	Total Credits
	3
	4
	5
	5
	2
	4
	3
	26
	38

Elective DX
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Intellectual Property Rights and Entrepreneurship

Subject Code: 10HSI51
Hrs/Week: L:T: P:S 3:0:0:0
Credits : 03

CIE Marks:100
SEE Marks:100
SEE Duration : 3 Hrs

Course Learning Objectives: The students will be able

1. To build awareness on the various forms of IPR and to educate on the link between technology innovation and IPR.
2. To encourage invention, investment and innovation and disclosure of new Technology and to recognize and reward innovativeness.
3. To promote linkages with industries and stimulate research through developing and utilizing novel technologies.
4. To trigger the entrepreneurial thinking amongst the student community and to provide necessary inputs and motivation for promoting entrepreneurial careers.

Unit – I

08 Hrs

Introduction: Types of Intellectual Property, International Scenario in IPR: WIPO, WTO, TRIPS.
Patents: Introduction, Basic concepts, Object and value of patent law, Advantages of patent to inventor, patentable inventions, inventions are not patentable, Over view of Patent Procedure, Biotechnology patents and patents on computer program, Patent rights on micro-organism, plant breeding and breeders right, protection of biodiversity, protection of traditional knowledge, Infringement of patents and remedy for infringement, Case study for patent engineering.
Trade Secrets: Definition, Significance, Tools to protect Trade secrets in India.

Unit – II

05 Hrs

Trade Marks: Basic concepts, Definition, Functions, different kinds of trademarks like service marks, collective trademarks, certification trademarks and textile trade marks, registrable and non registrable marks, Establishing trade mark right, Good will, infringement and action for trademarks, Passing off, Trade mark and Eco Label, Comparison with patents, industrial design and copy right, Case Studies.

Unit – III

08 Hrs

Industrial Design: basic concepts and scope and nature of rights process of registration rights, available after registration, transfer of interest or rights. Reliefs and Remedies and Action for infringement of the rights; Appeals, Case studies.
Copy Right: Introduction, Nature and scope, Subject matter, Related or allied rights, the works in which copy right subsists, Rights conferred by copy right, Copy right protection in India, transfer of copy rights, right of broad casting organizations and of performer, computer soft ware and IPR and Case Studies.
Cyber laws – Co-relation to Intellectual Property.

Unit – IV

07 Hrs

Entrepreneur and Entrepreneurship: Evolution of the concept of Entrepreneur, Characteristics of an Entrepreneur, Distinction between an entrepreneur and a manager, Functions of an entrepreneur, types of entrepreneur, Intrapreneur, Concept of Entrepreneurship ,Growth of entrepreneurship in India, Role of Entrepreneurship in economic development, overview on entrepreneurial development models, Case discussions on a couple of successful entrepreneurs.

Unit – V

07 Hrs

Micro Small & Medium Enterprises (MSME): Definition, Characteristics, Need and rationale, Objectives, Scope, role of MSME in Economic Development, Advantages of MSME, Steps to start an MSME – Government policy towards MSME, Impact of Liberalization, Privatisation & Globalization on MSME, Effect of WTO / GATT.
Sustainability and MSME.

Institutional Support to entrepreneurs: Over view on National and State Agencies. Identification of Business Opportunities: Market Feasibility studies; Technical Feasibility Studies; Financial Feasibility Studies and Social Feasibility studies.

Expected Course Outcomes: After completing the course the students will be able to

CO1: Identify and understand the applicable source, scope and limitations of the core Intellectual Property disciplines such as Patent, Copyright, Trademark and Trade secret Law.

CO2: Knowledge and competence related exposure to the various Legal issues pertaining to Intellectual Property Rights

CO3: Demonstrate and develop basic skills of legal reasoning, individual critical thinking and group interaction, as well as interprexpected tative, analytical and argumentative skills in oral and written forms of communication

CO4: Demonstrate the ability to provide a self-analysis in the context of an entrepreneurial career

Text Books:

1. P Narayan, "Intellectual Property Law", Eastern Law House, New Delhi and Kolkata, 2005, EAN: 9788171771813. (Covers Unit - I, II, III with case studies)
2. Entrepreneurship Development & Small Business Enterprises – Poornima M Charantimath, Pearson Education, 2007, ISBN: 81-7758-260-7. (Covers Unit - IV & V with case studies)

Reference Books:

1. Prabuddha Ganguly, "Intellectual Property Rights: Unleashing Knowledge Economy", Tata McGraw Hill Publishing Company Ltd., New Delhi, 1st Edition, 2001. ISBN: 0074638602.
2. Cornesh W.R, "Intellectual Property Rights – Patents, Copy Right, Trade Mark, Allied Rights", Universal Law Publishing Company Pvt. Ltd, Delhi, 2001, ISBN – 0199263078.
3. S.R Myneni, "Law of Intellectual Property", Asia Law House, Hyderabad, 2001, SKU – 664773841.
4. SS Khanka, Entrepreneurial Development, S Chand & Co, 2008, ISBN:81-219-1801-4

Scheme of Continuous Internal Evaluation:
CIE consists of Three Tests each for 45 marks (15 marks for Quiz + 30 marks for descriptive) out of which best of two will be considered. In addition there will be one seminar on new topics / model presentation etc. for 10 marks.

