DIPLOMA WING

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA,BHOPAL

SCHEME OF STUDIES & EXAMINATIONS (IMPLEMENTED FROM SESSION : JULY 2023)

SCHEME	NAME OF BRANCH	BRANCH CODE	SEMESTER
OCBC JULY 2022/2023	COMPUTER SCIENCE & ENGG.	CO4	FIFTH (V)

S.N.	PAPER CODE	SUBJECT CODE	SUBJECT NAME	THEORY COMPONENT								PRACTICAL COMPONENT					TOTAL CREDITS	TOTAL MARKS
				HRS PER WEEK	CREDITS	TERM WORK				THEORY PAPER		HRS PER WEEK	CREDITS	LAB WORK	PRACTICAL EXAM/VIVA			
						QUIZ/ASSIGNMENT	MID TERM TEST*		TOTAL	MARKS	DURATION				MARKS	DURATION		
							I	II										
1	7491	501	INTRO. TO e-GOVERNANCE	6	6	10	10	10	30	70	03 Hrs.	0	0	0	0	0	6	100
2	7492	502	INTERNET OF THINGS	5	5	10	10	10	30	70	03 Hrs.	0	0	0	0	0	5	100
3	7493	511	INFORMATION SECURITY OR	3	3	10	10	10	30	70	03 Hrs.	4	2	20	30	03 Hrs.	5	150
	7494	512	MULTIMEDIA TECHNOLOGIES															
4	7495	521	AD.COMPUTER NETWORKS OR	3	3	10	10	10	30	70	03 Hrs.	0	0	0	0	0	3	100
	7496	522	DATA SCIENCES															
5	7601	531	RENEWABLE ENERGY TECH. OR	3	3	10	10	10	30	70	03 Hrs.	0	0	0	0	0	3	100
	7610	532	OPERATION RESEARCH															
6			SUMMER INTERNSHIP-II**	0	0	0	0	0	0	0	0	0	3	20	30	03 Hrs.	3	50
7			MAJOR PROJECT***	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0
8			WORKSHOP/VISITS etc.	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0
9			RECOVERY CLASSES/LIBERARY etc.	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0
TOTAL				20	20				150	350		16	5	40	60		25	600

NOTE - (1)* Two Best, out of Three Mid Term Tests (Progressive Tests) Marks should be entered here.

(2)** 4-6 Weeks Summer Internship after IV Semester.

(3)***One Credit will be carried forward to the Six semester major project evaluation.

GRAND TOTAL OF CREDITS	GRAND TOTAL OF MARKS
25	600

DIPLOMA WING
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DIPLOMA IN COMPUTER SCIENCE & ENGINEERING (C04)

SEMESTER V

COURSE TITLE	:	INTRODUCTION TO e-GOVERNANCE
PAPER CODE	:	7491
SUBJECT CODE	:	501
TREORY CREDITS	:	06
PRACTICAL CREDITS	:	00

Course Learning Objectives:

To cover the concepts of e-Governance and to understand how technologies and business models shape the contours of government for improving citizen services and bringing in transparency.

Course Content:

UNIT 1:

Exposure to emerging trends in ICT for development; Understanding of design and implementation of e-Government projects, e-governance lifecycle.

UNIT 2:

Need for Government Process Re-engineering (GPR); National e-Governance Plan(NeGP) for India; SMART Governments & Thumb Rules

UNIT 3:

Architecture and models of e-Governance, including Public Private Partnership (PPP); Need for Innovation and Change Management in eGovernance; Critical Success Factors; Major issue including corruption, resistance for change, e-Security and Cyber laws

UNIT 4:

Focusing on Indian initiatives and their impact on citizens; Sharing of case studies to highlight best practices in managing e-Governance projects in Indian context. Visits to local e-governance sites (CSC, eSeva, Post Office, Passport Seva Kendra, etc) as part of Tutorials.

UNIT 5:

Mini Projects by students in groups – primarily evaluation of various e-governance projects.

Reference Books:

1. Managing Transformation –Objectives to Outcomes. J Satyanarayana, Prentice Hall India
2. The State, IT and Development. Kenneth Kenniston, RK Bagga and Rohit Raj Mathur, Sage Publications India Pvt Ltd.
3. e-Government -The Science of the Possible. J Satyanarayana, Prentice Hall, India
4. http://www.csi-sigegov.org/publications.php
5. https://negd.gov.in
6. https://www.nisg.org/case-studies-on-e-governance-in-india

Course outcomes:

Through exposure to introductory ideas and practices followed in a selected number of e-Governance initiatives in India, the course will help students to understand and appreciate the essence of e-Governance.

