DIPLOMA WING

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

SCHEME	NAME OF BRANCH AND BRANCH CODE	SEMESTER
OCBC JULY2022/2023	ELECTRONICS AND TELECOMMUNICATION-E03 ELECTRONICS ENGINEERING-E06	SIXTH(VI)

SCHEME OF STUDIES & EXAMINATIONS (IMPLEMENTED FROM SESSION:JULY2023)

S.N.	PAPER CODE	SUBJECTCODE	SUBJECTNAME	THEORYCOMPONENT								PRACTICALCOMPONENT					TOTALCREDITS	TOTALMARKS
				HRSPERWEEK	CREDITS	TERMWORK				THEORYPAPER		HRSPERWEEK	CREDITS	LABWORK	PRACTICAL EXAM/VIVA			
						QUIZ/ASSIGNMENT	MID TERM TEST*		TOTAL	MARKS	DURATION				MARKS	DURATION		
							I	II										
1	7386	601	ENTREPRENEURSHIPAND START-UPS	4	4	10	10	10	30	70	03Hrs.	0	0	0	0	0	4	100
2	7472	602	COMPUTERNETWORKINGAND DATA COMMUNICATION	7	7	10	10	10	30	70	03Hrs.	6	3	20	30	3Hrs.	10	150
3	7605	611	ARTIFICIALINTELLIGENCE	3	3	10	10	10	30	70	03Hrs.	0	0	0	0	0	3	100
	7607	612	PRODUCTDESIGN															
4	7609	621	MECHATRONICS	3	3	10	10	10	30	70	03Hrs.	0	0	0	**0**	0	3	100
	7611	622	INDUSTRIALROBOTS															
	7612	623	OPTICAL FIBER COMMUNICATION															
5		631	INDIANCONSTITUTION	2	0	0	0	0	0	0	0	0	0	0	**0**	0	0	0
		632	QUALITY ASSURANCE															
6			MAJORPROJECT**	0	0	0	0	0	0	0	0	6	4	100	50	03Hrs.	4	150
7			SEMINAR***	3	1	50	0	0	50	0	0	0	0	0	0	0	1	50
8			LIBERARY/VISITSetc.	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0
TOTAL				22	18				170	280		14	7	120	80		25	650

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

(2) **One Credit is carried forward from the Vth semester major project evaluation.

(3) ***One Hour Time duration for each student.

GRANDTOTALOFCREDITS	GRANDTOTALOFMARKS
25	650

DIPLOMA WING

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

DIPLOMA IN ET. & TELECOMMUNICATION ENGINEERING (E03)

SEMESTER VI

COURSE TITLE	ENTREPRENEURSHIP AND START-UPS
PAPER CODE	7386
SUBJECT CODE	601
THEORY CREDITS	04
PRACTICAL CREDITS	00

Course Learning Objectives:

1. Acquiring Entrepreneurial spirit and resourcefulness.
2. Familiarization with various uses of human resource for earning dignified means of living.
3. Understanding the concept and process of entrepreneurship - its contribution and role in the growth and development of individual and the nation.
4. Acquiring entrepreneurial quality, competency, and motivation.
5. Learning the process and skills of creation and management of entrepreneurial venture.

Course Content:

S. No.	Unit	Topic	Sub – Topic	Hours	Marks
1.	Unit 1	Introduction to Entrepreneurship and Start-Ups	• Entrepreneurship concept, need of entrepreneurs, traits of entrepreneur, function of entrepreneur, motivation, types of motivation, Maslow's need hierarchy • Concept of start-up, key aspects, start-up India, why entrepreneurs fail, intrapreneur,	12	12

			similarities/differences between intrapreneur, entrepreneur, businessman and manager. • Types of business structures: Sole proprietor, one person company, partnership, LLP, private limited company, public limited company, non- profit organizations (trusts, societies, section 8 companies), government sector companies.		
2.	Unit 2	Business ideas and their implementation	• Business ideas, sources of business ideas, techniques to discover business ideas. • Visualizing business ideas: Define business idea, utilize visual tools and techniques to refine business idea (business model canvas, mind mapping, story boarding, infographics) • Feasibility of business ideas: technical, operational, financial, marketing, environmental • Steps to frame business plan • Activity map: concept, objective, use	10	12

