GUJARAT TECHNOLOGICAL UNIVERSITY

DIPLOMA IN FABRICATION ENGINEERING

TEACHING SCHEME (w. e. f. Jan'2012)

SEMESTER- VIII

SR. NO.	SUBJECT CODE	SUBJECT	TEACHING SCHEME			CREDITS
			THEORY	TUTORIAL	PRACTICAL	
1	**385501**	Costing Estimation & Management	3	0	0	**3**
2	**385502**	Process Equipment Design	3	0	0	**3**
3	**385503**	Process Equipment Design (Practice)	0	0	2	**2**
4	**385504**	Automation in Fabrication Technology	3	0	0	**3**
5	**385505**	Automation in Fabrication Technology (Practice)	0	0	2	**2**
6	**385506**	Advance Materials and Metallurgy	3	0	0	**3**
7	**385507**	Advance Materials and Metallurgy(Practice)	0	0	2	**2**
8	**385508**	A Learning Laboratory (Practice)	0	0	2	**2**
9		Elective I -Theory	3	0	0	**3**
10		Elective I - Practices	0	0	2	**2**
11		Elective II- Theory	3	0	0	**3**
12		Elective II- Practices	0	0	2	**2**
		TOTAL	**18**	**0**	**12**	**30**

LIST OF ELECTIVE SUBJECTS

SR. NO.	SUB. CODE	ELECTIVE -I (THEORY)
1	**385509**	Ship Building, Repairing & Recycling
2	**385511**	Computer Integrated Manufacturing
3	**385513**	Static & Rotary Equipment Maintenance
4	**385515**	Production & Operation Management
5	**385517**	Piping & Plant Engineering
6	**385519**	Industrial & Offshore Structure Fabrication

SR. NO.	SUB. CODE	ELECTIVE -I (PRACTICE)
1	385510	Ship Building, Repairing & Recycling Practice
2	385512	Computer Integrated Manufacturing Practice
3	385514	Static & Rotary Equipment Maintenance Practice
4	385516	Production & Operation Management Practice
5	385518	Piping & Plant Engineering Practice
6	385520	Industrial & Offshore Structure Fabrication Practice

SR. NO.	SUB. CODE	ELECTIVE -II (THEORY)
1	385521	Coating, Painting & Corrosion Control
2	385523	Vehicle Body Building & Painting
3	385525	Advance Sheet Metal Fabrication
4	385527	Mechanical Behavior & Testing of Metal
5	385529	Sales & Marketing Management
6	385531	Quality, Productivity & Safety Management

SR. NO.	SUB. CODE	ELECTIVE -II (PRACTICE)
1	385522	Coating, Painting & Corrosion Control Practice
2	385524	Vehicle Body Building & Painting Practice
3	385526	Advance Sheet Metal Fabrication Practice
4	385528	Mechanical Behaviour & Testing of Metal Practice
5	385530	Sales & Marketing Management Practice
6	385532	Quality, Productivity & Safety Management

GUJARAT TECHNOLOGICAL UNIVERSITY

DIPLOMA IN FABRICATION ENGINEERING

SEMESTER- VIII

Subject Name: Costing Estimation and Management
Subject Code: 385501

Sr. No.	Course Content	Hrs.
1	**INTRODUCTION TO COSTING ESTIMATION AND MANAGEMENT** 1.1 Know the (5P) Purpose, Planning, Procedure, Problem solving, Performance of learning this Subject 1.2 Need, Scope & importance of Costing Estimation and Management in industries 1.3 Need of attitude, Knowledge & skill required for engineer for application of Costing Estimation and Management in industry 1.4 History, Concept and definition of Costing Estimation and Management 1.5 Need, salient features, benefits and function areas of Costing Estimation and Management 1.6 Prepare CV of Quality, Productivity & Safety management engineer 1.7 Role of this subject in your golden future(Why and how to learn this subject)	2
2	**COSTING** 2.1 Costing definition, Aims, Function 2.2 Classification of cost, Costing methods 2.3 Procedure for costing 2.4 Advantages of efficient costing 2.5 Process costing 2.6 Material costing 2.7 Labour costing 2.8 Material cost economics 2.9 Indirect expenses and depreciation 2.10 Mensuration	8
3	**ESTIMATION** 3.1 Estimation definition, Aims, Function 3.2 Importance of Estimating 3.3 Organization of estimating department 3.4 Estimation of material cost 3.5 Estimation in machine shop 3.6 Estimation in sheet metal shop 3.7 Estimation in forging shop 3.8 Estimation in welding shop	8

4	**PRODUCTION MANAGEMENT** 4.1 Production planning & control 4.2 Industrial engineering Work measurement Method study Ergonomics 4.3 Facility Location Concepts, steps in facility location, factors affecting selection of location 4.4 Plant Lay-out Definition, Types, Application, Advantages and Limitation 4.5 Material Handling Requirement Classification and Uses 4.6 Project planning and project report 4.7 CPM/PERT	5
5	**MATERIAL MANGEMENT** 5.1 Introduction 5.2 Inventory management 5.3 Value Analysis Aims, Definition, Benefits, Methods 5.4 Material Requirement Planning Concept, Definition, Area covered, Block Diagram, Benefits, Case example	3
6	**PRODUCT DESIGN AND PROCESS SELECTION** 6.1 Product design process 6.2 Designing for the customer 6.3 Designing for the manufacturer and assembly 6.4 Process selection 6.5 Process flow design 6.6 Process analysis 6.7 Measuring product and development performance 6.8	4
7	**MODERN MANAGEMENT TOOLS & TECHNIQUE** Basic Principle,Concept, Scope, Need,Advantage,Limitation And Application Of Modern Management Technique Apply To Industry Such As ERP,SCM,JIT,5S,KAIZEN, SIX SIGMA, TAGUCHI, QUALITY CIRCLE, QMS, ISO 9000,KANBAN, IPR, POKAYOKE, TPM Etc,Prouct Development ,Process Planning, Fitness For Purpose,Logistic Management,Safety Management System(SMS), TOC (Theory of constraint), APQP(Advance Product Quality Planning), PPAP(Production Part Approval Process), 7QC tools, Lean management, Lean manufacturing, PMP (Project Management Professionals)	6

NOTES:

A. FOR STUDENTS.

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B. FOR PAPER SETTER/MODERATOR.

