

West Bengal State Council of Technical &
Vocational Education and Skill
Development
(Technical Education Division)



Syllabus
of

Diploma in Electronics & Communication
Engineering [ECE] & Electronics & Tele-
Communication Engineering [ETCE]

Part-III (6th Semester)

2023

WEST BENGAL STATE COUNCIL OF TECHNICAL EDUCATION											
TEACHING AND EXAMINATION SCHEME FOR DIPLOMA IN ENGINEERING COURSES											
COURSE NAME: FULL TIME DIPLOMA IN ETCE & ECE											
DURATION OF COURSE: 6 SEMESTERS											
SEMESTER: SIXTH											
BRANCH: ELECTRONICS & TELECOMMUNICATION ENGG. AND ELECTRONICS & COMMUNICATION ENGG.											
SR. NO.	SUBJECT	CREDITS	PERIODS		EVALUATION SCHEME						Total Marks
			L	PR	THEORETICAL			PRACTICAL			
					TA	CT	Total	ESE	Internal	External	
1.	Engineering Economics and Project Management	3	3	-	20	20	40	60	-	-	100
2.	Entrepreneurship and Startups	3	3	-	20	20	40	60	-	-	100
3.	Industrial Automation or Control System and PLC	3	3	-	20	20	40	60	-	-	100
4.	Computer Networking and Data Communication	3	3	-	20	20	40	60	-	-	100
5.	Open Elective (Select any one) i) Industrial Management ii) Environmental Engineering & Science i) Renewable Energy Technologies	3	3	-	20	20	40	60	-	-	100
6.	Computer Networking and Data Communication Lab	1	-	2	-	-	-	-	60	40	100
7.	Industrial Automation Lab or Control System and PLC Lab	1	-	2	-	-	-	-	60	40	100
8.	Project	2	-	4	-	-	-	-	60	40	100
9.	Seminar	2	-	1	-	-	-	-	60	40	100
	Total	21	15	9	100	100	200	300	240	160	900

<ul style="list-style-type: none"> • STUDENT CONTACT HOURS PER WEEK: 24 hours • ACADEMIC CONTACT WEEKS PER SEMESTER: 17 weeks (Teaching-15 weeks + Internal Exam-2 weeks) • THEORY AND PRACTICAL PERIODS OF 60 MINUTES EACH • ABBREVIATIONS: L- Lecture, PR-Practical, IA- Internal Assessment, CT- Class Test, ESE-End Semester Exam • IA (Internal Assessment for Theoretical)=40 marks: CT=20 Marks, Attendance=10 marks and Quizzes/Assignment/Student Activity=10 marks. • Minimum qualifying marks for both Theoretical and Sessional subjects (for internal assessment and external assessment separately) are 40%. • IA (Internal Assessment for Practical)=60 marks: 50 marks for continuous evaluation and 10 marks for Class attendance. • Seminar topics should be relevant to the corresponding disciplines.

Name of the course: Industrial Automation	
Course Code: ETCE/DIA/S6	Semester: Sixth
Duration: One Semester (Teaching– 15 weeks + Internal Exam-2weeks)	Maximum Marks:100 Marks
Teaching Scheme:	Examination Scheme:
Theory: 3contact hrs./week	Class Test(Internal Examination):20 Marks
Practical:2contact hours/week	Attendance=10 marks and Quizzes/Assignment/Student Activity= 10 marks
	End Semester Examination:60 Marks
Credit:4(TH:3+PR:1)	Practical:100 Marks
Course Outcomes:	
<p>After completion of the course students will able to</p> <ul style="list-style-type: none"> • Understand the role of control elements in a close (single) loop and open loop control for Industrial Process Automation. • Identify proper control devices for defined process automation. • Use ON-OFF and PID controller for a defined process during automation. • Interface field devices (sensors/actuators) with PLC/SCADA/DCS. • Develop control loop in PLC by using Ladder logic/block logic program. 	

Content(Name of the topic)		Periods
Group–A		
Unit 1	Introduction to Industrial Automation	04
	1.1 Introduction to Industrial process and automation. 1.2 Need of Automation - Quality, Safety, Sustainability and Economic aspect. 1.3 Process Control: Process definition, Process gain, Open Loop Control, Close loop Control. 1.4 Example of open loop control. 1.5 Example of close loop control - Temperature control loop, Level control loop (With their functional explanation).	
Unit 2	Sensor and Actuators	14
	2.1 Define automation components: Sensor, Transmitter, Controller, Actuator, A/D & D/A conversion, Signal conditioning (Conceptual schematic). 2.2 Working principle and types of i) pressure transmitter, ii) temperature transmitter, iii) level transmitter and iv) flow transmitter v) proximity transmitter. 2.3 Elements and standards of Signal Conditioning and transmitting. 2.4 Actuators: Type and examples of Hydraulic, Pneumatic and Electric actuators. Control Valve –Working principle and functional diagram of Pneumatic, Electric type and Solenoid valve. Motor Drives – Types (VFD, Soft starter) and Functional diagram only. 2.5 Calibration principle- Zero and Span setting with standards, Calibration Chain-Primary reference (National and International Standards), Secondary Reference (Standard Lab) and Working Standard (Only definition).	
Group–B		
Unit 3	Control Engineering	05