3.	Unit 3	Idea to start up	• Market analysis- identifying the target market (target market segmentation, customer profiling, estimating market size, customer need analysis) • Competition evaluation and strategy development: identifying competitors, strategies for handling competition • Marketing: 4 P's of marketing (Product, Price, Place, and Promotion), developing a marketing plan, marketing strategies • Accounting: Basic terminologies – Debit, Credit, Capital, Assets, Liabilities, Profit, Loss, Balance sheet, Cash Flow, Return on Investment, gross margin, break-even analysis • Risk analysis: type of risks (financial, market, regulatory and compliance, operational, economic).	10	12
4.	Unit 4	Management	• Company's organization Structure: objective, key aspects, types of organization structure • Recruitment and management of talent: importance of recruitment, job description, recruitment methods, key aspects and importance of talent management • Financial organization and management: Elements of financial management, objective of financial management (Profit maximization, Wealth maximization)	10	12

5.	Unit 5	Financing and Protection of Ideas	• Financing methods available for start-ups in India: Bootstrapping, Angel investors, Friends and family, Venture capital, corporate venturing, Crowdfunding, Government grants and loans, Bank loans and microfinance, incubators and accelerators, IPO. • Communication of Ideas to potential investors: Investor Pitch, Investor pitch steps • Patenting and Licenses: Trademark, benefits of trademark, IPR, IPR Contracts	10	12
6.	Unit 6	Exit strategies for entrepreneurs, bankruptcy, and succession and harvesting strategy	• Reasons for entrepreneurial exits • Types of exit strategies: Acquisition, Merger, Management Buyout, Liquidation. • Bankruptcy: concept and Impact on stakeholders • Bankruptcy Alternatives methods: debt restructuring, operational restructuring, strategic partnerships	08	10

Suggested Case Studies:

- Case study on any business idea
- Case study of balance sheet

Learning Outcome:

Upon completion of the course, the student will be able to demonstrate knowledge of the following topics:

1. Understanding the dynamic role of entrepreneurship and small businesses

2. Organizing and Managing a Small Business

3. Financial Planning and Control

4. Forms of Ownership for Small Business

5. Strategic Marketing Planning

6. New Product or Service Development

7. Business Plan Creation

SUGGESTED LEARNING RESOURCES:

S. No.	Title of Book	Author	Publication
1	The Startup Owner's Manual: The Step-by-Step Guide for Building a Great Company	Steve Blank and Bob Dorf	K & S Ranch ISBN – 978-0984999392
2	The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses	Eric Ries	Penguin UK ISBN – 978-0670921607
3	Demand: Creating What People Love Before They Know They Want It	Adrian J. Slywotzky with Karl Weber	Headline Book Publishing ISBN – 978-0755388974
4	The Innovator's Dilemma: The Revolutionary Book That Will Change the Way You Do Business	Clayton M. Christensen	Harvard business ISBN: 978-142219602

SUGGESTED SOFTWARE/LEARNING WEBSITES:

a. https://www.fundable.com/learn/resources/guides/startup

b. https://corporatefinanceinstitute.com/resources/knowledge/finance/corporatestructure/

c. https://www.finder.com/small-business-finance-tips

d. https://www.profitbooks.net/funding-options-to-raise-startup-capital-for-your-business/

DIPLOMA WING

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

DIPLOMA IN ELECTRONICS& TELECOMMUNICATION ENGINEERING (E03)

SEMESTER VI

COURSE TITLE	:	COMPUTER NETWORKING AND DATA COMMUNICATION
PAPER CODE	:	7472
SUBJECT CODE	:	602
TREORY CREDITS	:	07
PRACTICAL CREDITS	:	03

Course Objective:

The aim of this course is to help the student to understand:

- Functioning of computer networks
- Popular networking protocols
- Mobile ad-hoc network

Course Content:

Unit	Topics and Sub-topics	Hours	Marks
Unit-1 Introduction to Computer Networks	Introduction to Computer Network • Advantage of computer network. • Computer Network Topologies – Bus, Star, ring, mesh, tree, Hybrid. • Comparison of Computer Networks –PAN, LAN, MAN, WAN • Computer Network Model –Introduction to OSI and TCP/IP models (Layers & their functions). • Block diagram of Fiber optic networks & Satellite networks • Introduction to Peer-to-peer network, Server client network, Intranet, Ethernet, VPN, • Function of Networking Devices- switch, router, Optical network unit, Wireless Access Point, Wireless Adapter.	**12**	**14**
Unit 2- Data Link Layer	Data link layer functions: • Format of MAC address. • Error Detection and Correction - Types of Errors codes: VRC, LRC & CRC, Correction: Hamming Code • Flow Control: Stop and wait & sliding window • Media access techniques – CSMA/CD, Token ring • Circuit and Packet Switching. • Multiplexer: TDM (T1 line)	**12**	**14**

