Gurugram University Gurugram

Curriculum for UG Degree Course in

Computer Science and Engineering

Gurugram University, Gurugram

GENERAL COURSE STRUCTURE & CREDIT DISTRIBUTION

STRUCTURE OF UNDERGRADUATE ENGINEERING PROGRAM

S. No.	Category	Breakup of Credits (Total 160)
1	Humanities and Social Sciences, including Management courses	11
2	Basic Science courses	19
3	Engineering Science courses including workshop, drawing, basics of electrical/mechanical/computer etc.	30.5
4	Professional core courses	64
5	Professional Elective courses relevant to chosen specialization/branch	12
6	Open subjects – Electives from other technical and /or emerging subjects	12
7	Project work, seminar and internship in industry or elsewhere	14
8	Mandatory Courses [Environmental Sciences, Induction training, Constitution of India, Essence of Indian Traditional Knowledge]	Non-credit
	Total	**162.5**

SEMESTER-WISE SUMMARY OF THE PROGRAM

S. No.	Semester	No. of Contact Hours	Credits	Marks
1.	I	25	19.5	900
2.	II	25	22	900
3.	III	28	22	1000
4.	IV	26	22	1000
5.	V	27	21	900
6.	VI	26	22	900
7.	VII	26	20	800
8.	VIII	22	14	500
	Total		**162.5**	6900

COURSE CODE AND DEFINITIONS

Course Code	Definitions
L	Lecture
T	Tutorial
P	Practical
BSC	Basic Science Courses
ESC	Engineering Science Courses
HSMC	Humanities and Social Sciences, including Management courses
PCC	Professional core courses
PEC	Professional Elective courses
OEC	Open Elective courses
LC	Laboratory course
MC	Mandatory courses
TRAINING	Training
PROJECT	Project

Management in the Cloud, Availability Management: SaaS, PaaS, IaaS Privacy Issues Privacy Issues, Data Life Cycle, Key Privacy Concerns in the Cloud, Protecting Privacy, Changes to Privacy Risk Management and Compliance in Relation to Cloud Computing, Legal and Regulatory Implications, U.S. Laws and Regulations, International Laws and Regulations

UNIT - IV

AUDIT AND COMPLIANCE: Internal Policy Compliance, Governance, Risk, and Compliance (GRC), Regulatory/External Compliance, Cloud Security Alliance, Auditing the Cloud for Compliance, Security-as-a Cloud.

DATA INTENSIVE COMPUTING: Map-Reduce Programming Characterizing Data-Intensive Computations, Technologies for Data- Intensive Computing, Storage Systems, Programming Platforms, MapReduce Programming, MapReduce Programming Model, Example Application

COURSE OUTCOMES:

At the end of this course, students will demonstrate the ability to

CO1: Recall and summarize the basic concepts of cloud computing
CO2: Discuss the architectural design of cloud and illustrate various programming models.
CO3: Outline the virtualization technology and determine their uses.
CO4: Explain the basic threats and security mechanism in cloud
CO5: Summarize the cloud available platforms for business and industry perspective

TEXT AND REFERENCE BOOKS:

1. –Cloud Computing Explained: Implementation Handbook for Enterprises‖, John Rhoton, Publication Date: November 2, 2009
2. –Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance (Theory in Practice)‖, Tim Mather, ISBN-10: 0596802765,O'Reilly Media, September 2009

7TH SEMESTER

B. Tech. (Computer Science and Engineering)

Scheme of Studies/Examination w.e.f. 2023-24

Semester – VII

S.N.	Category	Course Code	Course Title	Hours Per week			Total Contact Hrs. per week	Credits	Examination Schedule (Marks)			
				L	T	P			Marks of classwork	Theory	Practical	Total
9.	**PCC**		Neural Networks	3	0	0	3	3	30	70		100
10.	**PEC**		Professional Elective Course - IV	3	0	0	3	3	30	70		100
11.	**PEC**		Open Elective Course - III	3	0	0	3	3	30	70		100
12.	**OEC**		Open Elective Course - IV	3	0	0	3	3	30	70		100
13.	**HSMC**		Organizational Behaviour	3	0	0	3	3	30	70		100
14.	**LC**		Neural Networks Lab	0	0	2	2	1	50		50	100
15.	**PROJECT**		Project - II	0	0	8	8	4	100		100	200
16.	**PT**		Practical Training - II	0	0	2	2	1	50		50	100
			Total	**15**	**0**	**11**	**26**	**20**	**300**	**350**	**150**	**900**