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d. Marks ratio of knowledge: comprehension: application types questions must be 30:30:40 respectively.
e. Submit solution / answer keys along with distribution of marks in each question for the paper being submitted.

REFERANCE BOOKS:-

SR.NO.	BOOK NAME	AUTHOR NAME
1)	COSTING & ESTIMATION	T.R BANGA & S.C.SHARMA KHANNA PUBLISHERS
2)	PROJECT AND BUSINESS MANAGEMENT	M.MAHAJAN DHANPAT RAI & CO
3)	PRODUCTION AND OPERATION MANAGEMENT (EIGHT EDITION)	RICHARD CHASE NICHOLAS AQUILANO F. ROERT JACOBS TATA MCGRAW HILL PUBLISHING LTD
4)	PRODUCTION & OPERATIONS MANAGEMENT (SECOND EDITION)	KANISHKA BEDI OXFORD

GUJARAT TECHNOLOGICAL UNIVERSITY

DIPLOMA IN FABRICATION ENGINEERING

SEMESTER- VIII

Subject Name: Process Equipment Design
Subject Code: 385502

Sr. No.	Course Content	Hrs.
1	**BASIC CONSIDERATION IN PROCESS EQUIPMENT DESIGN** 2.11 Know the (5P) Purpose, Planning, Procedure, Problem Solving Performance of learning this subject 2.12 Need, Scope & importance of PED in industries 2.13 Need of attitude, Knowledge & skill required for engineer for application of PED in industry 2.14 History, Concept and definition of PED 2.15 Need, salient features, benefits and function areas of PED 2.16 General design procedure 2.17 Fabrication technique 2.18 Equipment classification 2.19 Power for rotational motion 2.20 Power for process equipment 2.21 Prepare CV of PED engineer 2.22 Role of this subject in your golden future(why and how to learn this subject)	2
2	**MATERIAL OF CONSTRUTION** 2.1 Mechanical properties 2.2 Material 2.3 Corrosion 2.4 Corrosion prevention 2.5 Selection of material consideration	4
3	**DESIGN OF MACHINE ELEMENTS** 3.1 Shaft 3.2 Coupling 3.3 Bearing 3.4 Gear box 3.5 Box & gland 3.6 Mechanical seal 3.7 Packing and gasket	6
4	**DESIGN OF HEAT EXCHANGER** 4.1 Introduction and types of heat exchanger 4.2 Design of shell and tube types heat-exchanger 4.2.1 Classification of shell and tube type heat exchanger 4.2.2 Fluid flow arrangements	5

	4.2.3 Materials of construction 4.2.4 Design pressure 4.2.5 Design temperature 4.2.6 Corrosion allowance 4.2.7 Shell 4.2.8 Tubes 4.2.9 Tube sheet 4.2.10 Shell side and tube side passes 4.2.11 Baffels 4.2.12 Tube sheet channel and shell joint 4.2.13 Expansion bellows 4.2.14 Nozzle and support	
5	**DESIGN OF REACTION VESSEL** 5.1 Introduction and classification 5.2 M.O.C. and agitation 5.3 Heating systems; Jackets, coils 5.4 Design consideration 5.5 Types of agitation	5
6	**DESIGN OF EVAPORATORS AND CRYSTALLIZERS** 6.1 Introduction and types 6.2 Entrainment separators 6.3 Design consideration	3
7	**DISTILLATION AND ABSORPTION TOWER/COLUMN** 7.1 Introduction 7.2 Basic feature of tower/column 7.3 Tower/column internals 7.4 Distillation column design steps	3
8	**COMPUTER AIDED DRAFTING & DESIGN** 8.1 Design software, features, systems requirement, application 8.2 Simple 2D and 3D drafting of process equipment	3
9	**PROCESS FLOW DIAGRAMS** 9.1 Definition / meaning 9.2 Process block diagram (PBD) 9.3 Process flow diagram (PFD) 9.4 Piping and instrumentation diagram (P&ID) 9.5 Commonly used symbols in PFD & P&ID	3
10	**PROCESS HAZARDS AND SAFTEY MEASUREMENT** 10.1 Introduction 10.2 Hazards in process industrial 10.3 Safety measure 10.4 Safety measure in equipment 10.5 Pressure relief device	2

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REFERANCE BOOKS:-

SR.NO.	BOOK NAME	AUTHOR NAME
1)	Process equipment design	V.V. Mahajani & S.B. Umarji
2)	Process equipment design	M.V.Joshi
3)	Process equipment design	B.C. Bhattacharya
4)	Process equipment design	Brozonel & young
5)	Process heat transfer	D.Q.Karn
6)	Machine design	R.S.Khurmi & J.K.Gupta
7)	Fabrication of heat exchanger	P.K.Syao
8)	Heat exchanger (selection , design, and construction)	S.Sanders
9)	Chemical engineers handbook	Parry
10)	Fundamental of process equipment design	W.I. Tagnov
11)	Introduction to process engg.& design	S.B.Thakor & B.I. Bhatt
12)	Codes and standard	ASME, TEMA, API, BIS, BS etc.