	<p>3.1 Standard Test Signals: Unit Step, Unit ramp, Impulse function and their Laplace transform.</p> <p>3.2 Transfer function definition – Poles and Zeros, 1st order system and 2nd order system. Example of 1st order and 2nd order system. Characteristics equations. Concept of stability using characteristics equation.</p> <p>3.3 Time domain analysis of 1st order system by step input signal- Transient response and steady state response with example.</p>	
Unit 4	Control Actions and Process Controllers	10
	<p>4.1 Process control system – block diagram, elements. Role of Controllers in Process Industry.</p> <p>4.2 Control actions - discontinuous & continuous modes; On - Off controllers: Neutral zone, Hysteresis Zone.</p> <p>4.3 Proportional controllers (offset, proportional band); Integral & Derivative controllers - Functional block diagram and Equation.</p> <p>4.4 Composite controllers -Functional block diagram and Equation of PI, PD, PID controllers.</p> <p>4.5 Parameters of P, PI, and PID controllers and tuning concept.</p>	
Group-C		
Unit 5	Automation and Control System	12
	<p>5.1 Communication Hierarchy in Process Automation- Field level, I/O level, Control level, HMI level, Enterprise level.</p> <p>5.2 Piping and Instrumentation Diagram: Concept, symbols, reading procedure.</p> <p>5.3 PLC- Functional Diagram, working principle, Analog I/O module, Digital I/O module- Source and Sink.</p> <p>5.4 PLC programming basics– Ladder logic, Block logic (identify the problem for three input variables and two output variables both analog and digital).</p> <p>5.5 DCS- Definition, functional diagram and distributed network and interfacing concept. Comparison between PLC & DCS and applicability.</p> <p>5.6 SCADA- Introduction, Concept of Supervisory Control, Human-Machine Interface and Alarm handling.</p> <p>5.7 Industrial Networking: Basic features of Fieldbus, Foundation Fieldbus, Profibus, HART, Ethernet, Modbus, Profinet.</p>	
	Total	45

Sl.No.	Suggested List of Laboratory Experiments
1	Water level control using On-Off method.
2	Temperature control using PID controller.
3	Develop ladder/block program using three digital inputs and two digital outputs (combinational logic).
4	Test ladder program for pulse counting by using limit switch/proximity sensor.
5	Temperature control using RTD/Thermocouple, PLC (PID block), heating element.
6	PID control using Electro Pneumatic control valve/cylinder, I/P converter.
7	Use various functions of SCADA simulation editors to develop simple project.
8	Do any other experiment except above using PLC as per availability of sensor and actuators.
9	Do at least one Mini-Project for automation using sensor, controller and actuators.

References:

Sl No.	Title of Book	Author	Publication
1.	Process Control Instrumentation Technology	Johnson	Pearson
2.	Process Control	Bela G. Liptak	Elsevier Science (3 rd Edition)
3.	Process Control Modeling, Design and Simulation	B. W. Bequette	PHI
4.	Electronic Measurement and Measurement Technique	Cooper	Prentice Hall of India
5.	Modern Electronic Instrumentation & Measurement Techniques	Helfrick & Cooper	Pearson
6.	Modern Control Engineering	Ogata	Pearson
7.	Control System Engg	J.J.Nagrath & M. Gopal	Wiley
8.	Modern Control System	Rameshbabu and R. Anandrajan	SCITECH
9.	Control System	Kumar	Tata McGraw-Hill
10.	Basic Instrumentation System & Programmable Logic Controller	Umesh Rathore	Katson Books
11.	Programable Logic Controller	Jadhav V. R.	Khanna Publisher, New Delhi
12.	SCADA	Boyar B. A.	ISA Publication New Delhi,
13.	Practical SCADA for Industry	Bailey, David; Wright, Edwin	Newnes (an imprint of Elsevier International edition, 2003, ISBN: 0750658053

Name of the course: Control System and PLC	
Course Code: ETCE/DCSP/S6	Semester: Sixth
Duration: One Semester (Teaching– 15 weeks + Internal Exam-2weeks)	Maximum Marks:100 Marks
Teaching Scheme:	Examination Scheme:
Theory: 3contact hrs./week	Class Test(Internal Examination):20 Marks
Practical: 2contact hours/week	Attendance=10 marks and Quizzes/Assignment/Student Activity= 10 marks
	End Semester Examination:60 Marks
Credit:4(TH:3+PR:1)	Practical:100 Marks
Course Outcomes:	
<p>After completion of the course students will able to</p> <ul style="list-style-type: none"> • Identify different components and types of control systems and their representations. • Analyze the response of a control system for standard inputs and comment on its stability. • Evaluate the performance of various types of controllers. • Identify various components of PLC and its hardware. • Apply PLC in various control systems by its proper programming. 	