NOTE:

1. **The evaluation of Practical Training - II will be based on the seminar, viva voice, and report submitted by the students.**
2. **Choose any one from Professional Elective Course – IV**
3. **Choose any one from Open Elective Course – III & IV**

Professional Elective Course – IV

1. Cyber Security Threats
2. Advanced Computer Architecture
3. Predictive Analytics
4. Information Hiding Techniques
5. Data Science

NEURAL NETWORKS

Semester	VII				
Course code					
Category	Professional Core Courses				
Course title	Neural Networks				
Scheme and Credits	L	T	P	Credits	
	3	0	0	3	
Classwork	30 Marks				
Exam	70 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Note: The examiner will set nine questions in total. Question one will be compulsory. Question one will have seven parts of 2 marks each from all units, and the remaining eight questions of 14 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, the first being compulsory and selecting one from each unit.

COURSE OBJECTIVES:

1. To understand the different issues involved in the design and implementation of neural networks
2. To study the basics of neural Networks and its activation functions.
3. To understand concept of perceptron and its application in real world.
4. To introduce techniques used for training artificial neural networks.
5. To implement design of an artificial neural network and build a NN model to solve a problem.

UNIT I

Introduction to ANN: Need of Artificial Neural Network, Biological Neurons and Memory, Structure & Function of a single Neuron, Biological neuron equivalencies to artificial neuron model, Evolution of neural network, Application of Artificial Neural Network

Models of Artificial Neuron & activation functions

UNIT II

McCulloch and Pits Neural Network (MCP Model): Architecture, Solution of AND, OR, XOR function using MCP model,

Hebb Model: Architecture, training and testing, Hebb network for AND, OR function.

Supervised Learning Network: Architecture of Perceptron Network, training and Testing algorithm for single output and multi-output model. Adaptive Linear Neuron (Adaline): Architecture, training and Testing algorithm

UNIT III

Learning Rules: Introduction to learning and type of learning, Hebbian Learning Rule, Perceptron Learning Rule, Correlation Learning Rule, Delta Learning Rule, Competitive Learning Rule

Back propagation Network: Back Propagation networks, Architecture of Back-propagation(BP) Networks, Back-propagation Learning

UNIT IV

Associative Memory Networks: Auto associative and Hetro associative memory and their architecture, training (insertion) and testing (Retrieval) algorithm using Hebb rule and Outer Product rule. Storage capacity, testing of associative memory for missing and mistaken data, Bidirectional Associative memory

COURSE OUTCOMES:

At the end of this course, students will demonstrate the ability to

CO1: Understand the difference between biological neuron and artificial neuron.
CO2: Familiar with different Neural network Models
CO3: Understand the concept of learning in Neural Network.
CO4: Understanding of CNN and RNN to model for real-world applications.
CO5: Analyse the given conceptual problem and able to visualize in Neural Network
CO6: Understand the associative memory and its architecture.

TEXT AND REFERENCE BOOKS:

1. Introduction to artificial Neural systems by Jacek M. Zurada, 1994, Jaico Publ. House.
2. Principles of Soft Computing by S.N. Deepa, S.N. Sivanandam., Weley publication.
3. –Neural Networks: A Comprehensive formulation‖, Simon Haykin, 1998
4. –Neural Networks‖, Kosko, 1992, PHI.
5. –Neural Network Fundamentals‖ – N.K. Bose , P. Liang, 2002, T.M.H
6. Neural Network To design and build a simple NN model to solve a problem, T.N.Shankar, University Science Press
1. Neuro Fuzzy Systems, Lamba, V.K., University Science Press

ORGANIZATIONAL BEHAVIOR

Semester	VII				
Course code					
Category	HSMC				
Course title	Organizational Behavior				
Scheme and Credits	L	T	P	Credits	
	3	0	0	3	
Classwork	30 Marks				
Exam	70 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Note: The examiner will set nine questions in total. Question one will be compulsory. Question one will have seven parts of 2 marks each from all units, and the remaining eight questions of 14 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, the first being compulsory and selecting one from each unit.