GUJARAT TECHNOLOGICAL UNIVERSITY

DIPLOMA IN FABRICATION ENGINEERING

SEMESTER- VIII

Subject Name: Automation in Fabrication Technology
Subject Code: 385504

Sr. No.	Course Content	Hrs.
1	**INTRODUCTION TO AUTOMATION** 1.1 Know the (5P) Purpose, Planning, Procedure, Problem solving, Performance of learning this Subject 1.2 Need, Scope & importance of Automation in industries 1.3 Need of attitude, Knowledge & skill required for engineer for application of Automation in industry 1.4 History, Concept and definition of Automation 1.5 Need, salient features, benefits and function areas of Automation 1.6 Prepare CV of automation engineer 1.7 Role of this subject in your golden future(Why and how to learn this subject)	2
2	**HARDWARE COMPONENTS FOR AUTOMATION AND PROCESS CONTROL** 2.1 Sensors and transducers 2.2 Actuators(Mechanical and Electrical Actuation system) 2.3 PLC (Programmable Logic Controller) 2.4 Analog-to-digital converter 2.5 Digital-to-analog converter 2.6 Input/output devices for discrete data	7
3	**NUMERICAL CONTROL** 3.1 Fundamental of NC technology 3.2 Computer numerical control-CNC 3.3 Distributed numerical control-DNC 3.4 Advantages, Limitations and Application of NC 3.5 Open loop and closed loop systems 3.6 NC part programming	9
4	**COMPUTER AIDED WELDING DESIGN** 4.1 Introduction and welding analysis 4.2 Engineering design v/s welding design 4.3 Perspective in welding design 4.4 Computer aided welding analysis (CAWA) 4.5 Computer aided welding design (CAWD) 4.6 Use of interactive computer graphics	5

5	**COMPUTER SYSTEMS FOR WELDING ENGINEERING** 5.1 Computer system 5.2 Software for welding engineers 5.3 Programming language, magdata, preheat, weld cost, weld spec, cut best, weld best, super weld best, ferrite predictor, weld selector, turbo-IX ,weld crack expert, procedure-write etc.	5
6	**WELDING ROBOTS** 6.1 Industrial robots 6.2 Welding robots 6.3 Robotic welding system 6.4 Types of welding robots 6.5 Robot selection mechanics 6.6 Integrated the welding system 6.7 Joint tracking system	4
7	**WELDING AUTOMATION** 7.1 Concept of welding automation 7.2 Welding operation, structure analysis 7.3 Classification of welding automation 7.4 Machine welding 7.5 Automatic welding 7.6 Flexible automated welding	4

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REFERANCE BOOKS:-

SR.NO.	BOOK NAME	AUTHOR NAME
1)	Automation production system and computer integrated manufacturing	Mikell P. Groover
2)	CAD/CAM/CIM	P.Radhakrishanan S.Subramaniyam V.Raju
3)	Welding technology	O.P.Khanna
4)	N.C.Programming	Pabla
5)	Computer Numerical Control	Hans B.Kief T.Frederick waters

GUJARAT TECHNOLOGICAL UNIVERSITY

DIPLOMA IN FABRICATION ENGINEERING

SEMESTER- VIII

Subject Name: Advance Materials and Metallurgy
Subject Code: 385506

Sr. No.	Course content	Hrs
1	**INTRODUCTION ADVANCE MATERIALS AND METALLURGY** 1.1 Know the (5P) Purpose, Planning, Procedure, Problem Solving, Performance of learning this subject 1.2 Need, Scope & importance of Materials and Metallurgy in industries 1.3 Need of attitude, Knowledge & skill required for engineer for application of Materials and Metallurgy in industry 1.4 History, Concept and definition of Materials and Metallurgy 1.5 Prepare CV of Materials and Metallurgy engineer 1.6 Role of this subject in your golden future(why & how to learn this subject) 1.7 Need, salient features, benefits and functional areas of Materials and Metallurgy 1.8 Reasons for implementing application of Materials and Metallurgy in industries.	2
2	**STEEL MAKING** 2.1 Introduction of pig iron, cast iron, steel, wrought iron and stainless steel. 2.2 History of Steel Making, from Bessemer Steel Making to present day Equipment and practices. 2.3 Thermodynamic and kinetics of refining carbon reaction,(Bessemer converter process, Open Hearth, Oxygen steel making, The Kaldo Process, Electri Furnace steel making, Spray Refining Process)	5
3	**ALLOY DESIGN** 3.1 Concept of alloy design, Steps in alloy design, Significance of alloy design. 3.2 Single phase, dual phase and multiphase materials, Effect of matrix on properties of materials, Effect of size, shape and distribution of second Phase on mechanical properties of alloys. 3.3 Precipitation and particle coarsening, recrystallization and grain growth. Solid/Liquid phase transformation in pure metals, single phase alloys, Constitutional super cooling and eutectic alloys. 3.4 Alloy design for better tensile strength, ductility, toughness, fatigue strength, creep strength, wear resistance and elevated temperature Strength. 3.5 High strength low alloy steels, Maraging steels, High speed steels, Hadfield steel and Super alloys.	4