Name of the course: Computer Networking and Data Communication	
Course Code: ETCE/DCNDC/S6	Semester: Sixth
Duration: One Semester (Teaching– 15 weeks + Internal Exam-2weeks)	Maximum Marks:100 Marks
Teaching Scheme:	Examination Scheme:
Theory: 3contact hrs./week	Class Test(Internal Examination):20 Marks
Practical: 2contact hours/week	Attendance=10 marks and Quizzes/Assignment/Student Activity= 10 marks
	End Semester Examination:60 Marks
Credit:4(TH:3+PR:1)	Practical:100 Marks
Course Outcomes:	
<p>After completion of the course students will able to</p> <ul style="list-style-type: none"> • Explain basic concepts of LAN, MAN, WAN, different Network Topologies and concept of different types of switching. • Analyze the services and role of each layer of OSI model • Analyze, specify and design the topological and routing strategies for an IP based networking infrastructure • Explain the different protocols used at application layer i.e. HTTP, SMTP, SNMP, FTP, TELNET and VPN. • Analyze performance of various communication protocols. • Explain basic knowledge of the use of cryptography and network security. 	

Content(Name of the topic)		Periods
Group–A		
Unit 1	NETWORK BASICS: STRUCTURE & REFERENCE MODEL	10
	<p>1.1 Idea of computer network – Network components</p> <p>1.2 Types of Network – Classify networks by their Geography- LAN, MAN & WAN; Classify Networks by their Network role: Peer to Peer, Client- Server Model.</p> <p>1.3 Network topology- Bus Topology, Ring Topology, Star Topology, Mesh Topology, Tree Topology, Hybrid Topology.</p> <p>1.4 SWITCHING: Circuit Switching – Message Switching – Packet Switching.</p> <p>1.5 Layered architecture of network system – Seven-layer OSI model – Functions of each OSI layer – Other ISO structure – TCP / IP Layer Structure, Comparison between OSI and TCP/IP models.</p>	
Unit 2	TRANSMISSION MEDIA AND NETWORKING DEVICES	10
	<p>2.1 Classification of Transmissions Medium: Compare between Unguided and Guided medium. Twisted Pair Cable (UTP, STP), Coaxial Cable, Optical Fiber Cable and Wireless Transmission Media (IR, Microwave).</p> <p>2.2 Network Hardware Components – NIC, Hubs, Switches - Layer 2 and Layer 3 Switches, Routers, Bridges, Repeaters, Gateways, Modems.</p> <p>2.3 Routing Algorithms: Concept of Static Routing, Dynamic Routing, Distance Vector Routing Algorithm and Routing Information Protocol.</p>	
Group–B		
Unit 3	IP Protocol and Network Applications	12

	<p>3.1 IP addressing: IP v4 Classful and Classless addressing, Subnetting and Super netting, Subnet Mask and Default Mask, Class less Inter Domain Routing (CIDR).</p> <p>3.2 IPV6: Types and advantages, Difference between IPV4 with IP V6.</p> <p>3.3 TCP/IP Protocols, Configuring TCP/IP.</p> <p>3.4 Other Network Layer Protocols: ARP, RARP, ICMP, UDP, Difference between TCP and UDP.</p>	
Unit 4	Application Layer Services	07
	<p>4.1 Structure and Objectives of Intranet & Internet, Use of Firewall and proxy server.</p> <p>4.2 Working of Email – POP-3, SMTP, MIME; TELNET, FTP, SNMP, World Wide Web, URL, HTTP, Working of DNS and DHCP Server.</p> <p>4.3 Working of VoIP, VPN and VSAT.</p>	
Group–C		
Unit 5	NETWORK and CYBER SECURITY	06
	<p>5.1 Different aspects of SECURITY: Privacy – Authentication – Integrity – Non-Repudiation.</p> <p>5.2 ENCRYPTION / DECRYPTION: Data Encryption System – Secret key method – Public key method (RSA algorithm), Digital signature.</p> <p>5.3 Define Cyber Security, Types of Cyber Security Threats -Phishing, Ransom ware, Malware, Social Engineering, Emotet, Man in the Middle (MITM), Password Attack, Spyware, Hacking, Viruses, Trojan and Worm.</p>	
	Total	45

Sl. No.	Suggested List of Laboratory Experiments
1	Compare and configure different Network Topologies physically or by using CISCO Packet Tracer software.
2	Compare and demonstrate Network directing devices: Repeater, Hub, Switch, Bridge, Router, Gateway.
3	Study of different types of Network cables and practically implement the cross wired cable and straight through cable by using crimping tool and RJ-45 Connector.
4	Connect the Computers in Local Area Network.
5	Study of different types of IP Addressing and Subnetting and Super netting concepts.
6	Configuring TCP/IP Network.
7	Study of basic Network and Network configuration commands.
8	Web page designing by using HTML.