COURSE OBJECTIVES:

The OBJECTIVES of this course is to expose the students to basic concepts of management and provide insights necessary to understand behavioral processes at individual, team and organizational level.

UNIT - II

Introduction of Management- Meaning, definitions, nature of management; Managerial levels, skills and roles in an organization; Functions of Management: Planning, Organizing, staffing, Directing & Controlling, Interrelationship of managerial functions, scope of management & Importance of management. Difference between management and administration.

UNIT - II

Introduction of organization: - Meaning and process of Organization, Management v/s Organization;

Fundamentals of Organizational Behavior: Concepts, evolution, importance and relationship with other Fields; Contemporary challenges and opportunities of OB.

Individual Processes and Behavior-Personality- Concept, determinants and applications; **Perception-** Concept, process and applications,

Learning- Concept (Brief Introduction);

Motivation- Concept, techniques and importance.

UNIT - III

Interpersonal Processes- **Teams and Groups**- Definition of Group, Stages of group development, Types of groups, meaning of team, merits and demerits of team; difference between team and group, **Conflict-** Concept, sources, types, management of conflict;

Leadership: Concept, function, styles & qualities of leadership.

Communication – Meaning, process, channels of communication, importance and barriers of communication.

UNIT - IV

Organizational Processes: Organizational structure - Meaning and types of organizational structure and their effect on human behavior;

Organizational culture - Elements, types and factors affecting organizational culture. **Organizational change:** Concept, types & factors affecting organizational change, Resistance to Change.

COURSE OUTCOMES:

At the end of this course, students will demonstrate the ability to

CO1: Students will be able to apply the managerial concepts in practical life.

CO2: The students will be able to understand the concept of organizational behavior at individual level and interpersonal level.

CO3: Students will be able to understand the behavioral dynamics in organizations.

CO4: Students will be able to understand the organizational culture and change.

CO5: To develop creative and innovative ideas that could positively shape the organizations.

CO6: To accept and embrace in working with different people from different cultural and diverse background in the workplace.

TEXT AND REFERENCE BOOKS:

1. Robbins, S.P. and Decenzo, D.A. Fundamentals of Management, Pearson Education Asia, New Delhi.
2. Stoner, J et. al, Management, New Delhi, PHI, New Delhi.
3. Satya Raju, Management – Text & Cases, PHI, New Delhi.
4. Kavita Singh, OrganisationalBehaviour: Text and cases. New Delhi: Pearson Education.
5. Pareek, Udai, Understanding OrganisationalBehaviour, Oxford University Press, New Delhi.
6. Robbins, S.P. & Judge, T.A., OrganisationalBehaviour, Prentice Hall of India, New Delhi.
7. GhumanKarminder, Aswathappa K., Management concept practice and cases, Mc Graw Hill education.
8. Chhabra T. N., Fundamental of Management, Sun India Publications-New Delhi

Neural Networks LAB

Semester	VI				
Course code					
Category	Professional Core Courses				
Course title	Neural Networks Lab				
Scheme and Credits	L	T	P	Credits	
	0	0	2	1	
Classwork	50 Marks				
Exam	50 Marks				
Total	100 Marks				
Duration of Exam	02 Hours				

Note:

(i) At least 10 experiments are to be performed by students in the semester.

(ii) At least 7 experiments should be performed from the list, remaining three experiments may either be performed from the above list or designed and set by the concerned institution as per the scope of the syllabus

CONTENTS

1. Introduction to Matlab in context with NN.
2. Plotting of Activation Functions: Threshold functions, Signum function, Sigmoid function, Tan-hyperbolic function, Ramp function, Identity function using matlab.
3. Implementation of some basic model like MCP with suitable example.
4. Implementation of Hebb model with suitable example.
5. How the weights and bias values affect the output of a neuron.
6. How the choice of activation function (or transfer function) affects the output of a neuron.
7. Implementation of linearly separable concept for a problem.
8. To study some basic neuron models and learning algorithms by using Matlab neural network toolbox.

COURSE OUTCOMES:

At the end of this course, students will demonstrate the ability to

CO1: For a given conceptual problem student will be able to analyze the problem and able to visualize using NN.