4	**MATERIAL SELECTION, WELDING PROCESS SELECTION AND QUALITY ASSURANCE OF FOLLOWING PRODUCTS** 4.1 Cold stretched vessels- INOX CVA ,KALOL,DIST. PANCHMLAH 4.2 Simple, sub critical, super critical boiler :- L & T MHI BOILER HAZIRA, THARMEX LTD-SAVALI, Super critical boiler : P-91, P-92 4.3 Steam Turbine & Hydro turbine of energy efficient power plant :- ALSTOM POWER LTD-BARODA, L & T MHI TURBINE HAZIRA, KALYANI ALSTOM LTD-GANDHIDHAM 4.4 Cryogenic vessels:- INOX INDIA LTD-HALOL Inner vessel SA:- 240 TYPE 304 Outer vessel SA:- 516 GR-70 4.5 Ship Building:- ABG SHIPPING-DAHEJ, L&T SHIPPING LTD-HAZIRA, PIPAVAV DEFENCE & OFFSHORE ENGINEERING COMPANY LTD(PDOECL)-PIPAVAV, MODEST INFRASTRUCTURE LTD-BHAVNAGAR, INLAND MARINE-BHAVNAGAR, ALCOCK ASHDOWN-BHAVNAGAR 4.6 Nuclear vessel:- L & T LTD HED HAZIRA, HDO LTD AHMEDABAD	7
5	**STUDY PROPERTIES OF SPECIFIC MATERIAL** 5.1 Metal at high temperature 5.1.1 Elevated temperature test 5.1.2 Creep tests 5.1.3 Stress rupture tests 5.1.4 Short time tension tests 5.1.5 Creep properties of various alloys 5.2 Metals at low temperatures 5.2.1 Effect of low temperature on properties 5.2.2 Effect of low temperature on notched bas test 5.2.3 Metallurgical factors 5.2.4 Mechanical factor 5.3 Establish relation between WPS & mechanical properties 5.4 Establish relation between mechanical properties & microstructure 5.5 Effect of alloying element & essential variable, non essential variable & supplementary variable 5.6 Experimental techniques in materials engineering Microstructural Analysis 5.7 Principle and experimental procedure, TEM & SEM, Atomic force microscopy, X-ray diffraction, Mechanical spectroscopy 5.8 Inconel materials cupronickel materials, titanium and exotic materials	6
6	**Foundry Metallurgy** 6.1 Material selection 6.2 Casting Process 6.3 Melting 6.4 Superheating 6.5 Fluxing 6.6 Solidification and Segregation	5

	6.7 Shrinkage 6.8 Hot tears 6.9 Control of Gas unsoundness in casting 6.10 Stress Relief of Casting 6.11 Testing and Inspection of casting, casting defects causes and remedies	
7	**Mechanical Working Metallurgy (Forging and Rolling)** 7.1 Rolling Theory of Plasticity and Yield-criteria,, Workability test, Hot working, cold working and warm working of metal, structure of cold work and hot work of metals, rolling of metals, various rolling mills and rolling processes, causes and remedies of hot and cold rolling defects, Concept of roll pas design, Factors affecting properties of rolled product 7.2 Forging metallurgy 7.2.1 Metal quality, Raw material selection, temperature of raw material for forging defects causes and remedies , load and energy requirements , reduction ratio, factor affecting quality of forged part 7.2.2 Heat treatment of forging, types of quenching 7.2.3Inspection and testing of forgings	7

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REFERANCE BOOKS:

SR.NO.	BOOK NAME	AUTHOR NAME
1)	Properties and Selection of Metals	ASM Handbook, Vol.1 & 2
2)	Introduction to physical metallurgy	Sidney H Avner
3)	Manufacture of iron and steel Vol. I, II	G.R.Bashforth
4)	Alloy Design, Indian	Academy of Science, Bangalore
5)	An Introduction To Steel Making Tupkary	R.H. Tupkary- Khanna Publishers, Delhi
6)	Forging and forming metals	Rusinoff
7)	Material science and metallurgy	O.P.Khanna
8)	Material science and metallurgy for engineers	V.D.Kodgire, S.V.Kodgire
9)	Physical Chemistry of Metals (with a collection of problems)	Darken and Gurry- Mc Graw Hill

GUJARAT TECHNOLOGICAL UNIVERSITY

DIPLOMA IN FABRICATION ENGINEERING

SEMESTER- VIII

Subject Name: A Learning Laboratory (Practice)
Subject Code: 385508

Sr. No.	Course Content	Hrs.
1	Problem Solving Techniques Basic concepts, scope, applications Case Study	1
2	Latest development in technical area such as FOF, Hybrid technology, e-Governance Basic Concept, Scope, Applications Case Study	1
3	Self Learning Prepare Material for two elective subject other then offered subject to study Global country report Managing change IPR(Intel-Actual Property Right) , Patenting Energy Efficiency Cross culture Awareness 7 Habits of Highly Effective People Gandhian Philosophy Entrepreneurship development You Can Win-Shiv Khera	2
4	Attitude Building Exercise Team Building Exercise Quick Decision Making Exercise Motivate people Exercise Result Oriented Communication Exercise Planning Exercise Case Study	2
5	Watching Inspirational Movie or Videos and Prepare Report of Learning Outcome Case Study	4
6	Career Planning Preparation of CV, Presentation, Types of Interview, Preparation for Interview, Mock Interview, Understand Expectations of Industries and Market, Effective Report Writing, Effective English Communication,	3
7	Career advancement study Student has to study the subject of their interest pertaining to need of industries. Prepare detail report of the information collected through references, future development, internet and industries. Some of the topics are in the area of futurology.	2