Unit 3- Network Layer	Network layer functions: • Introduction to Routing • Classful IP addressing: Class A, B, C, D, E. • Introduction to Internetworking and subnetting • Format of IPv4 & IPv6 address • Types of Routing Strategy • Introduction to Congestion Control • Network Layer Protocols- Introduction to Internet Protocol (IP) & ICMP		
Unit 4-, Transmission Media and Transmission Control Protocol	Transmission Media: Twisted Pair Cable (STP, UTP), Coaxial Cable, USB, Fiber Optics. Transmission Control Protocol- • Features • Port Addressing, • Connection Management • Timer Management: Retransmission Timer • Crash Recovery • Introduction to UDP • Application Layer Protocols- Introduction to HTTP, FTP & SMTP	**12**	**14**
Unit 5- Wireless Communication	Introduction to Wireless Media: RF, Microwave & Infra-red. Introduction to Wireless Communication Standards-802.11a, 802.15 Mobility Management in Wireless Networks, • Mobile IP : Concept with Block Diagram • Mobile Ad-hoc Networks: Key Characteristic, Key Challenges, Application • Ad hoc Routing Protocols: Reactive (On-Demand) Routing Protocols, • Cluster Techniques: Key Concepts and Benefits • Incremental Cluster Maintenance Scheme: Key Concepts, Advantages, Challenges and Considerations • Space time Coding for Wire- less Communication: Key Concepts.	**12**	**14**

REFERENCES / SUGGESTED LEARNING RESOURCES:

S. No.	Title of Book	Author	Publication
1.	Data communication and Networking	Behrouz A Forouzan	McGrawHill
2.	Computer Networking and Data communication	Dr. Sanjaya Shankar Tripathy	AICTE
3.	Computer Networks : Theory and PracticalS	Brajendra Pratao Singh and Manoj Madhav Gore	AICTE
4.	Computer Networking A top down Ap-proach	J.F.Kurose	Pearson

5.	Computer Networks and Internet	D.E. Comer	Pearson
6.	Wireless Communications: Principles and Practice, 2nd edition	T. Rappaport	Prentice Hall
7.	Wireless Communication and Networking	Jon W. Mark, Weihua Zhuang	
8.	Modelling and Analysis of Computer Communication Networks	Jeremiah F. Hayes	
9.	Data communication & Networking	Stallings	
10.	An Integrated Approach to Computer Networks	Bhavneet Sidhu	Khanna Publishing House.

COMPUTER NETWORKING AND DATA COMMUNICATION LAB

Course Content: SUGGESTED PRACTICALS/ EXERCISES :The practical in this section are PrOs (i.e. sub-components of the COs) to be developed and assessed in the student for the attainment of the competency.

S.No.	Practical Outcomes (PrOs)	Approx. Hrs. Require
1.	To study the different physical equipment used for networking	**02**
2.	Study the different internetworking devices in a computer network	**02**
3.	Study the working of basic networking commands	**02**
4.	Study of LAN in Star Topology	**02**
5.	Study of LAN in Bus Topology	**02**
6.	Study of LAN in Tree Topology	**02**
7.	Study of wireless communication (WiFi/Bluetooth)	**02**
8.	Sharing of files & folders between two PCs using LAN	**02**
	TOTAL	**20**

SUGGESTED SOFTWARE/LEARNING WEBSITES:

a) www.tutorialspoint.com/data_communication_computer_network/data_communication_computer_network_tutorial.pdf

b) www. turbofuture.com/industrial/Elements-of-Electronic-Communications-System

c) www.st-andrews.ac.uk/~www_pa/Scots_Guide/iandm/part3/page1.html

d) www.antenna-theory.com/basics/main.php

e) www.explainthatstuff.com/antennas.html

f) www.circuitdiagram.org/am-radio-receiver-with-mk484.html

g) www.circuitstoday.com/single-chip-fm-radio-circuit

DIPLOMA WING

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

DIPLOMA IN ET. & TELECOMMUNICATION ENGINEERING (E03)

SEMESTER VI

COURSE TITLE	Artificial Intelligence
PAPER CODE	7605
SUBJECT CODE	611
TREORY CREDITS	03
PRACTICAL CREDITS	00

Course Objectives: After completing this course, students will be able to, understand the fundamental concepts, goals, applications, and benefits of Artificial Intelligence.