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SEMESTER V

COURSE TITLE	:	INTERNET OF THINGS
PAPER CODE	:	7492
SUBJECT CODE	:	502
TREORY CREDITS	:	05
PRACTICAL CREDITS	:	00

Course Learning Objectives:

Internet of Things (IoT) is presently an important technology with wide ranging interest from Government, academia and industry. IoT cuts across different application domain verticals ranging from civilian to defence sectors which includes agriculture, space, health care, manufacturing, construction, water, mining, etc. Today it is possible to build different IoT solutions such as shopping system, infrastructure management in both urban and rural areas, remote health monitoring and emergency notification systems, and transportation systems. Therefore, it is very important to learn the fundamentals of this emerging technology.

Course Content:

UNIT 1:

Introduction to IoT; Sensing; Actuation

UNIT 2 :

Basics of IoT Networking, Communication Protocols, Sensor networks

UNIT 3:

Introduction to Arduino programming, Integration of Sensors/Actuators to Arduino

UNIT 4:

Implementation of IoT with Raspberry Pi; Data Handling Analytics

UNIT 5:

Case Studies: Agriculture, Healthcare, Activity Monitoring

Reference Books:

1. https://nptel.ac.in/noc/individual_course.php?id=noc17-cs22
2. "The Internet of Things: Enabling Technologies, Platforms, and Use Cases", by Pethuru Raj and Anupama C. Raman (CRC Press)
3. Internet of Things by Dr. Jeeva Jose, Khanna Publishing House (Edition 2017)
4. "Internet of Things: A Hands-on Approach", by Arshdeep Bahga and Vijay Madisetti (Universities Press)
5. *Internet of Things: Architecture and Design Principles, Raj Kamal,* McGraw Hill
6. Research papers

Course outcomes:

Students will have good understanding of various aspect of IoT, know some tools and have basic implementation skills.

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SEMESTER V

COURSE TITLE	:	INFORMATION SECURITY
PAPER CODE	:	7493
SUBJECT CODE	:	511
TREORY CREDITS	:	03
PRACTICAL CREDITS	:	02

Course Learning Objectives:

To learn how to evaluate and enhance information security of IT infrastructure and organisations

Course Content:

UNIT 1:

Introduction to Information Security, Various aspects of information security (PAIN), Security Features of Operating Systems – Authentication, Logs, Audit Features, File System Protection, User Privileges, RAID options, Anti-Virus Software, etc.

UNIT 2:

Understanding security weaknesses in popular networking protocols – IP, TCP, UDP, RIP, OSPF, HTTP, SMTP, etc.; security weaknesses in common networking devices – Hub, switch, router, WiFi; Security solutions to mitigate security risk of networking protocols (IPSec, HTTPS, etc) and devices (VLAN, VPN, Ingress Filtering, etc)

UNIT 3:

Basics of Cryptography, PKI, Security considerations while developing softwares

UNIT 4:

Network Security Products – Firewall, IDS/IPS, VPN Concentrator, Content Screening Gateways, etc.

UNIT 5:

Introduction to Security Standards – ISO 27001, Indian IT Act, IPR Laws; Security Audit procedures; Developing Security Policies; Disaster Recovery, Business Continuity Planning

Suggested Lab Work:

This is a skill course. Topics/tools taught in the class should be practiced in the Lab same week and practiced regularly during the semester till student becomes confident about it. Students should explore features of various tools/applications introduced during the course. Teacher should give weekly tasks as assignment.

Reference Books:

1. Information Security and Cyber Laws, Sarika Gupta, Khanna Publishing House
2. RFCs of protocols listed in content (https://www.ietf.org)
3. Various Acts, Laws and Standards (IT Act, ISO27001 Standard, IPR and Copyright Laws, etc.)
4. Security Guideline documents of Operating Systems (OS Manual, Man Pages, etc)
5. https://www.cert-in.org.in/
6. https://www.sans.org/

Course outcomes:

Understanding of security needs and issues of IT infrastructure. Have basic skills on security audit of networks, operating systems and application software.