CO2: Students will be familiar with different NN models and its implementation.

CO3: Students will be able to understand the concept of learning in NN and its implementation.

CO4: Apply Artificial Neural Networks models to handle uncertainty and solve engineering problems.

CO5: Identify and describe Artificial Neural Network techniques in building intelligent machines.

PRACTICAL TRAINING - II

Semester	VII				
Course code					
Category	PT				
Course title	Practical Training - II				
Scheme and Credits	L	T	P	Credits	
	0	0	2	1	
Classwork	50				
Exam	50				
Total	100				
Duration of Exam	02 Hours				

The evaluation of Practical Training – II will be based on the seminar, viva voice, and report submitted by the students.

PROJECT - II

Semester	VII				
Course code					
Category	Laboratory course				
Course title	Project - II				
Scheme and Credits	L	T	P	Credits	
	0	0	8	4	
Classwork	100 Marks				
Exam	100 Marks				
Total	200 Marks				
Duration of Exam	03 Hours				

COURSE OBJECTIVES

1. To allow students to demonstrate a wide range of the skills by working on PROJECT-I that has passed through the design, analysis, testing and evaluation.
2. To encourage problem solving skills.
3. To allow students to develop problem solving, synthesis and evaluation skills.
4. To encourage teamwork and leadership.
5. To improve students' communication skills by asking them to produce both a professional report and a professional poster and to give an oral presentation.

Students will be assigned projects individually or in a group of not more than 3 students depending on the efforts required for completion of project.

The project will have 4 stages:

(*Marks for internal evaluation are given in brackets)

1. Synopsis submission (10 marks)
2. 1st mid-term progress evaluation (10 marks)
3. 2nd mid-term progress evaluation (10 marks)
4. Final submission evaluation (20 marks)

The external examiner will evaluate the project on the basis of idea/quality of project, implementation of the project, project report and/or publication and viva.

COURSE OUTCOMES:

At the end of this course, students will demonstrate the ability to

CO1: Demonstrate a sound technical knowledge of their selected project solution.
CO2: Undertake problem solution.
CO3: Design engineering solutions to complex problems utilising a systems approach.
CO4: Conduct the remaining engineering project.
CO5: Communicate with team members at large in written an oral form.
CO6: Demonstrate the knowledge, skills and attitudes of a professional engineer.

Professional Elective Course - IV

CYBER SECURITY THREATS

Semester	VII				
Course code					
Category	Professional Elective Courses				
Course title	Cyber Security Threats				
Scheme and Credits	L	T	P	Credits	
	3	0	0	3	
Classwork	30 Marks				
Exam	70 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Note: The examiner will set nine questions in total. Question one will be compulsory. Question one will have seven parts of 2 marks each from all units, and the remaining eight questions of 14 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, the first being compulsory and selecting one from each unit.

COURSE OBJECTIVES:

1. The learner will gain knowledge about securing both clean and corrupted systems, protect personal data, and secure computer networks.
2. The learner will understand key terms and concepts in cyber law, intellectual property and cybercrimes, trademarks and domain theft.
3. The learner will be able to examine secure software development practices.
4. The learner will understand principles of web security.
5. The learner will be able to incorporate approaches for risk management and best practices.
6. The learner will gain an understanding of cryptography, how it has evolved, and some key encryption techniques used today.

UNIT - II

Introduction: Security threats - Sources of security threats- Motives - Target Assets and vulnerabilities – Consequences of threats- E-mail threats - Web-threats - Intruders and Hackers, Insider threats, Cyber crimes. Network Threats: Active/ Passive – Interference – Interception – Impersonation – Worms –Virus – Spam's – Ad ware - Spy ware – Trojans and covert channels – Backdoors – Bots – IP, Spoofing - ARP spoofing - Session Hijacking - Sabotage-Internal treats Environmental threats - Threats to Server security.

UNIT - II

Security Threat Management: Risk Assessment - Forensic Analysis - Security threat correlation –Threat awareness - Vulnerability sources and assessment- Vulnerability assessment tools –Threat identification - Threat Analysis - Threat Modelling - Model for Information Security Planning.