Course Content:

S. No.	Unit	Topic	Sub – Topic	Hours	Marks
1.	Unit 1	Introduction to Artificial Intelligence	Introduction to Artificial Intelligence • Artificial Intelligence (AI) definition • Goals of AI • Applications of AI • Benefits of AI	09	15

2.	Unit 2	Agents and Environments	Key Components of AI system • Overview of interaction between Agents and Environment • Working of AI agents - Collecting Information (Perceiving the Environment) - Processing Information & Making Decisions - Taking Action (Performing Tasks) - Learning & Improving Over Time Structure of an AI Agent: • Architecture • Agent Program Goals of Agents Types of Agents – **(Definition, Block diagram & Application)** • Simple Reflex Agents, • Model Based Reflex Agents • Goal Based Agents • Utility based agents • Learning agents • Multi- agent systems • Hierarchical agents Types of Environments **(Definitions with examples only)** • Fully Observable vs Partially Observable • Deterministic vs Stochastic • Competitive vs Collaborative • Single-agent vs Multi-agent • Static vs Dynamic • Discrete vs Continuous • Episodic vs Sequential • Known vs Unknown	09	15

3.	Unit 3	Search Algorithms in AI	Terminology used in Search Problem**(Definition only)** • State space, • Start State, • Goal State, • Solution and Plan Types of Search Algorithms **(Concept using Tree &Graph methods)** 1. Brute Force Search • Depth First Search • Breadth First search 2. Heuristic Search • Greedy Search • A* Tree Search • A* Graph Search	09	10
4.	Unit 4	Fuzzy Logic Systems	Introduction to Fuzzy Logic and Fuzzy systems in AI Difference between Boolean Logic and Fuzzy Logic Definition of Fuzzification & Defuzzification, Membership functions (Triangular & Trapezoidal) Advantages, Disadvantages and Applications of Fuzzy Logic Systems	09	15
5.	Unit 5	Artificial Neural Networks (ANN)	Introduction to Artificial Neural Networks (ANN) Neural Networks Architecture (Overview of Input layer, Hidden layer, Output layer) Comparison between Artificial neurons vs Biological neurons Learning Technique: Overview of Back-propagation in ANN Difference between Deep Learning & Machine Learning	09	15

Reference Books:

S. No.	Title of Book	Author	Publication
1	Artificial Intelligence by examples: Develop machine Intelligence from scratch using real artificial intelligence use cases	Denis Rothman	Packt Publishing ISBN – 978-1788990547

DIPLOMAWING

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

DIPLOMA IN ELECTRONICS AND TELECOMMUNICATION ENGINEERING(E03)/

DIPLOMA IN ELECTRONICS ENGINEERING(E06)

SEMESTERVI

COURSETITLE	:	PRODUCT DESIGN
PAPERCODE	:	7607
SUBJECTCODE	:	612
TREORYCREDITS	:	03
PRACTICALCREDITS	:	00

Course Learning Objectives:

- To acquire the basic concepts of product design and development process
- To understand the engineering and scientific process inexecuting a design from concept to finished product
- To study the key reasons for design or redesign.

Course Content:

UNIT-I: Definition of a product; Types of product; Levels of product; Product-market mix; New product development (NPD) process; Idea generation methods; Creativity; Creative attitude; Creative design process; Morphological analysis; Analysis of inter connected decision areas; Brain storming.

Unit-II: Product life cycle; The challenges of Product development; Product analysis; Product characteristics; Economic considerations; Production and Marketing aspects; Characteristics of successful Product development; Phases of a generic product development process;Customer need identification; Product development practices and industry-product strategies.

Unit-III: Product design; Design by evolution; Design by innovation; Design by imitation; Factors affecting product design; Standards of performance and environmental factors; Decision making and iteration; Morphology of design (different phases); Role of aesthetics in design.

Unit-IV: Introduction to optimization in design; Economic factors in design; Design for safety and reliability; Role of computers in design; Modeling and Simulation; The role of models in engineering design; Mathematical modeling; Similitude and scale models; Concurrent design; Six sigma and de- sign for six sigma; Introduction to optimization in design; Economic factors and financial feasibility in design; Design for manufacturing; Rapid Prototyping (RP); Application of RP in product design; Product Development versus Design.

Unit-V: Design of simple products dealing with various aspects of product development; Design starting from need till the manufacture of the product

Reference Books:

1. Product Design and Development, KarlT. Ulrich and Steven D. Eppinger, Tata McGraw– Hill edition.
2. Engineering Design–George E.Dieter.
3. An Introduction to Engineering Design methods VijayGupta.
4. Merie Crawford: NewProduct management, McGraw-HillIrwin.
5. Chitale A K and Gupta RC, “Product Design and Manufacturing”, Prentice Hall of India, 2005.
6. Kevin Otto and Kristin Wood, Product Design, Techniques in Reverse Engineering and New Product Development, Pearson education.