	Prior to final selection, students should get approved the topic in the form of proposal (Refer format of proposal) Case Study	
8	Costing and Estimation of Product QA and QC Plan of Job, Impact of Plant Layout on cost of manufacturing, Establish Relationship between Plant Layout and Selection of Material Handling Equipment Case Study	1
9	Human Development Scope Importance of Human Development Index (HDI), Factors Affecting HDI, Quality of Work Life, Stress Management, Emotions Management,HRIS Managing Individual & Organization Leading Organization Effectiveness True Leadership Learning with Meaning Leading in for Growth and Change Growth catalyst-The Right Leadership Culture and Processes Servant Leadership- A path of High Performance Doing Business in_____ Case Study	2
10	Study modern management tools and techniques, Product Design and Process Engineering, Ergonomics in Design Method of Technique Case Study	2
11	Seminar Preparation with Power Point Presentation. Cultivate Research and Development attitude, Develop analytical ability, Types of Thinking (Creative & Innovative), Logical Way of thinking, Corporate Social Responsibility, Quality of Work Life	4

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REFERANCE BOOKS:-

SR.NO.	BOOK NAME	AUTHOR NAME
1)	Training Manual Of Godrej, Bombay	----
2)	Training Manual Of ELC Surat	----
3)	Training Manual Of L&T Ltd	----
4)	Life Positive Magazine	----
5)	Human Capital	----
6)	Human Resource Management	----

GUJARAT TECHNOLOGICAL UNIVERSITY

DIPLOMA IN FABRICATION ENGINEERING

SEMESTER- VIII

Subject Name: - Ship Building, Repairing and Recycling (Elective I -Theory)
Subject Code: - 385509

Sr. No.	DESCRIPTION	Hours
1	**INTRODUCTION TO SHIPBUILDING** 1.1 Know the (5P) Purpose, Planning, Procedure, Problem solving Performance of learning this subject 1.2 Need, Scope & importance of Shipbuilding industries in Gujarat 1.3 Need of attitude, Knowledge & skill required for engineer 1.4 Prepare CV of ship building engineer 1.5 History, Concept and definition of Ship building 1.6 Basic design of ship 1.7 Classification/types of ship 1.8 Terminology of ship	2
2	**MATERIAL AND STRENGTH OF SHIPS** 2.1 material used for ship [hull, superstructure, piping and outfitting] 2.2 factor affecting selection of materials 2.3 testing of materials 2.4 stress in ship 2.5 factor affecting ship life 2.6 Ship stability- definition & scope a. Force and moment b. Form coefficients c. Trim d. The dead weight scale e. Interaction f. Bending of beam g. Strength curves for ships	5
3	**SHIP DRAWING & SHIP CONSTRUCTION** 3.1 list of drawings A) Hull production drawing B) Piping drawing C) Machinery drawing D) Electrical drawing E) Out fitting drawing 3.2 lofting – meaning, method and simple example 3.3 Definition and Types of line diagram 3.4 Plimsoll diagram	12

	3.5 Ship structure [bottom structure, shell plating and framing, Bulkhead and pillars, deck hatches and superstructure, fore end structure, aft end structure, tanker construction] 3.6 Ship component and their function 3.7 Welding and cutting process used in ship building 3.8 Prefabrication and erection of ship 3.9 Painting surface preparation methods, types of paints, application methods and causes of paint fail 3.10 Corrosion control and various corrosion problem in ship 3.11 Ship launching 3.12 Material handling equipment 3.13 Cathodic protection, (Anode) 3.14 Fabrication sequence of cargo ship 3.15 Distortion control in ship building A) Types of distortion B) Factor affecting distortion	
4	**QUALITY ASSURANCE (QA)** 4.1 Classification and Role of societies in ship building 4.2 DT/NDT test – types and acceptance criteria 4.3 Vacuum test(VT) and Air pressure test(APT) 4.4 Ship trial – needs 4.5 Dry survey a. Build up (B/U) b. Spatter c. Grinding d. pinhole e. Porosity f. Crack g. Buckling h. Under cut i. Miss match j. Fairing	3
5	**SHIPYARD CODES AND STANDARDS** Need, scope, importance & function 5.1 IACS (international association of classification societies) 5.2 ABS (American bureau of shipping) 5.3 SOLAS (Safety of life at sea) 5.4 MARPOL 5.5 IMO (International Maritime Organisation) 5.6 LR (Lloyd's Register) 5.7 GL (Germanischer Lloyd) 5.8 GPCB (Gujarat Pollution Control Board)	4

6	**REPAIR, REPLACEMENT & RECYCLE OF SHIP** 6.1 Ship life meaning, method and importance 6.2 Need for ship repair of ship 6.3 Repairing equipment and instruments types, function and working 6.4 Replacement decision – concept, meaning, criteria 6.5 Ship recycling meaning, definition and factor affecting 6.6 Ship recycling process 6.7 Waste disposal 6.8 Cutting equipment and process	5
7	**ROLE OF SAFETY SUPERVISOR** 7. 1 Importance of Safety and health 7. 2 Safety equipment and instrument 7. 3 Role & characteristics of safety supervisor 7. 4 Types, causes, remedies and prevention of Fire hazard 7. 5 Source of fire hazards 7. 6 Accident report writing 7. 7 Responsibility of supervisor & Characteristics 7. 8 Record keeping – need, importance, types 7. 9 Safety Training	5

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REFERANCE BOOKS:-

SR. NO.	BOOK NAME	AUTHOR NAME
1)	Merchant Ship Construction	D. A. TAYLOR
2)	Ship Design And Construction	R. TAGGART