Scheme of Semester End Examination:
The question paper consists of Part A and Part B. Part A will be for 20 marks covering the complete syllabus and is compulsory. Part B will be for 80 marks and shall consist of five questions (descriptive, analytical, problems or/and design) carrying 16 marks each. All five from Part B will have internal choice and one of the two have to be answered.

Computer Networks - I

Sub Code: 12CS52
L:T:P:S 3:1:0:1
Credits: 5

CIE Marks: 100
SEE marks: 100
Exam Hrs: 03

Prerequisite:
The student should have undergone the following courses :
(a) Basic Electronics Engineering (Code: 12EC14/24).
(b)Digital Logic Design using HDL (Code: 12CS34).

Course Learning Objectives: The Students will be able
1. To develop a fundamental understanding on the network elements.
2. To develop a clear picture on working of the network.
3. To understand and visualize the roles of various protocols.
4. To develop a clear understanding on the OSI Reference model and TCP/IP Suite.
5. To present protocols relevant for various types of channels used in computer networks.
6. To illustrate the operation and formats of IEEE standard protocols used in LAN.

Unit– I

3 Hrs

1. Introduction
Introduction to Data Communications, components, data representation, data flow, Essential elements of network architecture, Message switching, circuit switching and packet switching, Introduction to Networks, topologies, categories, Internet.

2. Data and Signals **6 Hrs**
Analog and digital, Periodic analog signals, Digital signals, Transmission impairments, Data rate limits, Performance.

Unit – II

3. Physical Layer : Digital Transmission and Media
Digital - to -digital conversion, Analog - to - digital conversion, Transmission modes.TransmissionMedia : Guided media, Unguided media - wireless. **6 Hrs**

4. Physical Layer : Bandwidth Utilization
Multiplexing : FDM, WDM, Synchronous TDM, Statistical TDM. Spreading : Frequency Hopping Spread Spectrum (FHSS), Direct Sequence Spread Spectrum. **3 Hrs**

5 Hrs

Unit – III

5. Network Models and Layered Architecture
Layered tasks, The OSI model, Layers in the OSI model, TCP / IP protocol suite, Addressing. Design Issues for the Layers, Connection-Oriented and Connectionless Services, Service Primitives. **4 Hrs**

6. Data Link Layer : Error Detection and Correction
Introduction, Block coding, Cyclic codes, Checksum **9 Hrs**

Unit– IV

7. Data Link Layer : Data Link Control
Framing, Flow and Error control, Protocols, Noiseless channels, Noisy channels, HDLC, Point-to-point Protocol - framing, transition phases.

Unit– V

8. Data Link Layer : Medium Access Control 4 Hrs

Random access - CSMA, CSMA / CD, CSMA / CA, Controlled access - reservation, polling, token passing, Channelization - FDMA, TDMA, CDMA.

9. Local Area Networks

Ethernet (802.3) MAC sub layer protocol, Binary exponential back off algorithm, Switched Ethernet, Fast Ethernet, Gigabit Ethernet, IEEE 802.2 LLC, Wireless LANs,802.11 stack, 802.11 Physical layer, 802.11 MAC sub layer protocol, 802.11 frame structure. 4 Hrs

Reference Books:

1. Behrouz A Forouzan; Data Communications and Networking; Tata McGraw-Hill; 4th Edition; 2006. ISBN-13: 978-0072822946
2. Alberto Leon-Garcia and IndraWidjaja; Communication Networks; Tata McGraw-Hill, 2nd Edition; 2011. ISBN-13: 978-0072463521
3. Andrew S Tanenbaum; Computer Networks; Pearson Education; 4th Edition; 2008. ISBN-13: 978-0130661029
4. William Stallings; Data and Computer Communications; Pearson Education; 8th Edition; 2009. ISBN-13: 978-0133506488

Expected Course Outcomes:

After completing the course the student will be able to:

CO1: Describe the basic concepts related to techniques used in the network support layers.