Course out comes:

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

CO1	Understand the basic concepts of product design and development process.
CO2	Illustrate the methods to define the customer needs.
CO3	Describe an engineering design and development process.
CO4	Understand the intuitive and advanced methods used to develop and evaluate a concept.
CO5	Apply modeling and embodiment principles in product design and development process.

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DIPLOMA WING

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

DIPLOMA IN ElECTRONICS & TELECOMMUNICATION ENGINEERING (E03)

SEMESTER V

COURSE TITLE	:	Mechatronics
PAPER CODE	:	7609
SUBJECT CODE	:	621
TREORY CREDITS	:	03
PRACTICAL CREDITS	:	00

Course Objective:

To provide foundational knowledge of Mechatronic systems, including sensors, actuators, microcontrollers, and control logic.
To develop skills in system design using hydraulic, pneumatic, and electrical components.
To enable understanding of signal processing, data conversion, and PLC-based automation.
To integrate interdisciplinary concepts for designing efficient, intelligent control systems.

Course Content:

Unit	Topics and Sub-topics	Hours	Marks
Unit-1 Introduction to Mechatronics	Introduction to Systems with mixed disciplines. Introduction to System Concepts (System, Open Loop System, close Loop System), Mechatronics: Introduction, need and applications. Mechatronics systems and components Electronics Fundamentals Review: Basic Laws (Ohms Law, KVL, KCL) and Components (Passive components, Active Components, Diode, Transistor)	**6**	**14**
Unit 2 – Elements in Mechatronics	Block Diagram of Mechatronic system and functions of each element: • Data conversion devices, • sensors • micro-sensors • Transducers • signal processing devices • Timers • Microprocessors • Microcontrollers PID Controllers: Concept of Proportional, Integral, Derivative control its types and applications PLCs Hardware, types, I/O modules.	**9**	**14**
Unit 3- Drives	Drives: Introduction, Functions and types of drives in mechatronics. Electrical Drives: Working principal of Stepper Motors Drive, Servo Drives.	**10**	**14**

	Key Features and Application of: • Linear Motion bearings (ball-type, roller-type), • cams (spherical, cylindrical and wedge cams) • Electronic cams. Systems controlled by camshafts (open and close valves).		
Unit 4- Hydraulic System	Hydraulic Systems: Basic principles and Block Diagram. Key Components of Hydraulic System (Principle and function): • Pumps: Piston Pumps, Gear Pumps, Vane Pumps. • Flow Control Valves (Throttle Valves, Needle Valves), • Pressure Control Valves (Pressure Relief Valves, Pressure Reducing Valves) • Direction Control Valves Spool Type DCVs (2/2, 3/2configurations) • Actuators: Linear Actuators, Rotary Actuators. • Supporting Elements: Hydraulic Reservoirs, Filters. Hydraulic Power Packs: Introduction and Application. Symbolic Representation of Hydraulic Circuit.	**10**	**14**
Unit-V Pneumatic System	Pneumatic System: Basic principles and Block Diagram. Production of compressed air (Principle and function): • Static Compressor: Reciprocating Compressors (single-stage, two-stage), Rotary Compressors (Rotary vane compressors) • Dynamic Compressor: Centrifugal Compressors. Distribution of compressed air: • Selection of Pipe material and dimension, Introduction and use of Control valves. Conditioning of compressed air: • Functions of Filter, Dryer, Lubricator. Pneumatic Actuators (Principle and Function): • Linear actuators (Single acting and double acting cylinder), • Rotary Actuator (Vane type) Graphical representations of pneumatic circuit: • Symbols used for actuator, reservoir, valves, compressors, filters.	**10**	**14**

SUGGESTED LEARNING RESOURCES:

S.No.	Title of Book	Author	Publication
1.	Analysis and design of Dynamic Systems	Cochin, Era and Cadwallender	AddisonWesley, 1997
2.	Mechatronics Engineering	Tomkinson, D. And Horne, J. Longman	McGraw Hill, 1996
3.	Mechatronics	Bolton, W	Pearson
4.	Fundamental of mecha- tronic	M. Jouaneh	Cengage Learning ISBN – 978-1111569020
5.	Mechatronics – An Integrated Approach	Clarence W. de Silva	CRC Press ISBN – 978-0849312748

DIPLOMA WING

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DIPLOMA IN ELECTRONICS & TELECOMMUNICATION ENGINEERING (E03)

SEMESTER VI

COURSE TITLE	**:**	**INDUSTRIAL ROBOTS**
PAPER CODE	**:**	**7611**
SUBJECT CODE	**:**	**622**
TIME DURATION FOR THEORY CLASS	**:**	**45 Hrs.**

Course Objective: To introduce diploma students to the fundamentals of industrial robotics, providing practical knowledge of robot components, programming, and applications in manufacturing environments.