References:

Sl No.	Title of Book	Author	Publication
1.	Computer Networks, 4th edition	A. S. Tanenbaum (2003)	Pearson Education/ PHI, New Delhi, India
2.	Data communication and Networking, 4th Edition	Behrouz A. Forouzan (2006)	Mc Graw-Hill, India
3.	Computer Networking: A top down approach	Kurose, Ross (2010)	Pearson Education, India
4.	Computer Networks	Bhushan Trivedi	Oxford University Press, 2013
5.	Computer Networks and Internets	Comer	Pearson
6.	Computer Networking with Internet Protocols	Stallings	Pearson

7.	A COURSE IN COMPUTER NETWORKS	Dr. Sanjay Sharma	S K Kataria & Sons
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List of Compulsory Subjects & Open Electives as per New Syllabus 2023

Compulsory Subject		
Subject Code	Name of the Subject	Page Number
HS 302	Entrepreneurship & Start-ups	3-6
Open Elective - I		
Subject Code	Name of the Subject	Page Number
OE 302	Engineering Economics & Project Management	7-9
Open Elective - II		
Subject Code	Name of the Subject	Page Number
OE 304/1	Electric Vehicle Technology	10-12
OE 304/2	Industrial Management	13-16
OE 304/3	Industrial Safety	17-22
OE 304/4	Disaster Management	23-25
OE 304/5	Environmental Science & Engineering	26-29
OE 304/6	Renewable Energy	30-32
OE 304/7	Mechatronics	33-35
OE 304/8	Internet of Things	36-37
OE 304/9	Sustainable Development	38-40
OE 304/10	Medical Electronics	41-42
OE 304/11	Occupational Health & Safety Engineering	43-49
OE 304/12	Industrial Hazards & Modern Waste Management	50-54
OE 304/13	Export & Import Management	55-60
OE 304/14	Industrial Management and Safety	61-66
OE 304/15	Electrical Machines & Control	67-73
OE 304/16	Artificial Intelligence	74-75
OE 304/17	Operations Research	76-77
OE 304/18	Soft Computing Techniques	78-79
OE 304/19	Construction Management	80-82
OE 304/20	Solid Waste Management	83-85
OE 304/21	Sustainable Architecture	86-87
OE 304/22	Machine Learning	88-90
OE 304/23	Web Designing	91-94
OE 304/24	Energy & Environment Control in Metallurgical Industries	95-97
OE 304/25	Network Security Management and Administration	98-101
OE 304/26	Internet of Things (for CFS)	102-103
OE 304/27	Network Security Management and Administration Lab (for CFS)	104-105
OE 304/28	Internet of Things Lab (for CFS)	106
OE 304/29	Economic Policies in India	107-108

Course Title	Entrepreneurship and Start-ups
Course Code	HS 302
Number of Credits	3
Pre Requisites	None
Total Contact Hours	3(L: 2; T: 1)/week = 45 hrs
Course Category	HS

Course Learning Objectives

1. To raise awareness, knowledge and understanding of enterprise/ entrepreneurship.
2. To motivate and inspire students toward an entrepreneurial career.
3. To understand venture creation process and to develop generic entrepreneurial competences.
4. To introduce students to the basic steps required for planning, starting and running a business.
5. To familiarise students with the different exit strategies available to entrepreneurs.

Course Outcomes:

After completing the course students will able to:

CO 1	Identify qualities of entrepreneurs, develop awareness about entrepreneurial skill and mindset and express knowledge about the suitable forms of ownership for small business
CO 2	Comprehend the basics of Business idea, Business plan, Feasibility Study report, Project Report and Project Proposal
CO 3	Understand the concept of start-up business and recognise its challenges within legal framework and compliance issues related to business.
CO 4	Make a Growth Plan and pitch it to all stakeholders and compare the various sources of funds available for start-up businesses

Detailed Course Content

Unit	Name of the Topic	Hours
	ENTREPRENEURSHIP – INTRODUCTION AND PROCESS	
1.	<ul style="list-style-type: none"> • Concept, Competencies, Functions and Risks of entrepreneurship • Entrepreneurial Values& Attitudes and Skills • Mindset of an employee/manager and an entrepreneur • Types of Ownership for Small Businesses <ul style="list-style-type: none"> ○ Sole proprietorship ○ Partnerships ○ Joint Stock company- public limited and private limited 	10