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DIPLOMA IN COMPUTER SCIENCE & ENGINEERING (C04)

SEMESTER V

COURSE TITLE	:	MULTIMEDIA TECHNOLOGIES
PAPER CODE	:	7494
SUBJECT CODE	:	512
TREORY CREDITS	:	03
PRACTICAL CREDITS	:	02

Course Learning Objectives:

To introduce students to the domain of Multimedia Technologies, which explain the technologies underlying digital images, videos and audio contents, including various compression techniques and standards, and the issues to deliver multimedia content over the Internet.

Course Content:

UNIT 1: Introduction to Multimedia

Multimedia Foundation and Concepts: Multimedia Hardware, Multimedia Software , Multimedia operating systems , Multimedia communication system

UNIT 2: Basic Compression Techniques

Video and Audio Data Compression Techniques – Lossy and Lossless. Example algorithms/standards: Huffman, RLE, JPEG, MPEG, MP3, MP4, LZMA, FLAC, ALAC, ITU G.722, H.261, H.265

UNIT 3: Content Development and Distribution

Desktop publishing (Coral Draw, Photoshop, Page maker)

Multimedia Animation & Special effects (2D/3D animation, Flash)

UNIT 4: Introduction to Digital Imaging

Basics of Graphic Design and use of Digital technology, Definition of Digital images, Digital imaging in multimedia

UNIT 5: Introduction to Multimedia Programming and Applications

Suggested Lab Work:

This is a skill course. Topics/tools taught in the class should be practiced in the Lab same week and practiced regularly during the semester till student becomes confident about it. Students should explore features of various tools introduced during the course and become comfortable with their use. Teacher should give weekly tasks as assignment.

Reference Books:

1. An Introduction to Multimedia Authoring, A. Eliens
2. Fundamentals of Multimedia, Prentice Hall/Pearson, Ze-Nian Li & Mark S. Drew.
3. Multimedia and Animation, V.K. Jain, Khanna Publishing House, Edition 2018
4. Fundamentals of Multimedia, Ramesh Bangia, Khanna Book Publishing Co., N. Delhi (2007)

Course outcomes:

Student will understand various aspects of Multimedia and related standards. Student will be able to build multimedia content and applications and also multimedia enable Web applications and mobile applications.

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DIPLOMA IN COMPUTER SCIENCE & ENGINEERING (C04)

SEMESTER V

COURSE TITLE	:	ADVANCE COMPUTER NETWORK
PAPER CODE	:	7495
SUBJECT CODE	:	521
TREORY CREDITS	:	03
PRACTICAL CREDITS	:	00

Course Learning Objectives:

Introduce Advance Networking Concepts, Theories and Tools

Course Content:

UNIT 1:

Review of Networking Basics; Advance Topics in IPv4 – Subnetting, Multicasting, Multicast Routing Protocols (IGMP, PIM, DVMRP); Advance Topics in TCP – flow management, congestion avoidance, protocol spoofing; IPv6

UNIT 2:

Telecom Networks, Switching Techniques; Introduction to Frame Relay, ATM, MPLS;

VSAT Communication – Star and Mesh architectures, bandwidth reservation;

Wireless Networks – WiFi, WiMax, Cellular Phone Technologies – GSM, CDMA, 3G, 4G

UNIT 3:

Network Redundancy, Load Balancers, Caching, Storage Networks; QoS; Network Monitoring – SNMP, RMON;

UNIT 4:

Introduction to Network Security – VLAN, VPN, Firewall, IPS, Proxy Servers

UNIT 5:

Network Simulation, Network design case studies and exercises, IP Addressing schema, Protocol Analysers (Wireshark, etc)

Reference Books:

1. RFCs and Standards Documents (www.ietf.org and other standard body websites)
2. Communication Networking – An Analytical Approach, Anurag-Manjunath-Joy
3. TCP/IP Illustrated (Vol.1,2), Stevens
4. Data Networks, Bertsekas-Gallager
5. An Engineering Approach to Computer Networking, S. Keshav

Course outcomes:

1. Understanding core concepts/theories/algorithms of computer networks
2. Some hands-on capability on various network devices and tools
3. Capability to design and implement a computer network

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SEMESTER V

COURSE TITLE	:	DATA SCIENCES: DATA WAREHOUSING AND DATA MINING
PAPER CODE	:	7496
SUBJECT CODE	:	522
TREORY CREDITS	:	03
PRACTICAL CREDITS	:	00

Course Learning Objectives:

Introduce students to the domain of Data Warehousing and Data Mining

Course Content:

UNIT 1: Introduction

Motivation, Importance, Definitions, Kind of Data, Data Mining Functionalities, Kinds of Patterns, Classification of Data Mining Systems, Data Mining Task Primitives, Integration of A Data Mining System with A Database or Data Warehouse System, Major Issues in Data Mining, Types of Data Sets and Attribute Values, Basic Statistical Descriptions of Data, Data Visualization, Measuring Data Similarity. PREPROCESSING: Data Quality, Major Tasks in Data Preprocessing, Data Reduction, Data Transformation and Data Discretization, Data Cleaning and Data Integration.