COURSE CONTENT:

Unit	Topics and Sub-Topics	Duration	Marks
UNIT 1 - FUNDAMENTALS OF ROBOTICS	**1.1 Introduction to Automation and Robotics** • Basic concepts and terminology • Historical development of robotics • Current and future applications • Benefits and limitations of industrial robots **1.2 Components of Industrial Robotics** • Types of robot arms and configurations • Robot architecture fundamentals • Degrees of freedom concepts **1.3 End Effectors** • Types and selection criteria • Requirements and challenges **1.4 Precision of Movement** • Resolution, accuracy, and repeatability concepts • Speed and load capacity considerations	**09 hrs.**	**14**
UNIT 2 – ROBOT KINEMATICS	**2.1 Motion Analysis** • Basic rotation matrices (essential concepts only) • Equivalent axis and angle representations • Euler angle's introduction **2.2 Homogeneous Transformations** • Basic principles and applications **2.3 Manipulator Kinematics** • D-H notation fundamentals • Transformation matrix basics • Coordinate systems in robotics **2.4 Industrial Robot Kinematics**	**09 hrs.**	**14**

	• Forward kinematics concepts • Inverse kinematics basics • Simple applications		
UNIT 3 – DYNAMICS AND TRAJECTORY PLANNING	**3.1 Differential Transformation** • Basic concepts of differential transformation • Introduction to Jacobians **3.2 Robot Dynamics** • Basic principles of Lagrange-Euler and Newton-Euler approaches **3.3 Trajectory Planning** • Path planning basics • Obstacle avoidance fundamentals • Motion types and planning methods	**09 hrs.**	**14**
UNIT 4 - ROBOT COMPONENTS & SENSORS	**4.1 Robot Actuators** • Working principles of pneumatic, hydraulic, and electric actuators • Selection criteria and comparison **4.2 Feedback Components** • Position sensors: types and applications • Motion and position measurement devices **4.3 Additional Sensors** • Tactile, range, force and torque sensors • Selection and application **4.4 End Effectors and Tools** • Gripper types and selection • Specialized tools for manufacturing	**09 hrs.**	**14**
UNIT 5 – INDUSTRIAL ROBOT APPLICATIONS	**5.1 Robot Applications in Manufacturing** • Material transfer systems • Loading/unloading operation **5.2 Manufacturing Operations** • Welding, painting, and assembly applications • Process requirements and robot selection **5.3 Robot Integration** • Cell design fundamentals • Safety considerations • Economic justification basics	**09 hrs.**	**14**

Suggested Text Books/References:

1. Groover, M.P. et al., "Industrial Robotics: Technology, Programming, and Applications," McGraw-Hill (Focus on chapters 1-7)
2. Craig, J.J., "Introduction to Robotics: Mechanics and Control," Pearson Education (Reference chapters 2-5 for simplified kinematics)
3. Deb, S.R., "Robotics Technology and Flexible Automation," Tata McGraw-Hill (Particularly useful for practical applications)
4. Niku, S.B., "Introduction to Robotics: Analysis, Control, Applications," Wiley (Good for simplified explanations)

DIPLOMA WING

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DIPLOMA IN ELECTRONICS AND TELECOMMUNICATION ENGINEERING(E03) /

DIPLOMA IN ELECTRONICS ENGINEERING(E06)

SEMESTERVI

COURSETITLE	:	INDIAN CONSTITUTION
PAPERCODE	:	--
SUBJECTCODE	:	--
TREORYCREDITS	:	00
PRACTICALCREDITS	:	00

Course Content

Unit1–The Constitution-Introduction

- The History of the Making of the Indian Constitution
- Preamble and the Basic Structure, and its interpretation
- Fundamental Rights and Duties and their interpretation
- State Policy Principles

Unit2–Union Government

- Structure of the Indian Union
- President–Role and Power
- Prime Minister and Council of Ministers
- Lok Sabha and RajyaSabha

Unit3–State Government

- Governor–Role and Power
- Chief Minister and Council of Ministers
- State Secretariat