CO2: Analyse and explain the differences between various types of transmissions through physical media and associated error handling mechanisms.

CO3: Apply the concepts and solve problems relevant to performance of communication links.

CO4: Assess the applicability of different line coding methods and protocols used in the network support layers.

Scheme of Evaluation for CIE:

Theory (100):

CIE consists of Three Tests each for 45 marks (15 marks for Quiz + 30 marks for descriptive) out of which best of two will be considered. In addition there will be one assignment/seminar on new topics / model presentation etc. for 10 marks.

Scheme of Evaluation for SEE:

Theory (100):

The question paper consists of Part A and Part B. Part A will be for 20 marks covering the complete syllabus and is compulsory. Part B will be for 80 marks and shall consist of five questions (descriptive, analytical, problems or/and design) carrying 16 marks each. All five from Part B will have internal choice and one of the two have to be answered compulsorily.

Microprocessor & Microcontroller

Sub Code: 12CS53
L:T:P:S 3:0:1:1
Credits:05

CIE Marks: 100+50
SEE marks: 100+50
Exam Hrs: 03

Prerequisite:
The student should have undergone the following courses ,
1. Digital Electronics ,
2. Introduction to Computer Programming

Course Learning Objectives:
The students will be able:
1. To Analyze draw and explain 8086 Microprocessor & 8051 Microcontroller architecture/block diagram and & describe their Pins/signals
2. To Analyze and code programs with different addressing modes, instructions , assembler directives of 8086
3. To Design and develop flow chart & algorithms to solve problems and write assembly language programs for 8086
4. To Develop embedded C programs for 8051 microcontroller and run on the simulator and target board
5. To Differentiate between Microprocessor & Microcontroller based systems and based on the problem statement, able to decide whether to go for microprocessor or microcontroller for solving the problem/industry requirement.

Unit-I **6 hrs**

Microprocessors - Intel 8086 Processor
Introduction , Architecture , Signal Descriptions, Physical Memory Organization, Minimum mode of operation, Maximum mode of operation , Brief overview of Intel Advanced Microprocessors

Unit-II **7 hrs**

8086 Instruction set & Assembler Directives
Addressing modes , Instruction set, Assembler directives ,Assembly Language Programming.

Unit-III **7 hrs**

Special Architectural Features, Interfacing I/O Ports & Related Programming
8086: Procedures , Macros, Stack Structure & Programming for Stack, Interrupts - structure of IVT and Interrupt programming, Interfacing Memory(static RAM), Interfacing I/O Ports, 8255(Mode0 only), Interfacing & Programming with LEDs, Switches and Seven segment displays

Unit-IV **6 hrs**

Microcontrollers - Intel 8051 Microcontroller & Programming
Introduction, Block Diagram, Memory Organization , Interrupts, Introduction to Embedded C Programming, Working of I/O Ports, Counters & Timers, Programming(embedded C) of I/O Ports, Counters & Timers(Mode1 only). Writing Delay programs using Timers.

Unit-V

7 hrs

8051 Interfacing & Applications

Interfacing & Programming (using embedded C) of : Matrix Keypad, Parallel ADC (ADC0804) DAC (DAC0800), Stepper motor, DC Motor, High power devices using Relays, Industrial sensor using optoisolators. Programming serial port of 8051, Communication of 8051 with the PC using serial port, Brief overview of ARM Microcontrollers.

Laboratory Experiments

1a. Write an 8086 ALP to search an element in a list of 'n' 16-bit numbers using the Binary Search algorithm. [Use Codeview to demonstrate the result]

1b. Write an ALP to implement decimal UP/decimal Down/Ring counter using Interface module

2a. Write an 8086 ALP to sort a given set of 'n' numbers in ascending or descending orders using Bubble sort algorithm. [Use Codeview to demonstrate the result]

2b. Write an ALP to read the status of 8 inputs bits from 8bit switch and display 'FF' if it is even parity otherwise display 00. Also display number of 1's in the input data on the LED outputs, using interface module.

3a. Write the macros using 8086 ALP to perform the following tasks using DOS/BIOS interrupts,

i) To read a character from the keyboard
ii) To display a character
iii) To clear the screen
iii) To exit to DOS operating system.

Write these macros in separate file "macros.asm", Using these macros write a program(in a different file) to read a string terminated by carriage return from keyboard and print the same on the Monitor after clearing the screen and setting the cursor to the center of the screen.