	<p>companies</p> <ul style="list-style-type: none"> • Difference between entrepreneur and Intrapreneur 	
2.	<p>PREPARATION FOR ENTREPRENEURIAL VENTURES</p> <ul style="list-style-type: none"> • Business Idea- Concept, Characteristics of a Promising Business Idea, Uniqueness of the product or service and its competitive advantage over peers. • Feasibility Study – Concept – Locational, Economic, Technical and Environmental Feasibility. Structure and Contents of a standard Feasibility Study Report • Business Plan – Concept, rationale for developing a Business Plan, Structure and Contents of a typical Business Plan • Project Report- Concept, its features and components • Basic components of Financial Statements- Revenue, Expenses (Revenue & capital exp), Gross Profit, Net Profit, Asset, Liability, Cash Flow, working capital, Inventory. Funding Methods-Equity or Debt. <p>Students are just expected to know about the features and key inclusions under, Business Plan and Project Report. <u>They may not be asked to prepare a Business Plan/ Project Report/ Project Feasibility Report in the End of Semester Examination.</u></p>	20
3.	<p>ESTABLISHING SMALL ENTERPRISES</p> <ul style="list-style-type: none"> • Legal Requirements and Compliances needed for establishing a New Unit- <ul style="list-style-type: none"> ○ NOC from Local body ○ Registration of business in DIC ○ Statutory license or clearance ○ Tax compliances 	03
4.	<p>START-UP VENTURES</p> <ul style="list-style-type: none"> • Concept & Features • Mobilisation of resources by start-ups: Financial, Human, Intellectual and Physical • Problems and challenges faced by start-ups. • Start-up Ventures in India – Contemporary Success Stories and Case Studies to be discussed in the class. <p>Case studies have been included in the syllabus to motivate and inspire students toward an entrepreneurial career from the success stories. <u>No questions are to be set from the case studies.</u></p>	04

5.	FINANCING START-UP VENTURES IN INDIA <ul style="list-style-type: none"> • Communication of Ideas to potential investors – Investor Pitch • Equity Funding, Debt funding – by Angel Investors, Venture Capital Funds, Bank loans to start-ups • Govt Initiatives including incubation centre to boost start-up ventures • MSME Registration for Start-ups –its benefits 	06
6.	EXIT STRATEGIES FOR ENTREPRENEURS <ul style="list-style-type: none"> • Merger and acquisition exit, Initial Public Offering (IPO), Liquidation, Bankruptcy – <u>Basic Concept only</u> 	02

Examination Scheme

❖ End Semester Examination: 60 marks

Suggested Question Paper Scheme for End Semester Examination

Group A: 20marks

Question Type	Number of questions to be set	Number of questions to be answered
MCQ, Fill in the blanks, True or False (Carrying 1 mark each)	25	20

Group B: 40marks

Question Type	Number of questions to be set	Number of questions to be answered
Subjective Type questions (Carrying 8 marks each)	10	5

❖ Internal Assessment: 40 marks

- Class test : 20 marks
- Assignment: 10 marks
- Class attendance: 10 marks

Suggested Learning Resources

Sl. No.	Title of Book	Author	Publication
1.	Entrepreneurship Development	Sangeeta Sharma	Prentice Hall of India Learning Private Ltd
2.	Entrepreneurship Development	S. Anil Kumar	New Age International
3.	Fundamentals of Entrepreneurship	Sangram Keshari Mohanty	Prentice Hall of India Learning Private Ltd
4.	Fundamentals of Entrepreneurship	Dr. G.K. Varshney	Sahitya Bhawan Publication
5.	Managing New Ventures: Concepts and Cases on Entrepreneurship	Anjan Raichaudhuri	Prentice Hall of India Learning Private Ltd
6.	How to Start a Business in India	Simon Daniel	Buuku, Chennai
7.	Entrepreneurship and Small Business Management	S.S. Khanka	S. Chand & Sons, New Delhi
8.	Entrepreneurship Development and Business Ethics	Abhik Kumar Mukherjee & Shaunak Roy	Oxford University Press
9.	Entrepreneurship Development and Business Ethics	Dr B Chandra & Dr B Biswas	Tee Dee Publications
10.	Entrepreneurship Development Small Business Entrepreneurship	Poornima Charantimath	Pearson Education India

Draft Syllabus of Engineering Economics & Project Management

Course Code:	OE301
Course Title:	Engineering Economics & Project Management
No. of Credits:	3 (L:3, T:0,P: 0)
Prerequisites:	NIL
Course Category:	Open Elective (Compulsory for all branches)

Course Objectives:

- To acquire knowledge of basic economics to facilitate the process of economic decision making.
- To acquire knowledge on basic financial management aspects.
- To develop the idea of project plan, from defining and confirming the project goals and objectives, identifying tasks and how goals will be achieved.
- To develop an understanding of key project management skills and strategies.

Group-A

Unit-I (INTRODUCTION, THEORY OF DEMAND & SUPPLY) [9 hours]

- 1.1 Introduction to Engineering Economics, the relationship between Engineering and Economics
- 1.2 Resources, scarcity of resources, and efficient utilization of resources.
- 1.3 Opportunity cost, rationality costs, and benefits
- 1.4 Theory of Demand: the law of demand, different types of demand, determinants of demand, demand function, price elasticity of demand.
- 1.5 Theory of Supply: determinants of supply, supply function.
- 1.6 Market mechanism: Equilibrium, basic comparative static analysis (Numerical problems)

Unit-II (THEORY OF PRODUCTION & COSTS) [10 hours]