Unit4–Local Administration

- District Administration
- Municipal Corporation
- Zila Panchayat

Unit5–Election Commission

- Role and Functioning
- Chief Election Commissioner
- State Election Commission

Suggested Learning Resources:

S.No.	Title of Book	Author	Publication
1.	Ethics and Politics of the Indian Constitution	Rajeev Bhargava	Oxford University Press,NewDelhi, 2008
2.	The Constitution of India	B.L. Fadia	Sahitya Bhawan;New edition(2017)
3.	Introduction to the Constitution of India	D D Basu	Lexis Nexis;Twenty-Third 2018edition

Suggested Software/LearningWebsites:

a. https://www.constitution.org/cons/india/const.html
b. http://www.legislative.gov.in/constitution-of-india
c. https://www.sci.gov.in/constitution
d. https://www.toppr.com/guides/civics/the-indian-constitution/the-constitution-of-india/

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DIPLOMAWING

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

DIPLOMA IN ELECTRONICS ANDTELECOMMUNICATION ENGINEERING (E03)/

DIPLOMA IN ELECTRONICS ENGINEERING (E06)

SEMESTER-VI

COURSE TITLE	:	MAJOR PROJECT
PAPER CODE	:	--
COURSE CODE	:	--
TREORY CREDITS	:	00
PRACTICAL CREDITS	:	04(03+01CreditoftheVSem.)

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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DIPLOMA WING

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DIPLOMA IN ELECTRONICS AND TELECOMMUNICATION ENGINEERING (E03) /

DIPLOMA IN ELECTRONICS ENGINEERING (E06)

SEMESTERVI

COURSE TITLE	:	SEMINAR
PAPER CODE	:	--
COURSE CODE	:	--
TREORY CREDITS	:	01
PRACTICAL CREDITS	:	00

SEMINAR

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

DIPLOMAWING

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

DIPLOMA IN ELECTRONICS ANDTELECOMMUNICATION ENGINEERING (E03)/

DIPLOMA IN ELECTRONICS ENGINEERING (E06)

SEMESTER-VI

COURSE TITLE	:	MAJOR PROJECT
PAPER CODE	:	--
COURSE CODE	:	--
TREORY CREDITS	:	00
PRACTICAL CREDITS	:	04(03+01CreditoftheVSem.)

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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DIPLOMA WING

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

DIPLOMA IN ELECTRONICS AND TELECOMMUNICATION ENGINEERING (E03) /

DIPLOMA IN ELECTRONICS ENGINEERING (E06)

SEMESTERVI

COURSE TITLE	:	SEMINAR
PAPER CODE	:	--
COURSE CODE	:	--
TREORY CREDITS	:	01
PRACTICAL CREDITS	:	00

SEMINAR

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

DIPLOMA WING

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

DIPLOMA IN ELECTRONICS& TELECOMMUNICATION ENGINEERING (E03)

SEMESTER VI

COURSE TITLE	:	**Optical Fiber Communication**
PAPER CODE	:	623
SUBJECT CODE	:	7612
TREORY CREDITS	:	04
PRACTICAL CREDITS	:	00

Course Objectives

The student will be able to:

- Understand the basic principles of optical fiber communication.
- Identify different types of optical fibers and cables.
- Understand light propagation and losses in optical fibers.
- Explain optical sources, detectors, and components.
- Understand optical communication systems and networks.

Course Outcomes

On completion of the course, the student will be able to:

- Explain the working principle of optical fiber communication systems.
- Classify optical fibers based on structure and application.
- Analyze losses and dispersion in optical fibers.
- Describe optical sources, detectors, and amplifiers.
- Understand basic optical networks and applications.

Detailed Syllabus (Theory)

Unit I: Introduction to Optical Fiber Communication

- Need for optical fiber communication
- Advantages and disadvantages of optical fiber communication

- Block diagram of optical fiber communication system
- Applications of optical fiber communication:
    - Telecommunication
    - Internet and broadband
    - Cable TV
- Introduction to FTTH
- Comparison of optical fiber with copper communication
- Wavelength Division Multiplexing (WDM)

Unit II: Optical Fiber Basics

- Principle of light propagation
- Total internal reflection
- Snell's law
- Structure of optical fiber
- Types of optical fibers:
    - Single mode fiber
    - Multimode step index fiber
    - Multimode graded index fiber
- Numerical aperture and acceptance angle

Unit III: Transmission Characteristics of Optical Fiber

- Attenuation in optical fibers
    - Absorption loss
    - Scattering loss
    - Bending loss (macro and micro bending)
- Dispersion in optical fibers
    - Modal dispersion