3b. Write an ALP to read the status of two 8-bit inputs (X and Y) and display the result X*Y using the interface module

4a. Write an 8086 ALP to read two strings, store them in locations str1, str2, check whether they are equal or not and display appropriate messages. Also display the length of the stored strings

4b. Write an ALP program to display messages "FIRE" & "HELP" on 4 digit seven segment display alternately with a suitable delay, [the exact delay value not specified]

5a. Write an 8086 ALP to read password and validate the user and display appropriate message, also display the count of characters in the password.

5b. Write an Embedded C Program to Interface LCD for displaying a string on single line / two line

6a. Write 8086 ALP Procedures to perform the following functions,
i) "read_8" – read 2 digit hex number from keyboard, AL should return the val
ii)"disp_16" - display decimal equivalent of 4 digit hex number/16 bit binary number, AX contains the number
Using the above procedures write an ALP to read 8bit number and compute its factorial and display the result. Store the procedures in different file and link it with the main program.

6b. Write an Embedded C program to rotate stepper motor in clock wise direction for "N" steps

7a. Write an 8086 ALP to read the 4 digit hex number and convert 4digit Hex number to decimal number, and display the decimal number.

7b. Write an Embedded C program to rotate stepper motor in anti-clock wise direction for "N" steps

8a. Write an 8086 ALP to implement Stack Data Structure, with all the operations

8b. Write an Embedded C program to rotate stepper motor in clock-wise & in anti-clock wise direction for "N" steps

9a. Write an 8086 ALP to compute GCD of two 16 bit Positive Integer numbers

9b. Write an Embedded C program to generate sine waveform using DAC module

10a. Write an 8086 ALP to compute LCM of two 16 bit Positive Integer numbers

10b. Write an Embedded C program to generate full rectified sine waveform using DAC module

11a. Write an 8086 ALP to compute nCr using recursive procedure. Assume that 'n' and 'r' are non-negative integers.

11b. Write an Embedded C program to generate half rectified sine waveform using DAC module

12a. Write an 8086 ALP to generate the first 'n' Fibonacci numbers. Input the value of n and display the Fibonacci numbers.

12b. Write an Embedded C program to interface 4 X 4 matrix keyboard using lookup table and display the key pressed on the Monitor

Reference Books:

1. A K Ray & K M Bhurchandi, Advanced Microprocessors and Peripherals : Architecture, Programming and Interfacing, 2nd Edition, Tata McGraw-Hill Pub. ISBN-13: 978-0-07-014062-2
2. Ramani Kalpathi& Ganesh Raja, Microcontrollers & Applications, Revised Edition, Sanguine Technical Publishers ISBN: 9788131732397
3. Muhammad Ali Mazidi, Janice GillispieMazidi , Rolin D. McKinlay, The 8051 Microcontroller &Embedded Systems (Using Assembly & C), Second Edition, Prentice Hall (Pearson). ISBN: 0135080444.
4. Barry B Brey, The Intel Microprocessors 8086/8088, 0186/80188,80286,80386,80486 Pentium and Pentium processor,6th Edition, Pearson Education. ISBN-13: 978-8131726228
5 Douglas V.Hall, Microprocessors and Interfacing, Revised 2nd Edition, TMH,ISBN-13:978-0-07-060167-3
6. LylaB.Das, Microprocessors & Microcontrollers , First Edition, Pearson, ISBN 978-81-317-6906-5.

Expected Course Outcomes:

After completing the course the student will be able to:

CO1: Identify the required architecture for an application

CO2: Design and develop efficient software in Assembly level language & Embedded C.

CO3: Design system configuration for a given application.

CO4: Integrate, implement and test the design in applications.

Scheme of Evaluation for CIE:

Theory (100):

CIE will consist of Three Tests each for 45 marks (15 marks for Quiz + 30 marks for descriptive) out of which best of two will be considered. In addition there will be one assignment/seminar on new topics / model presentation etc. for 10 marks.

Practical (50):

The students have to execute the programs in the lab and a record is to be maintained. Each program is evaluated independently for 10 marks. Finally, total marks are reduced to 30. A lab test will be conducted at the end of the semester for the remaining 20 marks.

Scheme of Evaluation for SEE:

Theory (100):

The question paper will consist of Part A and Part B. Part A will be for 20 marks covering the complete syllabus and is compulsory. Part B will be for 80 marks and shall consist of five questions (descriptive, analytical, problems or/and design) carrying 16 marks each. All five from Part B will have internal choice and one of the two have to be answered compulsorily.

Practical (50):

In the examination questions must be given from lots. The questions for the lab exam will be programs from the given list. After the students get a question, modification may be done by the examiner. Students can ask for a change only once. The penalty for change in question is 20%.