UNIT 2: Data Warehousing and on-line Analytical Processing

Data Warehouse basic concepts, Data Warehouse Modeling - Data Cube and OLAP, Data Warehouse Design and Usage, Data Warehouse Implementation, Data Generalization by Attribute-Oriented Induction, Data Cube Computation.

UNIT 3: Patterns, Associations and Correlations

Mining Frequent Patterns, Associations and Correlations: Basic Concepts, Efficient and Scalable Frequent Itemset Mining Methods, Pattern Evaluation Methods, Applications of frequent pattern and associations.

Frequent Patterns and Association Mining: A Road Map, Mining Various Kinds of Association Rules, Constraint-Based Frequent Pattern Mining, Extended Applications of Frequent Patterns.

UNIT 4: Classification

Basic Concepts, Decision Tree Induction, Bayesian Classification Methods, Rule-Based Classification, Model Evaluation and Selection, Techniques to Improve Classification Accuracy: Ensemble Methods, Handling Different Kinds of Cases in Classification, Classification by Neural Networks, Support Vector Machines, Pattern-Based Classification, Lazy Learners (or Learning from Your Neighbors).

UNIT 5: Cluster Analysis

Basic Concepts of Cluster Analysis, Clustering Structures, Major Clustering Approaches, Partitioning Methods, Hierarchical Methods, Density-Based Methods, Model-Based Clustering, Why outlieranalysis, Identifying and handling of outliers, Outlier Detection Techniques. WEB MINING: Basic concepts of web mining, different types of web mining, PAGE RANK Algorithm, HITS Algorithm

Reference Books:

1. Jiawei Han, Micheline Kamber, Jian Pei, Data Mining: Concepts and Techniques, Elsevier
2. Margaret H Dunham, Data Mining Introductory and Advanced Topics, Pearson Education
3. Amitesh Sinha, Data Warehousing, Thomson Learning, India.
4. Xingdong Wu, Vipin Kumar, the Top Ten Algorithms in Data Mining, CRC Press, UK.

Course outcomes:

Student will have general idea about Data Warehousing and Data Mining techniques, will be able to explore further and effectively use related tools.

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SEMESTER V

COURSE TITLE	:	RENEWABLE ENERGY TECHNOLOGIES
PAPER CODE	:	7601
SUBJECT CODE	:	531
TREORY CREDITS	:	03
PRACTICAL CREDITS	:	00

Course Learning Objectives:

- To understand present and future scenario of world energy use.
- To understand fundamentals of solar energy systems.
- To understand basics of wind energy.
- To understand bio energy and its usage in different ways.
- To identify different available non-conventional energy sources.

Course Content:

UNIT-I: Introduction: World Energy Use; Reserves of Energy Resources; Environmental Aspects of Energy Utilisation; Renewable Energy Scenario in India and around the World; Potentials; Achievements / Applications; Economics of renewable energy systems.

Unit-II: Solar energy: Solar Radiation; Measurements of Solar Radiation; Flat Plate and Concentrating Collectors; Solar direct Thermal Applications; Solar thermal Power Generation Fundamentals of Solar Photo Voltaic Conversion; Solar Cells; Solar PV Power Generation; Solar PV Applications.

Unit-III: Wind Energy: Wind Data and Energy Estimation; Types of Wind Energy Systems; Performance; Site Selection; Details of Wind Turbine Generator; Safety and Environmental Aspects.

Unit-IV: Bio-Energy: Biomass direct combustion; Biomass gasifiers; Biogas plants; Digesters; Ethanol production; Bio diesel; Cogeneration; Biomass Applications.

Unit-V: Other Renewable Energy Sources: Tidal energy; Wave Energy; Open and Closed OTEC Cycles; Small Hydro-Geothermal Energy; Hydrogen and Storage; Fuel Cell Systems; Hybrid Systems.