    - Chromatic dispersion
    - Material and waveguide dispersion
- Bandwidth and rise time

Unit IV: Optical Sources and Detectors

- Optical sources:
    - LED: construction, working, characteristics, advantages and disadvantages
    - Laser Diode: construction, working, characteristics, advantages and disadvantages
- Comparison of LED and Laser Diode
- Optical detectors:
    - PIN photodiode
    - Avalanche photodiode (APD)
- Detector characteristics

Unit V: Optical Fiber Components

- Need Optical connectors
- Optical splices:
    - Mechanical splice
    - Fusion splice
- Need Optical couplers
- Need Optical isolators
- Need Optical switches
- Need Optical attenuators
- Need for optical amplifiers
- Optical link power budget
- Rise time budget

Text Books :

1. **John M. Senior** – *Optical Fiber Communications: Principles and Practice*
2. **Gerd Keiser** – *Optical Fiber Communications*
3. **Govind P. Agrawal** – *Fiber-Optic Communication Systems*
4. **D. C. Agarwal** – *Fiber Optic Communication*

Diploma / Easy-Language Reference Books

5. **R. P. Khurana** – *Fiber Optic Communication*
6. **K. Thyagarajan & A. K. Ghatak** – *Introduction to Fiber Optics*
7. **M. N. Avadhanulu** – *An Introduction to Fiber Optics*

Online Learning (Good for Diploma Students)

- **NPTEL** – Optical Fiber Communication (IIT lectures)

DIPLOMA WING
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DIPLOMA IN ELECTRONICS& TELECOMMUNICATION ENGINEERING (E03)
SEMESTER VI

COURSE TITLE	:	**QUALITY ASSURANCE**
PAPER CODE	:	623
SUBJECT CODE	:	
TREORY CREDITS	:	00
PRACTICAL CREDITS	:	00

Course Objectives

Aftercompletingthiscourse,studentswillbeableto:

- Understandqualityassuranceconcepts.
- Applyqualitystandardsinmanufacturingandtesting.
- Performcalibrationandvalidation.
- Conductqualityaudits.
- Improveproductreliabilityusingqualitytools.

UNIT-I:Fundamentals of Quality Assurance

- IntroductiontoQuality
- QualityConcepts
- QualityAssurance
- QualityControl
- Inspection
- CostofQuality
- QualityPlanning
- Continuous Improvement
- PDCACycle
- QualityDocumentation

UNIT-II:Quality Standards and Documentation

- ISO 9001:2015
- ISO/IEC17025
- IEC Standards
- BIS Standards
- CE Marking
- RoHS
- QualityManual
- SOP Preparation
- WorkInstructions
- Record Keeping
- Traceability

UNIT-III:Inspection, Calibration and Validation

- IncomingInspection
- In-processInspection
- Final Inspection
- VisualInspection
- CalibrationPrinciples
- CalibrationProcedure
- Validation
- MeasurementUncertainty(Introduction)
- AcceptanceCriteria
- InspectionReports

UNIT-IV: Reliability and Quality Improvement

- ReliabilityEngineering
- Reliability Testing
- MTBF
- MTTF
- MTTR
- RootCause Analysis
- FishboneDiagram
- Pareto Analysis
- FMEA
- CAPA
- SixSigma (Introduction)

UNIT-V: Quality Auditand Continuous Improvement

- InternalAudit
- ExternalAudit
- SupplierQuality
- ProcessAudit
- ProductAudit
- StatisticalProcessControl(SPC)
- Control Charts
- QualityMetrics
- Corrective Action
- PreventiveAction
- IndustrialCase Studies

Recommended Reference Books

1. A.K.Sawhney–*ACourseinElectricalandElectronicMeasurementsand Instrumentation*
2. H.S.Kalsi–*ElectronicInstrumentation*
3. Helfrick&Cooper–*ModernElectronicInstrumentationandMeasurement Techniques*
4. DavidA.Bell–*ElectronicInstrumentationandMeasurements*
5. DaleH.Besterfield–*QualityControl*
6. DouglasC.Montgomery–*IntroductiontoStatisticalQualityControl*

7. PatrickD.T.O'Connor–*PracticalReliabilityEngineering*
8. CharlesE.Ebeling–*AnIntroductiontoReliabilityandMaintainability Engineering*
9. ISO9001:2015QualityManagementSystems
10. ISO/IEC17025:2017GeneralRequirementsfortheCompetenceofTestingandCalibration Laboratories