3)	Ship Construction	D. J. EYRES
4)	Naval Architecture For Marine Engineers	W. MUCKLE
5)	Rules And Regulations For Construction And Classification Of Steel Ship	IRS
6)	American Bureau Of Shipping (Rule Books)	ABS
7)	Ship Recycling-A Handbook for Mariners	PURNENDU MISRA ANJAN MUKHERJEE (NAROSA PUBLISHING HOUSE)
8)	Ship Stability for Masters and Mates	CAPTAIN D. R. DERRETT DR C. B. BARRASS

GUJARAT TECHNOLOGICAL UNIVERSITY

DIPLOMA IN FABRICATION ENGINEERING

SEMESTER- VIII

Subject Name: Computer Integrated Manufacturing (Elective I -Theory)
Subject Code: 385511

Sr. No.	Course Content	Hrs
1	**INTRODUCTION TO ADVANCE MANUFACTURING SYSTEMS (AMS)** 1. 1 Know the(5P) Purpose, Planning, Procedure, Problem solving Performance of learning this subject 1. 2 Need, Scope & importance of CIM in industries 1. 3 Need of attitude, Knowledge & skill required for engineer for application of CIM in industry 1. 4 History, Concept and definition of CIM 1. 5 Need, salient features, benefits and function areas of CIM 1. 6 Prepare CV of CIM engineer 1. 7 Role of this subject in your golden future(Why and how to learn this subject)	2
2	**GROUP TECHNOLOGY** 2.1 GT- concept, definition, need, scope, & benefits 2.2 GT- codification systems, types, importance, part families, part classification and coding systems, examples/case study. 2.3 GT Layout-concept, need, importance, comparison with conventional layout examples/case study, benefits. 2.4 Computer Aided Process Planning (CAPP)- conventional process planning & example, CAPP-concept, type, feature, method and importance	4
3	**CELLULER MANUFACTURING** 3.1 Concept and definition, application and benefits 3.2 Part family and cell formation 3.3 Composite component and key machine concepts. 3.4 Cell layout and design 3.5 Job and tool movement within cell 3.6 Types of cell: manual and automatic cell, assembly cell, comparison of cell and Flexible Manufacturing Cell (FMC)	4
4	**JUST IN TIME (JIT) , SUPPLY CHAIN MANAGEMENT (SCM), CONCURRENT ENGINEERING (CE) AND FACTORY OF FUTURE(FOF)** 4.1 JIT,SCM, CE,FOF concept, meaning, definition, need and reasons to include this concept in AMS 4.2 Unnecessary elements in conventional manufacturing system with reference to JIT with suitable engineering example/ case study. 4.3 JIT ,SCM,CE ,FOF implementation requirement	6

5	**FLEXIBLE MANUFACTURING SYSTEM (FMS)** 5.1 Flexible Manufacturing Unit (FMU), turn-mill centres, multiple centres, advances machining centres, etc. 5.2 Transfer line- concept, meaning, features & examples. 5.3 Flexible Manufacturing System (FMS)-concept, meaning & benefits, major elements and their role. 5.4 FMS: layout concept, system, tool handling systems, material handling principle and system. 5.5 Automated Guided Vehicles (AGV) in FMS- concept, definition, types, functions. 5.6 Signal flow diagram, line balancing, Automated Storage and Retrieval System (AS/RS), case example of FMS for specific components/ group of components.	5
6	**INSPECTION PRINCIPLES AND PRACTICE** 6.1 Types of inspection 6.2 Inspection procedure 6.3 Automated Inspection 6.4 When and where to inspect 6.4.1 Off- line and online inspection 6.4.2 Product inspection VS process monitoring 6.4.3 Distributed Inspection VS final inspection 6.5 Contact VS Non contact Inspection Techniques 6.6 Cordinate measuring m/c 6.7 Machine vision	5
7	**INTEGRATION OF COMPUTER AIDED DESIGN (CAD) WITH COMPUTER AIDED MANUFACTURING (CAM)** 7.1 Concept, meaning, importance and benefits 7.2 Activities involved in integration of CAD with CAM 7.3 Features and application of software packages having CAD/CAM integration 7.4 Interfacing: types, standards, features and application	4
8	**COMPUTER INTEGRATED MANUFACTURING (CIM)** 8.1 Concept, definition, area covered and benefits. 8.2 CIM: need, block diagram & explanations, importance & feature of each terms involved 8.3 Computer Aided Inspection- concept, benefits, types working and example, Coordinate Measuring Machine (CMM)-its working and application 8.4 Protocols in CIM-their features, function and application	4

NOTES:

A. FOR STUDENTS.

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B. FOR PAPER SETTER/MODERATOR.

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e. Submit solution / answer keys along with distribution of marks in each question for the paper being submitted

REFERANCE BKOOKS:-

SR. NO.	BOOK NAME	AUTHOR NAME
1)	AUTOMATION, PRODUCTION SYSTEMS AND CIM	MICKELL R. GROOVER
2)	MODERN ARC WELDING TECHNOLOGY	S.V. NADKARNI
3)	ADVANCE MANUFACTURING SYSTEM	B.C. BHATTACHARYA
4)	CAD/CAM	JIMMER & GROOVER
5)	WELDING TECHNOLOGY	O.P.KHANNA
6)	WELDING PROCESS	R.S. PARMAR

GUJARAT TECHNOLOGICAL UNIVERSITY

DIPLOMA IN FABRICATION ENGINEERING

SEMESTER- VIII

Subject Name: Static and Rotary Equipment Maintenance
(Elective I -Theory)
Subject Code: 385513