Reference Books:

1. O.P. Gupta, Energy Technology, Khanna Publishing House, Delhi (ed. 2018)
2. Renewable Energy Sources, Twidell, J.W. & Weir, A., EFN Spon Ltd., UK, 2006.
3. Solar Energy, Sukhatme. S.P., Tata McGraw Hill Publishing Company Ltd., New Delhi, 1997.
4. Renewable Energy, Power for a Sustainable Future, Godfrey Boyle, Oxford University Press, U.K., 1996.
5. Fundamental of Renewable Energy Sources, GN Tiwari and MK Ghoshal, Narosa, New Delhi, 2007.
6. Renewable Energy and Environment-A Policy Analysis for India, NH Ravindranath, UK Rao, B Natarajan, P Monga, Tata McGraw Hill.
7. Energy and The Environment, RA Ristinen and J J Kraushaar, Second Edition, John Willey & Sons, New York, 2006.
8. Renewable Energy Resources, JW Twidell and AD Weir, ELBS, 2006.

Course outcomes:

At the end of the course, the student will be able to:

CO1	Understand present and future energy scenario of the world.
CO2	Understand various methods of solar energy harvesting.
CO3	Identify various wind energy systems.
CO4	Evaluate appropriate methods for Bio energy generations from various Bio wastes.
CO5	Identify suitable energy sources for a location.

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SEMESTER V

COURSE TITLE	:	OPERATION RESEARCH
PAPER CODE	:	7610
SUBJECT CODE	:	532
TREORY CREDITS	:	03
PRACTICAL CREDITS	:	00

Course Learning Objectives:

- To understand and analyze managerial problems in industry so that they are able to use resources (capitals, materials, staffing, and machines) more effectively.
- To acquire knowledge of formulating mathematical models for quantitative analysis of managerial problems in industry.

Course Content:

UNIT-I: Development: Definition, Characteristics and phase of Scientific Method, Types of models; General methods for solving operations research models.

Unit-II: Allocation: Introduction to linear programming formulation, graphical solution, Simplex Method, artificial variable technique, Duality principle. Sensitivity analysis.

Unit-III: Transportation Problem: Formulation; Optimal solution; Unbalanced Transportation problems; Degeneracy; Assignment problem: Formulation; Optimal solution.

Unit-IV: Sequencing: Introduction; Terminology; Notations and Assumptions; Problems with n-jobs and two machines; Optimal sequence algorithm; Problems with n-jobs and three machines.

Unit-V: Theory of games: Introduction; Two-person zero-sum games; The Maximum–Minimax principle; Games without saddle points; Mixed Strategies; 2 x n and m x 2 Games; Graphical solutions; Dominance property; Use of L.P. to games.

Reference Books:

1. Operations Research: Principles and Applications - G.Srinivasan, PHI Learning Private Limited.
2. Operations Research: An Introduction - Hamdy A. Taha, Pearson.
3. Operations Research: Principles and Practice - Ravindran, Phillips and Solberg, Wiley India
4. Operations Research: Concepts and Cases - Hillier and Liberman, McGraw-Hill

Course outcomes:

At the end of the course, the student will be able to:

CO1	Recognize the importance and value of Operations Research and mathematical modeling in solving practical problems in industry.
CO2	Formulate a managerial decision problem into a mathematical model.
CO3	Understand Operations Research models and apply them to real-life problems.
CO4	Understand and implement the Transportation Models and Assignment Models at work-place.
CO5	Understand the characteristics of different types of decisions.

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SEMESTER V

COURSE TITLE	:	SUMMER INTERNSHIP - II
PAPER CODE	:	--
SUBJECT CODE	:	--
TREORY CREDITS	:	00
PRACTICAL CREDITS	:	03

SUMMER INTERNSHIP - II

4-6 weeks summer internship after IVth Semester.

It should be undertaken in an Industry only.

Evaluation is based on work done, quality of report, performance in viva-voce, presentation etc.

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SEMESTER V

COURSE TITLE	:	MAJOR PROJECT
PAPER CODE	:	--
SUBJECT CODE	:	--
TREORY CREDITS	:	00
PRACTICAL CREDITS	:	00 (ONE CREDIT WILL BE CARRIED FORWARD TO THE VI SEM. MAJOR PROJECT EVALUATION)

MAJOR PROJECT

It should be based on real/live problems of the Industry/Govt./NGO/MSME/Rural Sector or an innovative idea having the potential of a Startup.

Evaluation is based on work done, quality of report, performance in viva-voce, presentation etc.

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