UNIT - III

Security Elements: Authorization and Authentication - types, policies and techniques – Security certification - Security monitoring and Auditing - Security Requirements Specifications – Security Policies and Procedures, Firewalls, IDS, Log Files, Honey Pots

UNIT - IV

Access control, Trusted Computing and multilevel security - Security models, Trusted Systems, Software security issues, Physical and infrastructure security, Human factors – Security awareness, training, Email and Internet use policies.

COURSE OUTCOMES:

At the end of this course, students will demonstrate the ability to

CO1: Analyze and resolve security issues in networks and computer systems to secure an IT infrastructure.

CO2: Design, develop, test and evaluate secure software.

CO3: Develop policies and procedures to manage enterprise security risks.

CO4: Evaluate and communicate the human role in security systems with an emphasis on ethics, social engineering vulnerabilities and training.

CO5: Interpret and forensically investigate security incidents.

TEXT AND REFERENCE BOOKS:

1. Swiderski, Frank and Syndex, ―Threat Modeling‖, Microsoft Press, 2004.
2. William Stallings and Lawrie Brown, ―Computer Security: Principles and Practice‖, Prentice Hall, 2008.
3. Joseph M Kizza, ―Computer Network Security‖, Springer Verlag, 2005
4. Thomas Calabres and Tom Calabrese, ―Information Security Intelligence: Cryptographic Principles & Application‖, Thomson Delmar Learning, 2004.

ADVANCED COMPUTER ARCHITECTURE

Semester	VII				
Course code					
Category	Professional Elective Courses				
Course title	Advanced Computer Architecture				
Scheme and Credits	L	T	P	Credits	
	3	0	0	3	
Classwork	30 Marks				
Exam	70 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Note: The examiner will set nine questions in total. Question one will be compulsory. Question one will have seven parts of 2 marks each from all units, and the remaining eight questions of 14 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, the first being compulsory and selecting one from each unit.

COURSE OBJECTIVES:

1. To make students know about the Parallelism concepts in Programming.
2. To give the students an elaborate idea about the different memory systems and buses.
3. To introduce the advanced processor architectures to the students.
4. To make the students know about the importance of multiprocessor and multicomputer.
5. To study about data flow computer architectures.

UNIT - II

Architecture And Machines: Some definition and terms, interpretation and microprogramming. The instruction set, Basic data types, Instructions, Addressing and Memory. Virtual to real mapping. Basic Instruction Timing.

UNIT - II

Cache Memory Notion: Basic Notion, Cache Organization, Cache Data, adjusting the data for cache organization, write policies, strategies for line replacement at miss time, Cache Environment, other types of Cache. Split I and D-Caches, on chip caches, Two level Caches, write assembly Cache, Cache references per instruction, technology dependent Cache considerations, virtual to real translation, overlapping the Tcycle in V-R Translation, studies. Design summary.

UNIT - III

Memory System Design: The physical memory, models of simple processor memory interaction, processor memory modeling using queuing theory, open, closed and mixedqueue models, waiting time, performance, and buffer size, review and selection of queuing models, processors with cache.

UNIT - IV

Concurrent Processors: Vector Processors, Vector Memory, Multiple Issue Machines, Comparing vector and Multiple Issue processors.

Shared Memory Multiprocessors: Basic issues, partitioning, synchronization and coherency, Type of shared Memory multiprocessors, Memory Coherence in shared Memory Multiprocessors.

COURSE OUTCOMES:

At the end of this course, students will demonstrate the ability to

CO1: Understand the Concept of Parallel Processing and its applications.

CO2: Implement the Hardware for Arithmetic Operations.

CO3: Analyze the performance of different scalar Computers.

CO4: Develop the Pipelining Concept for a given set of Instructions.

CO5: Distinguish the performance of pipelining and non-pipelining environment in a processor.

TEXT AND REFERENCE BOOKS:

1. Advance computer architecture by Hwang & Briggs, 1993, TMH.
2. Pipelined and Parallel processor design by Michael J. Fiynn – 1995, Narosa

PREDICTIVE ANALYTICS

Semester	VII				
Course code					
Category	Professional Elective Courses				
Course title	Predictive Analytics				
Scheme and Credits	L	T	P	Credits	
	3	0	0	3	
Classwork	30 Marks				
Exam	70 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Note: The examiner will set nine questions in total. Question one will be compulsory. Question one will have seven parts of 2 marks each from all units, and the remaining eight questions of 14 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, the first being compulsory and selecting one from each unit.