- 2.1 Concept of production (goods & services), Different factors of production (fixed and variable factors), Short-run Production function (Graphical illustration), and Long run production function (returns to scale).
- 2.2 Theory of Cost: Short-run and long-run cost curves with graphical illustration, basic concept on total cost, fixed cost, variable cost, marginal cost, average cost etc.
- 2.3 Economic concept of profit, profit maximization (numerical problems)

UNIT-III (DIFFERENT TYPES OF MARKET AND ROLE OF GOVERNMENT) [4 hours]

3.1 Perfect Competition: Features of Perfectly Competitive Market.

3.2 Imperfect Competition: Monopoly, Monopolistic Competition, and Oligopoly.

3.3 Role of government in Socialist, Capitalist and Mixed Economy structure with example.

Group-B

Unit-I (CONCEPT OF PROJECT) [4 hours]

1.1 Definition and classification of projects)

1.2 Importance of Project Management.

1.3 Project life Cycle [Conceptualization→Planning→Execution→Termination]

Unit-II (FEASIBILITY ANALYSIS OF A PROJECT) [10 hours]

2.1 Economic and Market analysis.

2.2 Financial analysis: Basic techniques in capital budgeting– Payback period method, NetPresentValue method, InternalRate of Returnmethod.

2.3 Environmental Impact study–adverse impact of the project on the environment.

2.4 Project risk and uncertainty: Technical, economical, socio-political, and environmental risks.

2.5 Evaluation of the financial health of a project–Understanding the basic concept of Fixed & Working Capital, Debt & Equity, Shares, Debentures etc., and different financial ratios like Liquidity Ratios, Activity Ratios, Debt-equity ratio & Profitability Ratio (Basic concept only).

N.B: Knowledge of financial statements is not required; for the estimation of ratios the values of the relevant variables will be provided.

Unit-III (PROJECT ADMINISTRATION) [8 hours]

3.1 Gantt Chart– a system of bar charts for scheduling and reporting the progress of a project (basic concept).

3.2 Concept of Project Evaluation and Review Technique (PERT) and Critical Path method (CPM): basic concept and application with real-life examples.

ExaminationScheme:

A. SemesterExaminationpatternof60 marks:

1. Objective type Question (MCQ, Fill in the blanks, and Very Short question-1 mark each): At least five questions from each unit. [Total marks: 20]
2. Subjective questions: Eight questions to be answered taking at least three from each group. (Two questions should be given from each unit). [Total marks: 40]

B. Assignment (10Marks)

Guidelinefor Assignment (10 Marks)

Students should be instructed to prepare a report on a project (preferably the Major Project they prepare in 6th Semester), using a popular project management software in IT/ Computer Laboratory, under the guidance of the Lecturer in Computer Science & Technology and Lecturer in Humanities.

C. Class Test: Two examinations 20 marks each. Take best of two.

D. Attendance: 10 Marks

Suggested reference books:

- 1 *Principles of Economics – Case and Fair, Pearson Education Publication*
- 2 *Principles of Economics – Mankiw, Cengage Learning*
- 3 *Project planning, analysis, selection, implementation and review – Prasannachandra–Tata McGraw Hill.*
- 4 *Project Management – Gopala Krishnan – Mcmillan India Ltd*

Theoretical Paper:

Name of the Course: Open Elective for All disciplines except Mechanical Engineering					
Course Title : Industrial Management			Semester : Sixth		
Category: Open Elective			Full Marks: 100		
Code no. : OE			Examination Scheme:		
Duration : 17 weeks			External Assessment		
			End Semester Examination	60	
			Internal Assessment		
Teaching Scheme			Class Test :	20	
L	T	Total	Credit	Assignment/Student activity	10
3			3	Class attendance	10
			Total	100	
<p>Pass Criterion: Students have to obtain at least 40% marks (pass marks) in both internal assessment and end semester examination separately.</p> <p>Assignment / Student Activity: Submission of Home assignment, submission of report after conducting site visit/ industry visit/ micro-project / market survey / internet search on specific topic, preparation of chart, creation of innovative model or present seminar on specific topic which is suitable for the given subject as per instruction of subject teacher.</p>					

1. Course Outcomes:

1. Explain the importance of management process in Business.
2. Understand different types of organization, Objectives and functions of management.
3. Understand the functional areas of management relating human resources, Materials, Finance.
4. Apply various rules and regulations concerned with Business & Social Responsibilities of the Technician
5. Identify various components of management
6. Find the economic order quantity (EOQ) for given situation.
7. Apply break even analysis for optimum production
8. Apply principles of safety in industrial activities.