Sr. No.	Course Content	Hrs.
1	**INTRODUCTION TO STATIC AND ROTARY EQUIPMENT MAINTENANCE** 1. 1 Know the (5P) Purpose, Planning, Procedure, Problem solving Performance of learning this Subject 1. 2 Need, Scope & importance of Static and Rotary Equipment Maintenance 1. 3 Need of attitude, Knowledge & skill required for engineer for application of Static and Rotary Equipment Maintenance in industry 1. 4 History, Concept and definition of Static and Rotary Equipment Maintenance 1. 5 Need, salient features, benefits and function areas of Static and Rotary Equipment Maintenance 1. 6 Prepare CV of Static and Rotary Equipment Maintenance engineer 1. 7 Role of this subject in your golden future(Why and how to learn this subject)	2
2	**INTRODUCTION TO STATIC AND ROTARY EQUIPMENT AND ITS APPLICATION** 2.1 Pipes - Flanges – Valves 2.2 Vessel 2.3 Columns, Reactors, 2.4 Drums, Storage Tanks 2.5 Baffles, Distribution Trays 2.6 Packing Grids, Catalyst Bed Supports 2.7 Cyclones, Demister Pads 2.8 Heat Exchangers 2.9 Furnaces And Boilers 2.10 Thermal Equipment 2.11 Fire Tubes	6
3	**CENTRIFUGAL PUMPS, COMPRESSORS AND TURBO-COMPRESSORS** 3.1 Compressors 3.2 Turbo compressors 3.3 Symbols 3.4 Centrifugal pump types 3.5 Pump performance 3.6 Pump characteristics 3.7 Specifications and standards 3.8 Test procedures and techniques 3.9 Pump specific speed *n*s	5

	3.10 Pump balancing 3.11 Balance calculations 3.12 Pump components – clearances and fits	
4	**MACHINE ELEMENT** 4.1 Screw fasteners 4.2 Bearings 4.3 Mechanical power transmission – broad guidelines 4.4 Shaft couplings 4.5 Gears 4.6 Seals 4.7 Cam mechanisms 4.8 Belt drives 4.9 Clutches 4.10 Brakes 4.11 Pulley mechanisms 4.12 Useful references and standards	7
5	**MATERIALS OF CONSTRUCTION** 5.1 Plain carbon steels – basic data 5.2 Alloy steels – basic data 5.3 Stainless steels – basic data 5.4 Non-ferrous alloys – basic data 5.5 Material traceability	5
6	**PRIME MOVERS** 6.1 Steam turbines 6.2 Gas turbines – aero derivatives 6.3 Gas turbines – industrial 6.4 Reciprocating internal combustion engines 6.5 Turbochargers	5
7	**MAINTENANCE** 7.1 Type of Maintenance 7.2 Basic concept, principle of different type of Maintenance 7.3 Application, Advantages & Limitation 7.4 Basic equipment, instruments, tools for maintenance 7.5 Procedural steps of rotary equipment maintenance 7.6 Procedural steps of static equipment maintenance 7.7 Record, document Quality control & economics aspects. 7.8 Modern maintenance management practices 7.9 Fault finding & Decision Tree Concept	6

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REFERANCE BOOKS:-

SR.NO.	BOOK NAME	AUTHOR NAME
1)	ENGINEER'S GUIDE TO ROTATING EQUIPMENT	Clifford Matthews.

GUJARAT TECHNOLOGICAL UNIVERSITY

DIPLOMA IN FABRICATION ENGINEERING

SEMESTER- VIII

Subject Name: Production and Operations Management (Elective I -Theory)
Subject Code: 385515

Sr. No.	Course Content	Hrs.
1	**INTRODUCTION TO PRODUCTION AND OPERATIONS MANAGEMENT** 1.1 Know the (5P) Purpose, Planning, Procedure, Problem solving, Performance of learning this Subject 1.2 Need, Scope & importance of Production And Operations Management in industries 1.3 Need of attitude, Knowledge & skill required for engineer for application of Production And Operations Management in industry 1.4 History, Concept and definition of Production And Operations Management 1.5 Need, salient features, benefits and function areas of Production And Operations Management 1.6 Prepare CV of Vehicle Production And Operations Management engineer 1.7 Role of this subject in your golden future(Why and how to learn this subject)	2
2	**DEMAND FORECASTING** 2.1 Demand forecasting- definition, importance, type for new products & established products, their features and applications. 2.2 Time series analysis : features, type (This includes simple average, simple moving average, weighted moving average and exponential smoothing), advantages and disadvantages of each type, method of forecasting for each type, examples of each type. 2.3 Forecast or error, sources of errors, measurement of error and methods of fitting a trend line. (This includes hand fitting & least square methods) 2.4 Decomposition of time series: Seasonal variations seasonal index, decomposition using least square regression, depersonalizes demand, method, examples. Note: Two Problem questions of 6-8 marks out of total 70.	5
3	**AGGREGATE PRODUCTION PLANNING AND CAPACITY REQUIREMENT PLANNING (CRP)** 3.1 Major production/operation planning activities, terminology, meaning, and definition. 3.2 Aggregate production planning: Concept, goals, interrelationship in production system. 3.3 Types of production plan, factors affecting them, examples 3.4 CRP: Concept, need and meaning: method, decision variables, suitable and mechanical engineering examples. NOTE: One problem question from CRP of 4-6 marks out of total 70	5