COURSE OBJECTIVES:

1. To provide the knowledge of various quantitative and classification predictive models based on various regression and decision tree methods.
2. To provide the knowledge to select the appropriate method for predictive analysis
3. To provide the understanding of how to search, identify, gather and pre-process data for the analysis.
4. To provide the understanding of how to formulate predictive analytics questions.

UNIT - II

Introduction: The Analytics Life Cycle, Introduction to Predictive Analytics, Matrix Notation, Basic Foundations, Model, Method and Feature Selection

Regression: Covariance, Correlation and ANOVA review; Simple Linear Regression, OLS Model Diagnostics, Dummy Variables, Multivariate Regression, OLS Assumptions ,Weighted Least Squares (WLS), Generalized Linear Models (GLM).

UNIT - II

Classification Models: Introduction, Binomial Logistic Regression, Multinomial Logistic Regression, Linear Discriminant Analysis, Quadratic Discriminant Analysis.

Decision Trees: Introduction Regression Trees, Regression Tree Issues, Classification Trees, Pruning Trees, Bootstrap Aggregation (Bagging), Random Forest Models.

UNIT - III

Data Pre-Processing: Overview, Variable Types, Introduction to Data Transformations, Data Transformations: Categorical to Dummy Variables, Polynomials, Box-Cox Transformation, Log & Elasticity Models, Logit Transformation, Count Data Models, Centering, Standardization, Rank Transformations, Lagging Data (Causal Models), Data Reduction.

UNIT - IV

Variable Selection: Dimensionality Issues, Multi-Collinearity, Variable Selection Methods, Step

Methods.

Dimensionality: Regularization (Penalized or Shrinkage Models, Ridge Regression, LASSO, Dimension Reduction Models, Principal Components Regression (PCR), Partial Least Squares (PLS).

Machine Learning: Machine Learning Overview, Bias vs. Variance Trade-off, Error Measures, Cross-Validation.

COURSE OUTCOMES:

At the end of this course, students will demonstrate the ability to

CO1: Ability to develop and use various quantitative and classification predictive models based on various regression and decision tree methods.

CO2: Analyse the working mechanism of data pre-processing for the model building.

CO3: Ability to select the appropriate method for predictive analysis

CO4: Ability to search, identify, gather and pre-process data for the analysis.

CO5: Ability to formulate predictive analytics questions.

TEXT AND REFERENCE BOOKS:

1. –An Introduction to Statistical Learning: with Applications in R‖ by James, Witten, Hastie and Tibshirani, Springer, 1st. Edition, 2013.
2. –The Elements of Statistical Learning-Data Mining, Inference, and Prediction –by Trevor Hastie, Robert Tibshirani, Jerome Friedman , Second Edition , Springer Verlag, 2009.
3. Predictive & Advanced Analytics (IBM ICE Publication)

INFORMATION HIDING TECHNIQUES

Semester	VII				
Course code					
Category	Professional Elective Courses				
Course title	Information Hiding Techniques				
Scheme and Credits	L	T	P	Credits	
	3	0	0	3	
Classwork	30 Marks				
Exam	70 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Note: The examiner will set nine questions in total. Question one will be compulsory. Question one will have seven parts of 2 marks each from all units, and the remaining eight questions of 14 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, the first being compulsory and selecting one from each unit.

COURSE OBJECTIVES:

1. To learn about data hiding applications and their techniques.
2. To learn about hacking.
3. To learn security-based protocols, attacks and intrusions.
4. To work with advance data hiding techniques.

UNIT - II

Introduction to Information Hiding: Types of Information Hiding, Applications, Importance & Significances. Differences between cryptography and steganography, Wisdom from Cryptography, types of steganography their application and significances. Past present and future of steganography

UNIT - II

Framework for Secret Communication, Security of Steganography System, Information Hiding in Noisy Data, Adaptive versus non-Adaptive Algorithms, Active and Malicious Attackers, Information hiding in Written Text, Steganographic system, Study of Different methods of insertion and retrieval of message using image steganography, Study of histrogram analysis using MATLAB of original image and stegno image

UNIT - III

Basics of watermarking, Watermarking process, Watermarking applications, Requirements and Algorithmic Design Issues, Evaluation and Benchmarking of Watermarking, Bit plane of an Image, study of noises in stego images and their comparisons, Robustness of watermarking schemes on different attacks like blurring, cropping , compression of theimage. PSNR calculation of the images.