2. Theory Components:

Unit	Topics	Teaching Hours
Unit: 1 Overview Of Business	1.1. Types of Business -Service -Manufacturing -Trade 1.2. Industrial sectors Introduction to: -Engineering industry -Process industry -Textile industry -Chemical industry -Agro industry 1.3 Globalization Introduction - Advantages & disadvantages w.r.t. India	04

	1.4 Intellectual Property Rights (I.P.R.)	
Unit: 2 Management Process	<p>2.1 What is Management?</p> <ul style="list-style-type: none"> -Evolution - Various definitions - Concept of management <p>-Management is the combination of art and science</p> <ul style="list-style-type: none"> - Levels of management -Administration & management - Scientific management by F.W.Taylor <p>2.2 Principles of Management (14 principles of Henry Fayol)</p> <p>2.3 Functions of Management</p> <ul style="list-style-type: none"> -Planning -Organizing -Directing -Controlling <p>2.4 Social responsibility and Environmental dimension of management.</p>	05
Unit: 3 Organizational Management	<p>3.1 Organization :-</p> <ul style="list-style-type: none"> - Definition -Steps in organization <p>3.2 Types of organization</p> <ul style="list-style-type: none"> - Line - Line & staff - Functional - Project <p>3.3 Departmentation</p> <ul style="list-style-type: none"> - Centralized & Decentralized -Authority & Responsibility - Span of Control <p>3.4 Forms of ownership</p> <ul style="list-style-type: none"> - Proprietorship -Partnership - Joint stock - Co-operative Society - Govt. Sector 	06
Unit: 4 Human Resource Management	<p>4.1 Personnel Management</p> <ul style="list-style-type: none"> - Introduction - Definition -Objectives -Functions <p>4.2 Staffing</p> <ul style="list-style-type: none"> - Introduction to HR Planning -Recruitment Procedure <p>4.3 Personnel– Training & Development</p> <ul style="list-style-type: none"> - Types of training - Induction -Skill Enhancement <p>4.4 Grievance handling</p> <p>4.5 Leadership, Leadership quality, Leadership style</p> <ul style="list-style-type: none"> -Motivation - Maslow’s Theory of Motivation <p>4.6 Introduction to</p> <ul style="list-style-type: none"> -ESI Act -Workmen Compensation Act 	08

Unit: 5 Financial Management	5.1. Financial Management - Objectives & Functions 5.2. Break Even Analysis -Introduction -Graphical representation -Significance -Limitations 5.3. Introduction to – -Excise Tax - Income Tax -GST -Custom Duty	06
Unit: 6 Materials Management	6.1 Objectives and function of Materials Management 6.2. Purchase Procedure - Objects of Purchasing - Functions of Purchase Dept. - Steps in Purchasing 6.2 Economic Order Quantity(EOQ) - Introduction & Graphical Representation 6.3 Inventory Management. -Meaning & Objectives 6.4 ABC Analysis, VED Analysis 6.5 Stores function, -BIN card, -Pricing of materials -Store verifications	08
Unit: 7 Sales and Marketing Management	7.1 Introduction 7.2 Difference between Selling and Marketing 7.3 Functions of Marketing 7.4 Market Survey 7.5 Sales promotions 7.6 Recent trends	04
Unit: 8 Safety Engineering	8.1 Accidents -causes of accidents 8.2 Need for safety 8.3 Organization for safety 8.4 Safety committee 8.5 Safety programmes 8.6 Safety measures	04
Sub Total :	Total Lecture Classes	45
No. of classes required for conducting Internal Assessment		06
Grand Total :		51

Assignments: (any five)-

1. Preparation of chart for fire safety.
3. Preparation of chart for personal, Tools & Equipment and products safety.
4. Preparation of chart to avoid accident.
5. Preparation of chart to show the different financial ratios.
6. Preparation of chart to show the different types of organization.
7. **Preparation of EOQ model.**
8. **Preparation of beak even analysis model**
9. **Prepare charts for showing steps of recruitment, training and performance appraisal**

**Suggested scheme for question paper design for conducting internal assessment examination:
(Duration:45minutes)**

Questions to be set as per Bloom's Taxonomy				
	Distribution of Theory Marks			
	Level 1(Remember)	Level 2(understand)	Level3 (Apply &above)	Total
Class Test -1	4	8	8	20
Class Test -2	4	8	8	20

4. Suggested Scheme for End Semester Examination[duration: 2 hours 30 minutes]

A: Multiple Choice Type Questions(Carrying 1mark each)				
Group	Unit	To be Set	To be Answered	Total Marks
A1	1 & 2	07	20	20x01=20
A2	3,4 &5	10		
A3	6,7 & 8	08		
Total:		25	20	20
B: Subjective Type Questions (Carrying 8 marks each)				
Group	Unit	To be Set	To be Answered	Total Marks
B1	1 & 2	02	05	08x05=40
B2	3,4 &5	04		
B3	6,7 & 8	03		
Total:		09	05	40
Sub-Total[A]:				20
Total[A+B]:				60