Data Base Management Systems

Sub Code: 12CS54
L:T:P:S 3:0:1:1
Credits:05

CIE Marks: 100+50
SEE marks: 100+50
Exam Hrs: 03

Prerequisite:
Programming Fundamentals, Discrete Mathematical Structures, Probability & Statistics.

Course Learning Objectives:
The students will be able to:
1. Analyse the basic concepts and architecture associated with DBMS
2. Apply normalization steps in database design and removal of data anomalies
3. Describe the characteristics of database transactions and how they affect database integrity and consistency.
4. Create, maintain and manipulate a relational database using SQL.
5. Employ the conceptual and relational models to design large database

Unit-I

8 hrs.

1. Introduction to Database Systems
Databases and Database users: Introduction, An example, Characteristics of Database Approach, Actors on the scene, Workers behind the scene, Advantages of using the DBMS Approach, A brief history of Database applications, When not to use a DBMS. Database System—Concepts and Architecture: Data Models, Schemas and Instances, Three-schema Architecture and Data Independence, Database Languages and Interfaces, The Database System Environment, Centralized and Client/Server Architectures for DBMSs, Classification of Database Management Systems.

2. Entity-Relationship Model
Using High-Level Conceptual Data Models for Database Design; An Example Database Application; Entity Types, Entity Sets, Attributes and Keys; Relationship types, Relationship Sets, Roles and Structural Constraints; Weak Entity Types; Refining the ER Design for the COMPANY Database; ER Diagrams, Naming Conventions and Design Issues.

Unit-II

7 hrs

3. Relational Model and Relational Algebra
Relational Model Concepts; Relational Model Constraints and Relational Database Schemas; Update Operations and Dealing with Constraint Violations; Unary Relational Operations: SELECT and PROJECT; Relational Algebra Operations from Set Theory; Binary Relational Operations: JOIN and DIVISION ;Additional Relational Operations; Examples of Queries in Relational Algebra; Relational Database Design Using ER- to-Relational Mapping.

4.Sql-99: Schema Definition, Basic Constraints and Queries
SQL Data Definition, Specifying Basic Constraints in SQL, Schema Change Statements in SQL; Basic Queries in SQL; More Complex SQL Queries; Insert, Delete and Update Statements in SQL

Unit-III

7 hrs

5. Introduction to SQL programming Techniques
Data base programming: Issues and Techniques, Embedded SQL, Dynamic SQL and SQLJ.

6. Relational Database Design
Informal Design Guidelines for Relation Schemas; Functional Dependencies; Normal Forms Based on Primary Keys; General Definitions of Second and Third Normal Forms; Boyce-Codd Normal Form; Properties of Relational Decompositions; Algorithms for Relational Database Schema Design; Multivalued Dependencies and Fourth Normal Form; Join Dependencies and Fifth Normal Form

Unit-IV

7. Transaction Processing Concepts

7 h

The ACID property, Transaction and schedules, Concurrent Execution of Transactions, Lock ba Concurrency control, performance of locking, Transaction support in SQL, Introduction to cr recovery

8. Concurrency Control

2PL, Serializability, recoverability, Introduction to Lock management , Lock conversions, Deali with Deadlocks, Specialized Locking Techniques, Concurrency control without Locking

Unit-V

9. Crash Recovery

7 h

Introduction to ARIES, the LOG, Other recovery related structures, The Write Ahead Log protoc checkpointing, Recovery from a system Crash, media recovery,

10. Database Security and Authorization

Introduction to Database Security Issues, Discretionary Access Control based on Granting a Revoking Privileges, Mandatory Access Control and Role-Based Access Control for Multilev Security

Database Management System LAB

A Mini Project should be implemented and shall be carried out in a batch of two students. T students will finalize a topic in consultation with the faculty. The mini project must be carried o in the college only.

The Mini Project tasks would involve

- Understand the complete domain knowledge of application and derive the complete da requirement specification of the Mini Project
- Design of the project
- Normalization of the Relational design up to 3NF (Desirable 5NF).
- Appreciate the importance of security for database systems.
- Documentation and submission of report.

General Guidelines :

- Database for the project- MySQL, DB2, Oracle, SQL Server etc
- Front End for the project – Visual Basic, C++, C#, Web Interface (HTML, PhP)

Typical Mini Projects

- Placement management system.
- Result management & analysis system.
- RVCE Blog management system.
- Student Feedback system

Library management

Reference Books:

1. Elmasri, Navathe; Fundamentals of Database Systems; Pearson Education; 5th Edition; 2006. ISBN – 978-81-317-1625-0
2. Raghu Ramakrishnan and Johannes Gehrke; Database Management Systems; Tata McGraw-Hill; 3rd Edition, 2003. ISBN – 0-07-123151-X
3. Silberschatz, Korth and Sudharshan; Data base System Concepts; Tata Mc-GrawHill; 5th Edition; 2002. ISBN – 007-124476-X

Expected Course Outcomes:

After completing the course the student will be able to:

CO1: Understand the fundamentals of database and its operation, different architectures, Query language, transaction, security and recovery issues.