UNIT - IV

Use of image steganography in biometric sciences, Study of security enhancement of biometric template using steganographic Frame proof codes:-Definition, Introduction of frame proof codes,

Methods to obtain 2- frame proof codes using mutually orthogonal latin squares. Use of frame proof codes in ownership and software piracy.

COURSE OUTCOMES:

At the end of this course, students will demonstrate the ability to

CO1: Explain information security.

CO2: Give an overview of access control of relational databases.

CO3: State the basic concept in information systems security, including security technology and principles, software security and trusted systems and IT security management.

CO4: Learn advance data hiding techniques.

CO5: Understand how to apply these data hiding techniques in real-life projects.

TEXT AND REFERENCE BOOKS:

1. Recent Advancesin Information Hiding and Applications, Pan, J.-S., Huang, H.-C., Jain, L.C., Zhao, Y., Springer (2013).
2. Information Hiding Techniques for Steganography and Digital Watermarking, Stefan Katzenbeisser, Fabien A. P. Petitcolas, Artech House, 2000.

DATA SCIENCE

Semester	VII				
Course code					
Category	Professional Elective Courses				
Course title	Data Science with R programming				
Scheme and Credits	L	T	P	Credits	
	3	0	0	3	
Classwork	30 Marks				
Exam	70 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Note: The examiner will set nine questions in total. Question one will be compulsory. Question one will have seven parts of 2 marks each from all units, and the remaining eight questions of 14 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, the first being compulsory and selecting one from each unit.

COURSE OBJECTIVES:

1. . Able to apply fundamental algorithmic ideas to process data.
2. Understand the Data Analytics lifecycle.
3. Able to construct predictive models to classify new data set.
4. Learn to apply hypotheses and data into actionable predictions.
5. Document and communicate the results effectively to different stakeholders.
6. Effectively communicate the findings using visualization techniques

UNIT - I

Introduction to Data Science: Concept of Data Science, Traits of Big data, statistical modelling and algorithm modelling, AI and data science, Myths of Data science

UNIT - II

Introduction to Programming Tools for Data Science: Toolkits using Python: Matplotlib, NumPy, Scikit-learn, NLTK, Visualizing Data: Bar Charts, Line Charts, Scatterplots, working with data: Reading Files, Scraping the Web,

UNIT - III

Data Science Methodology: Business Understanding, Analytic Approach, Data Requirements, Data Collection, Data Understanding, data Preparation, Modeling, Evaluation, Deployment, feedback

UNIT - IV

Data Science Application: Prediction and elections, Recommendations and business analytics, clustering and text analytics.

COURSE OUTCOMES:

At the end of this course, students will demonstrate the ability to

CO1: Understand the value of data science and the process behind using it.
CO2: Use Python to gather, store, clean, analyse, and visualise data-sets.
CO3: Apply toolkits to formulate and test data hypotheses and uncover relationships within data-sets
CO4: Understand the data science methodology in the data science pipeline
CO5: Understand real-world challenges with several case studies

TEXT AND REFERENCE BOOKS:

1. David Dietrich, Barry Heller, Beibei Yang, –Data Science and Big Data Analytics‖ , EMC Education Services,2015
2. Nina Zumel, John Mount,—Practical Data Science with R‖,Manning Publications,2014
3. Jure Leskovec, Anand Rajaraman, Jeffrey D.Ullman,—Mining of Massive Datasets‖, Cambridge University Press,2014
4. Mark Gardener,–Beginning R- The Statistical Programming Language‖, John Wiley & Sons, Inc,2012
5. W.N.Venables, D.M.Smithandthe R Core Team,–An Introduction to R‖, 2013
6. Tony Ojeda, Sean Patrick Murphy, Benjamin Bengfort, Abhijit Dasgupta, –Practical Data Science Cookbook‖, Packt Publishing Ltd.,2014