6. Suggested Learning Resources:

Sl. No.	Title of Book	Author	Publication
1.	Industrial Engineering and Management	O.P. Khanna	Dhanpat Rai & Sons
2	Management Principles, Processes & Practices	A.Bhattacharya & A.Kumar	Oxford University Press
3	The process of Management	W.H. Newman E.Kirby Warren Andrew R. McGill	Prentice-Hall of India, New Delhi 2004.
4	Industrial Engineering & Management,	V.Arun Viswanath, Anoop. S. Nair, S.L.Sabu	SCITECH Publication(s) Pvt. Ltd
5	Industrial Management	Rustom S. Davar	Khanna Publication
6.	Industrial Engg & Management	N V S Raju	Cengage
7.	Industrial Management	Jhamb & Bokil	Everest Publication , Pune

Semester	:	VI	
Course Code	:	OE	
Course Title	:	Renewable Energy	
Number of Credits	:	3 (L: 3, T: 0, P: 0)	
Prerequisite	:	NIL	
Course Category	:	OE	
Course Objective			
Following are the objectives of this course			
	To provide basic knowledge of different sources of renewable energy and Renewable energy plants		
Course Content			
		Hrs/Unit	
Module 1	Unit 1	Introduction	6
		1.1 Classification of energy: Primary and secondary energy, Commercial and non-commercial energy, Renewable and Non-renewable energy, Conventional and Non-conventional energy. 1.2 Advantage of Renewable energy 1.3 Sources of Renewable Energy: Solar Energy, Wind Energy, Biomass Energy, Hydro Energy, Geothermal Energy, Tidel and Ocean energy (only brief idea on all these)	
	Unit II	Solar energy	9
		2.1 Units of solar power and solar energy 2.2 Essential subsystem in solar energy plant: Solar collector or concentrator, energy transport medium, energy storage, energy conversion plant, power conditioning control and protection system, alternative or standby power supply. 2.3 Solar Electric System: Solar water Heater, Solar lighting system, Solar cooker, Electric vehicle charging station (Working principle only) 2.4 Idea on Photovoltaic Technology	
Module 2	Unit III	Bioenergy	7
		3.1 Introduction on Biogas, Sources of Bioenergy 3.2 Different forms of Biomass, their composition & fuel properties 3.3 Production of Biogas: working principle of fixed-dome type and floating gas holder type biogas plant 3.4 Idea of gasifier, digester 3.5 Use of Biogas	
	Unit IV	Wind Energy	6
		4.1 Basic working principle of Wind energy production	

		4.2 Speed and power relation, Average power of the wind 4.3 System components of wind Energy (e.g. Tower, Turbine, Blades etc). 4.4 Control of rotor speed	
Module 3	Unit V	Hydropower	5
		5.1 How hydropower plant works 5.2 Main components of Hydropower plant: Gate, penstock, surge tank, turbine, transformer etc. 5.3 Types of hydropower: Run-of-River power plant (no active storage), Plant with significance storage, Pumped storage, Tidal plant (Only basic idea)	
	Unit VI	Measuring Instruments	9
		6.1 Basic principle of Pyranometer for solar radiation measurement. 6.2 Idea on different instrument used in Hydroelectric power plant, Solar thermal plant, Wind power plant, Biogas plant (name of instruments and where to use in that plant.)	

Suggested Learning resources

Title	Author	Publisher
Non-Conventional Energy	ShobhNath Singh	Pearson
Renewable and Efficient Electric Power Systems	Gilbert M. Masters	Wiley
Alternative Energy Systems & Applications	B.K.Hodge	Wiley
Renewable Energy Technologies,	J.C.Sabonnadiere,	Wiley
Introduction to Renewable Energy	Vaughn Nelson	CRC Press
Renewable Energy: Power for a Sustainable Future	Godfrey Boyle	
Renewable Energy Technology	Jha, Sen, Tiwari, Kothari	New Age International
Renewable Energy Technology	Chetan Singh Solanki	PHI
Non-Conventional Energy Resources	S.H.Saeed, D.K.Sharma	S.K.Kataria& Sons
Energy Techonology: Nonconventional, Renewable & conventional	Rao, Parulekar	Khanna Publisher
Non-conventional Energy Sources	G.D. Rai	Khanna Publisher
Non-Conventional Energy Resources	B. H. Khan	McGraw Hill Publications.
Solar Energy – Principles of Thermal Collection and Storage	S. P. Sukhatme, J.K. Nayak	Tata McGraw-Hill, New Delhi
Solar Energy, Fundamentals and Applications	Garg, Prakash	Pearson
Solar energy	A.M. Rehman	Scitech

		Publications(India) Pvt. Ltd
Introduction to solar principles	Thomas E. Kissell	Pearson
Biogas Systems, Principle and	Mital KM.	New Age International Ltd.
Course Outcome		
At the end of the course student will be able to:	<ul style="list-style-type: none"> ➤ Classify different energy sources ➤ Understand basics on solar energy, bioenergy, wind energy, and hydropower. ➤ Identify different parts of solar energy plant. ➤ Know various sources of biomass, and construction of biogas production plant ➤ Understand concepts of wind energy, components and functions of it ➤ Grow critical thinking and problem-solving skills to overcome obstacles to use renewable energy system. ➤ Identify different measuring instruments related to specific renewable energy plant. 	