & Design: Job Analysis: Job Description & Job Description, Job Specification. Job Satisfaction: Job satisfaction and its importance; Motivation, Factors affecting motivation, introduction to Motivation Theory; Workers ' Participation, Quality of work life. The Compensation Function: Basic concepts in wage administration, company's wage policy, Job Evaluation, Issues in wage administration, Bonus & Incentives, Payment of Wages Act-1936, Minimum Wages Act-1961	7

4	Integration: Human Relations and Industrial Relations; Difference between Human Relations and Industrial Relations, Factors required for good Human Relation Policy in Industry; Employee Employer relationship Causes and Effects of Industrial disputes; Employees Grievances & their Redressal, Administration of Discipline, Communication in organization, Absenteeism, Labour Turnover, Changing face of the Indian work force and their environment, Importance of collective Bargaining; Role of trader unions in maintaining cordial Industrial Relations.	7
5	Maintenance: Fringe & retirement terminal benefits, administration of welfare amenities, Meaning and Importance of Employee Safety, Accidents-Causes & their Prevention, Safety Previsions under the Factories Act 1948; Welfare of Employees and its Importance, Social security, Family Pension Scheme, ESI act 1948, Workmen's Gratuity Act 1972, Future challenges for Human Resource Management..	7

COURSE OUTCOMES: The students would have learnt

CO1: To develop the understanding of the concept of human resource management and tounderstand its relevance in organizations.

CO2: To develop necessary skill set for application of various HR issues.

CO3: To analyse the strategic issues and strategies required to select and develop manpower resources.

CO4: To integrate the knowledge of HR concepts to take correct business decisions.

Text Books:

1. Thomas H. Cormen, Charles E. Leiserson, Ronald Rivest, Clifford Stein, "Introduction to Algorithm" ,Publisher PHI. ISBN 81-203-2141-3
2. T.N.Chhabra- Human Resource Management, Dhanpat Rai & Co.

Reference Books:

1. Lowin B. Flipppo - Principles of personnel Management , Mc Graw-Hill
2. R.C. Saxena - Labour Problems and social welfare, K.Math & Co.
3. A Minappa and M. S. Saiyada - Personnel Management , Tata Mc. Graw-Hill
4. C.B. Mamoria - Personnel Management, Himalaya Publishing House, Bombay
5. T.N. Bhagotiwai - Economics of Labour and Industrial Relations, Sahitya Bhawan Agra

Course Outcomes and their mapping with Programme Outcomes:

CO	PO												PS O		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	3	2	2	1	1							3	3	3	3
CO2	3	2	3	2	1							3	3	3	3
CO3	3	3	3	3	2							3	3	3	2
CO4	3	3	3	3	3							3	3	3	2
CO5	3	3	3	3	3							3	3	3	2

Weightage: 1-Sightly; 2-Moderately; 3-Strongly

Sub Title: BUSINESS INTELLIGENCE		
Sub Code: CS06TOE04	No. of Credits : 3=3: 0: 0(L-T-P)	No of lecture hours/week :03
Exam Duration : 3 hours	IA+ESE=30+70	Total no of contact hours:36

COURSE OBJECTIVE:

1. Understand the role of BI in enterprise performance management and decision support.
2. Understand the applications of data mining and intelligent systems in managerial work.
3. Understand data warehousing and online analytical processing (OLAP) concepts.
4. Learn data analysis and reporting using available BI software.
5. Learn the responsibility of BI.

UNIT No	Syllabus Content	No of Hours
1	Business Intelligence Introduction to Business Intelligence: Introduction to OLTP and OLAP, BI Definitions & Concepts, Business Applications of BI, BI Framework, Role of Data Warehousing in BI, BI Infrastructure Components – BI Process, BI Technology, BI life cycle, BI Roles & Responsibilities.	8
2	Basics of Data Integration (Extraction Transformation Loading): Concepts of data integration need and advantages of using data integration, introduction to common data integration approaches, introduction to ETL, Introduction to data quality, data profiling concepts and applications.	7
3	Introduction to Multi-Dimensional Data Modeling: Introduction to data and dimension modeling, multidimensional data model, ER Modeling vs. multi dimensional modeling, concepts of dimensions, facts, cubes, attribute, hierarchies, star and snowflake schema, introduction to business metrics and KPIs, creating cubes using SSAS.	7
4	Basics of Enterprise Reporting: Introduction to enterprise reporting, concepts of dashboards, balanced scorecards, six sigma and overall architecture.	7
5	Data Mining Functionalities: Association rules mining, Mining Association rules from single level, multilevel transaction databases, Classification and prediction, Decision tree induction, Bayesian classification, k-nearest neighbor classification, Cluster analysis, Types of data in clustering, categorization of clustering methods.	7

COURSE OUTCOMES: The students would have learnt

CO1: Gain knowledge of Business Intelligence.CO2:
To build business projects.
CO3: To generate and manage BI reports.
CO4: To do BI Deployment, Administration & Security.CO5:
Link Business Intelligence with Data Mining.

Text Books:

1. R N Prasad, Seema Acharya: Fundamentals of Business Analytics, Wiley India, First Edition, 2011
2. J.Han and M. Kamber: Data Mining: Concepts and Techniques By Morgan Kaufman publishers, Harcourt India pvt. Ltd. Latest Edition
3. David Loshin: Business Intelligence: The Savvy Manager's Guide., Latest Edition By Knowledge Enterprise.

Reference Books:

1. Larissa Terpeluk Moss, Shaku Atre: Business Intelligence roadmap by Addison Weseley
2. Cindi Howson: Successful Business Intelligence: Secrets to making Killer BI Applications by Tata McGraw Hill
3. Mike Biere: Business intelligence for the enterprise by Addison Weseley, August 2010

Course Outcomes and their mapping with Programme Outcomes:

CO	PO												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1								1	1	2	1	1	3	3	1
CO2								1	2	1	3	2	3	2	2
CO3								2	1	2	1	3	1	2	2
CO4								1	1	2	3	2	3	2	1
CO5								1	3	2	3	1	3	1	3

Weightage: 1-Sightly; 2-Moderately; 3-Strongly