8TH SEMESTER

B.Tech. (Computer Science and Engineering)
Scheme of Studies/Examination w.e.f. 2023-24

Semester - VIII

S. No.	Category	Course Code	Course Title	Hours Per week			Total Contact Hrs. per week	Credits	Examination Schedule (Marks)			
				L	T	P			Marks of classwork	Theory	Practical	Total
4.	**ESC**		MOOC - I (Essential)	3	-	-	-	3	-	-	-	100
5.	**ESC**		MOOC - II (Essential)	3	-	-	-	3	-	-	-	100
6.	**PROJECT**		Project – III/Industrial Training	0	0	16	16	8	150		150	300
			Total	**6**	**0**	**16**	**22**	**14**	**150**	**-**	**150**	**500**

NOTE: At the end of the 8th semester, each student has to submit the certificate of MOOCs (Essential).

PROJECT – III

Semester	VIII				
Course code					
Category	Professional Core Courses				
Course title	Project - III				
Scheme and Credits	L	T	P	Credits	
	0	0	16	8	
Classwork	150 Marks				
Practical	150 Marks				
Total	300 Marks				
Duration of Exam	03 Hours				

COURSE OBJECTIVES

1. To allow students to demonstrate a wide range of the skills learned during their course of study by asking them to deliver a product that has passed through the design, analysis, testing and evaluation
   To encourage multidisciplinary research through the integration learned in a number of courses.
2. To allow students to develop problem solving, analysis, synthesis and evaluation skills.
3. To encourage teamwork.
4. To improve students' communication skills by asking them to produce both a professional report and a professional poster and to give an oral presentation

Students will be assigned projects individually or in a group of not more than 3 students depending on the efforts required for completion of project.

The project will have 4 stages:

(*Marks for internal evaluation are given in brackets)

5. Synopsis submission (10 marks)
6. 1st mid-term progress evaluation (10 marks)
7. 2nd mid-term progress evaluation (10 marks)
8. Final submission evaluation (20 marks)

The external examiner will evaluate the project on the basis of idea/quality of project, implementation of the project, project report and/or publication and viva.

COURSE OUTCOMES:

At the end of this course, students will demonstrate the ability to

CO1: Demonstrate a sound technical knowledge of their selected project topic.
CO2: Undertake problem identification, formulation and solution.
CO3: Design engineering solutions to complex problems utilising a systems approach.
CO4: Conduct an engineering project.
CO5: Communicate with engineers and the community at large in written an oral form.
CO6: Demonstrate the knowledge, skills and attitudes of a professional engineer.

MOOC - I

Semester	VIII				
Course code					
Category	Engineering Science Course				
Course title	MOOC - I				
Scheme and Credits	L	T	P	Credits	
	3	0	0	3	
Classwork	-				
Practical	-				
Total	100 Marks				
Duration of Exam	-				

A student has to complete NPTEL Courses of 12 Weeks respectively through MOOCs. For registration to MOOCs Courses, the students shall follow NPTEL Site http://nptel.ac.in/ as per the NPTEL policy and norms. The students can register for these courses through NPTEL directly as per the course offering in Odd/Even Semesters at NPTEL. These NPTEL courses (recommended by the University) may be cleared during the B. Tech degree program (not necessary one course in each semester). After successful completion of these MOOCS courses the students, shall, provide their successful completion NPTEL status/certificates to the University (COE) through their college of study only.

MOOC - II

Semester	VIII				
Course code					
Category	Engineering Science Course				
Course title	MOOC - II				
Scheme and Credits	L	T	P	Credits	
	3	0	0	3	
Classwork	-				
Practical	-				
Total	100 Marks				
Duration of Exam	-				

A student has to complete NPTEL Courses of 12 Weeks respectively through MOOCs. For registration to MOOCs Courses, the students shall follow NPTEL Site http://nptel.ac.in/ as per the NPTEL policy and norms. The students can register for these courses through NPTEL directly as per the course offering in Odd/Even Semesters at NPTEL. These NPTEL courses (recommended by the University) may be cleared during the B. Tech degree program (not necessary one course in each semester). After successful completion of these MOOCS courses the students, shall, provide their successful completion NPTEL status/certificates to the University (COE) through their college of study only.