CO2: Analyze different relational model concepts and normalize relations.

CO3: Design relational models using schema definition and constraints.

CO4: Implement the relational model for transaction using SQL.

Scheme of Evaluation for CIE:

Theory (100):

CIE will consist of Three Tests each for 45 marks (15 marks for Quiz + 30 marks for descriptive) out of which best of two will be considered. In addition there will be one assignment/seminar on new topics / model presentation etc. for 10 marks.

Practical (50):

The students have to execute the programs in the lab and a record is to be maintained. Each program is evaluated independently for 10 marks. Finally, total marks are reduced to 30. A lab test will be conducted at the end of the semester for the remaining 20 marks.

Scheme of Evaluation for SEE:

Theory (100):

The question paper will consist of Part A and Part B. Part A will be for 20 marks covering the complete syllabus and is compulsory. Part B will be for 80 marks and shall consist of five questions (descriptive, analytical, problems or/and design) carrying 16 marks each. All five from Part B will have internal choice and one of the two have to be answered compulsorily.

Practical (50):

In the examination questions must be given from lots. The questions for the lab exam will be programs from the given list. After the students get a question, modification may be done by the examiner. Students can ask for a change only once. The penalty for change in question is 20%.

Probability, Statistics and Queuing

Sub Code: 12CS5A2
L:T:P:S 3:1:0:1
Credits: 5

CIE Marks: 100
SEE marks: 100
Exam Hrs: 03

Prerequisite:
Student will have to undergo the elementary engineering mathematics of all the four semester.

Course Learning Objectives:
The students will be able to:
1. Compute the probabilities of composite events using the basic rules of probability.
2. Exhibit the significance of the connection between logic, sets, probability, statistics, queuing theory and their Applicability to the real world.
3. Explain the concept of approximation, estimation, error, hypothesis testing, and accuracy in interpreting the results Of such measurements.
4. Demonstrate several approaches to basic problem solving and implement those strategies.
5. Acquire, organize, and synthesize information and creatively use of that information.

Unit – I

1. Conditional probability, Conditional expectation and Sampling theory 7 Hrs.

Conditional probability, Bayes Theorem, Joint distributions-discrete and continuous, covariance, Conditional expectation, computing expectations by conditioning, computing variances by conditioning, central limit theorem, sampling distribution of the mean (known and unknown), **sampling distribution of difference of means, sampling distribution of the variance.**

Unit – II

2. Estimation and Tests of Hypothesis 7 Hrs.

Interval estimation of mean(sigma known and sigma unknown),Estimation of difference between two means, interval estimation of variance, Tests of Hypotheses, Type-I error, Type II error, Hypotheses concerning Mean, The relation between test and confidence intervals. Hypothesis concerning two Means, Hypothesis concerning variance, Hypothesis concerning two variances.

Unit – III

3. Probability bounds,Approximations, Computations and Poisson processes 7 Hrs.

Tail probability in equalities-Markov's inequality, Chern off bounds, Jensen's inequality,The second moment and the conditional expectation inequality, **Poisson random variables,** The **exponential distribution and its properties, Counting processes, Definition of Poisson process, Inter arrival and waiting time distributions, Further properties of Poisson process,**Conditional distribution of the arrival times,

Unit – IV

4. Introduction to queuing Theory 7 Hrs.

Introduction, Preliminaries, Exponential models,Birth-and-Death process models,**M/M/1 queuing system, M/M/1/c queuing system, M/M/c queuing system, M/M/c/c,**other queuing systems.

Unit – V

5. Markov Chains 7 Hrs.

Chapman-Kolmogorov equations, Transition matrix of Markov process, Classification of states, Limiting probabilities, mean time spent in transient states, **branching processes, time reversible Markovchain**, Markov chain Monte-Carlo methods and Markov decision processes.

Reference Books
1. Millerand Fr Pearson Edu
2. Sheldon M. Academic P 9780123705
3. Sheldon M. 9th Edition, 2
4. R.E. Walpo Scientists, P
5. Arnold, O. Applications

Expected Cours
After completing
CO1: Understan
CO2: analyse t testing, c
CO3: Demonst hypothes accuracy
CO4: Apply the

Scheme of Eval
Theory (100):
CIE will consis out of which be new topics / mo

Scheme of Eva
Theory (100):
The question p complete syllab (descriptive, ar have internal ch

Reference Books:

1. Millerand Freund's (Richard. A. Johnson, C.B.Gupta), Probability and statistics for Engineers, Pearson Education, Second impression 2007. ISBN- 978-0-12-051051-1, Unit - I,II,III,V
2. Sheldon M. Ross, Introduction to Probability and Statistics for Engineers and Scientists Academic Press-An imprint of Elsevier, 4th Edition, First reprinted in India 2011. ISBN-9780123705280, Unit - I,II,III
3. Sheldon M. Ross, Introduction to Probability Models, Academic Press-An imprint of Elsevier, 9th Edition, 2009. ISBN-9780080920177, Unit - I,II,III
4. R.E. Walpole, S.L. Myers and Keying Ye, Probability and Statistics for Engineers and Scientists, Pearson Education, Eight Edition,2007.ISBN81-7808-613-1 Unit - I,II,III,V
5. Arnold, O. AllenIntoductionto Probability and Statistics and Queuing with Computer Science Applications, An imprint of ELSEVIER,AP, Second Edition, 2011, Unit - IV

Expected Course Outcomes:

After completing the course the student will be able to:

CO1: Understand many basic skills of probability, statistics, markov chains and queuing.

CO2: analyse the significance of the connection between logic , sets, probability, estimation, testing, classification of states, birth and death process

CO3: Demonstrate the concept of sampling, relation between real world confidence intervals, hypothesis concerning parameters, counting and poison processing, queuing models and accuracy in interpreting the results of such measurements.

CO4: Apply the concepts to the real world.

Scheme of Evaluation for CIE:

Theory (100):

CIE will consist of Three Tests each for 45 marks (15 marks for Quiz + 30 marks for descriptive) out of which best of two will be considered. In addition there will be one assignment/seminar on new topics / model presentation etc. for 10 marks.

Scheme of Evaluation for SEE:

Theory (100):

The question paper will consist of Part A and Part B. Part A will be for 20 marks covering the complete syllabus and is compulsory. Part B will be for 80 marks and shall consist of five questions (descriptive, analytical, problems or/and design) carrying 16 marks each. All five from Part B will have internal choice and one of the two have to be answered compulsorily.

Artificial Intelligence

Sub Code: 12CS5A6
L:T:P:S 3:1:0:1
Credits: 5

CIE Marks: 100
SEE marks: 100
Exam Hrs: 03

Prerequisite:
This Course requires a background in computer programming, algorithms and data structures, and basic discrete mathematics and probability theory.

Course Learning Objectives:
The students will be able to:

1. Understand fundamental AI concepts and current issues.
2. Understand and apply a range of AI techniques including search, logic-based reasoning, neural networks and reasoning with uncertain information.
3. Recognize computational problems suited to an AI solution.
4. Have an understanding of the basic issues of knowledge representation, blind and heuristic search.
5. Understand the design issues inherent in different AI approaches.

Unit –I 7 hrs

1. Introduction and Review of AI: What is AI? The foundations of AI, The history of AI Introduction Concepts and definition of AI, AI Problems, The Underlying assumption, What is an AI technique?, AI characteristics, AI versus Natural Intelligence, Applications of AI, etc. AI as Representation and Search – The Predicate Calculus- Inference rules.

Unit –II 8 Hrs

2. Heuristic Search: Heuristic Search – An algorithm for heuristic search, Admissibility, Monotonicity and informedness, Heuristic in games, complexity issues. Control and implementation of state space search- Recursion based search, pattern directed search, production systems, Predicate calculus and planning. The black board architecture for Problem solving.

Unit –III 8 Hrs

3. Knowledge based systems
Uncertainty: Acting under uncertainty; Inference using full joint distributions; Independence; Bayes' rule and its use; The Wumpus world revisted.
Probabilistic Reasoning: Representing knowledge in an uncertain domain; The semantics of Bayesian networks; Efficient representation of conditional distributions; Exact inference in Bayesian networks; Approximate inference in Bayesian Networks; Extending probability to first-order representations.

Unit –IV 8 Hrs

4. Learning Methods
Knowledge in Learning:A logical formulation of learning; Knowledge in learning; Explanation-based learning; Learning using relevance information; Inductive logic programmingStatistical learning; Learning with complete data; Learning with hidden variables; Instance-based learning.

Unit-V 5 Hrs

5. Philosophical Foundations: Weak AI and Strong AI; The ethics and risks of developing AI. AI Present and Future:Agent components; Agent architectures; Are we going in the right direction? What if AI does succeed?

Reference Books:

1. Stuart Russel, Peter Norvig: "Artificial Intelligence A Modern Approach", 2nd Edition, Pearson Education, 2003. ISBN-13: 978-0131038059
2. G. F Iunger and W. A Stubblefield, Artificial Intelligence – Structures and Strategies for complex problem solving, 4th Edition, addsison –Wesley, 1998. ISBN-13: 978-0805347807
3. Elaine Rich, Kevin Knight: "Artificial Intelligence", 3rd Edition, Tata McGraw Hill, 2009. ISBN-13: 978-0070522633
4. P.H Winston, Artificial Intelligence, 3rd Edition, Addison-Wesley, 1992. ISBN-13: 978-0201533774
5. Nils J. Nilsson: "Principles of Artificial Intelligence", Elsevier, 1980. ISBN-13: 978-0934613101

Expected Course Outcomes:

After completing the course the student will be able to:

CO1: Understand the basic concepts and challenges of Artificial Intelligence.

CO2: Apply basic Artificial Intelligence algorithms to solve problems.

CO3: Connect the ethical issues in Artificial Intelligence and combine various logic-based techniques in research applications.

CO4: Assess the strong association by comparing different Artificial Intelligence techniques.

Advanced Algorithms

Sub Code: 12CS5B4
L:T:P:S 3:0:0:0
Credits:3

CIE Marks: 100
SEE marks: 100
Exam Hrs: 03

Prerequisite:

1. Knowledge of basic computer science principles and skills, at a level sufficient to write a reasonably non-trivial computer program.
2. Familiarity with the basic Data structure concepts.
3. Must have done Analysis and Design of algorithms course.

Course Learning Objectives:

The students will be able to:

1. Design and implement `new' algorithms in the real world.
2. Map practical problems to algorithmic problems.
3. Read and understand algorithms published in journals.
4. Develop writing skills to present own algorithms
5. Collaborate and work together in group to design new algorithms.

Unit –I 7 Hrs

1. Analysis techniques:

Growth of functions: Asymptotic notation, Standard notations and common functions, Substitution method for solving recurrences, Recursion tree method for solving recurrences, Master theorem, Amortized analysis, Aggregate, Accounting, and Potential methods

Unit –II 7 Hrs

2. String Matching Algorithms:

Naïve algorithm, Rabin-Karp algorithm, String matching with finite automata, Knuth-Morris-Pratt algorithm

Graph Algorithms

Bellman-Ford Algorithm, Shortest paths in a DAG, Johnson's Algorithm for sparse graphs.

Unit –III 7 Hrs

3. Advanced Data structures

Red-Black tree, Fibonacci heaps, Splay trees, Binomial Queues, skip lists.

Maximum Flow:

Flow networks, Ford Fulkerson method and Maximum Bipartite Matching

Unit –IV 7 Hrs

4. Number Theoretic Algorithms:

Elementary notions, GCD, Modular arithmetic, solving modular linear equations, The Chinese remainder theorem, powers of an element, RSA cryptosystem, primality testing, Integer factorization

Unit-V 7 Hrs

5 Polynomials and the FFT

Representation of polynomials; The DFT and FFT; Efficient implementation of FFT.

Recent trends : Topics to be selected by the faculty handling the Course Code and given as assignments to the students (Assignment for 10 marks).

Reference Books:

1. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein; Introduction to Algorithms; Columbia University, 3rd Edition; 2009, ISBN-13: 978-0262033848.
2. Mark Allen Weiss; Data Structures and Algorithm Analysis in C++; Addison-Wesley; 4th Revised edition; 2013, **ISBN-13:** 9780132847377.

Expected Course Outcomes:

After completing the course the student will be able to:

CO1: Understand the fundamentals of Asymptotic notation, Standard notations and common functions , Naïve string matching algorithm, Flow networks, Elementary notions, GCD, Representation of polynomials.

CO2: Analyze and solve practical problems using different algorithmic techniques.

CO3: Design robust algorithms using mathematical techniques.

CO4: Implement advanced techniques for a given problem.

Scheme of Evaluation for CIE:

Theory (100):

CIE will consist of Three Tests each for 45 marks (15 marks for Quiz + 30 marks for descriptive) out of which best of two will be considered. In addition there will be one assignment/seminar on new topics / model presentation etc. for 10 marks.

Scheme of Evaluation for SEE:

Theory (100):

The question paper will consist of Part A and Part B. Part A will be for 20 marks covering the complete syllabus and is compulsory. Part B will be for 80 marks and shall consist of five questions (descriptive, analytical, problems or/and design) carrying 16 marks each. All five from Part B will have internal choice and one of the two have to be answered compulsorily.