4	**RESOURCE PLANNING & SCHEDULING** 4.1 Definition, aim, purpose & types. 4.2 Information necessary for scheduling 4.3 Material requirement planning (MRP)- definition 4.4 Master production schedule (MPS) - concept, need, information flow, preparation steps: suitable preparation with example. 4.5 Estimation of shop loads. 4.6 Planning and scheduling system: scheduling techniques such as Gantt chart, Mile stone chart, analytical method, Johnson method, slotting technique, etc. 4.7 Short interval scheduling 4.8 Critical ratio scheduling. 4.9 Manufacturing resource planning (MRP II): Concept, meaning, definition, scope, importance and application. 4.10 Enterprise Resource Planning (ERP): concept and definition, information on software available. NOTE: One problem question from scheduling of 4-5 marks out of total 70.	6
5	**LINER PROGRAMMING** 5.1 Introduction, importance, application. 5.2 Various terms, and their meaning. 5.3 Canonical form of LPP. 5.4 Mathematical formulation of the problem. 5.5 Graphical solution. 5.6 Slack & surplus variable. 5.7 Simplex method, simplex method for requirement, approximation, equality, variable unrestricted in sign for maximization and minimization (for 2 variables and maximum 3 constrains) Note: problem questions (analytical and graphical both application type) of 10-12 marks out of 70.	5
6	**TRANSPORTATION TECHNIQUES** 6.1 Introduction, importance, application. 6.2 Transportation techniques: initial feasible solution, vocal's approximation method, stepping stone method, row column cost method, MODI method for balanced problem (for maximum 4 sources and 4 destinations) 6.3 Simple transshipment problems. Note: Problem questions (application type) of 6-8 marks out of 70.	4
7	**ASSGNMENT TECHNIQUES.** 7.1 Introduction, Importance and Application. 7.2 Technique for solution, Hungarian method, modified matrix (for maximum 4 activities) 7.3 Maximization problem. Note: Problem questions (application type) of 4-6 marks out of 70.	4
8	**REPLACEMENT THEORY AND SEQUENCING PROBLEMS.** 8.1 Introduction, importance and application. 8.2 Various terms, their meaning & definitions, cost of "Keeping it on" and "Replacing", examples. 8.3 Replacement by alternative equipment. 8.4 Sequencing problems: Introduction, heuristic problem solving, sequencing	5

	problems, sequencing problems for n jobs and 2 machines & n jobs and 3 machines (n=no. of jobs should not be more than 4) Note: Problem questions (application type) of 4-6 marks out of 70.	

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REFERANCE BOOKS:-

SR. NO.	BOOK NAME	AUTHOR NAME
1)	Production & Operation Management	Chase And Aquilano (Lrwin publication)
2)	Operations Management: Problems And Model	Elwood S. Buffa (John Willy & Sons)
3)	Operations Research	S. D. Sharma
4)	Operations Research	N.R. Dave, Manglani (C. Jamnadas & Co)
5)	Principles Of Operation Research	Harvey M. Wagner
6)	Computer database organization	Jame's Martin, by PHI publication
7)	New Information technology	Edited Alan Burns, Elis Harword Ltd.
8)	Production and Operations Management	Everette, Adam, Jr. and Ronald J. Elbert, (PHI publications)
9)	Management information system	S.Sadagopan (PHI publication)
10)	Production & Operation Management	Ray Wild Cassel

11)	Production & Operation Management	S.N. Charry (TMGH publication)
12)	Modern productions & operations management	Elwood S. Buffa and Rakesh K. Sarin (john willy & sons publications)
13)	Books on database software taken for study and practice.	
14)	Production and operations management	N.G. Nair, TMGH publications

GUJARAT TECHNOLOGICAL UNIVERSITY

DIPLOMA IN FABRICATION ENGINEERING

SEMESTER- VIII

Subject Name: Piping and Plant Engineering (Elective I -Theory)
Subject Code: 385517

Sr. No.	Course Content	Hrs.
1	**Introduction To Piping And Plant Engineering** 1. 1 Know the (5P) Purpose, Planning, Procedure, Problem solving Performance of learning this Subject 1. 2 Need, Scope & importance of Piping And Plant Engineering in industries 1. 3 Need of attitude, Knowledge & skill required for engineer for application of Piping And Plant Engineering in industry 1. 4 History, Concept and definition of Piping And Plant Engineering 1. 5 Need, salient features, benefits and function areas of Piping And Plant Engineering 1. 6 Prepare CV of Piping And Plant engineer 1. 7 Role of this subject in your golden future(Why and how to learn this subject)	2
2	**Piping Engineering fundamentals** 2.1 Piping Engineering 2.2 Pipe and elements 2.3 Piping drawing 2.4 Piping arrangement 2.5 Scope and importance	5
3	**Standards and codes** 3.1 Necessity 3.2 Different standards and codes 3.3 Applications	3
4	**Design Fundamentals** 4.1 Failure analysis of pipe-causes and effects 4.2 Piping design procedure-mechanical process design. 4.3 Pressure drops calculation. 4.4 Friction losses-phenomenon and calculation 4.5 Stress analysis and programming 4.6 Location of piping 4.7 Selection of support, piping element, and fitting 4.8 Piping flexibility 4.9 Vibration prevention controls-needs methods.	6
5	**Piping Maintenance** 5.1 Maintenance requirements, and corrosion, bend twist, leakage, and crack concept. 5.2 Equipment used for maintenance process-tupes, functions 5.3 Maintenance procedure	4

	5.4 Piping repairing & testing Hydraulic & Air test)-types, methods. 5.5 Corrosion & Cathodic Protection – need methods.	
6	**Pipe Hydraulics and Sizing** 6.1 Scope 6.2 Velocity consideration 6.3 Pressure drops consideration 6.4 Economic consideration	3
7	**Pipe Erection** 7.1 Necessity and importance 7.2 Pre-requisite 7.3 Erection drawing study 7.4 Erection manpower, tools, and equipment 7.5 Role of erection engineer 7.6 Erection planning 7.7 Role of erection supervisor	6
8	**Inspection of Piping System** 8.1 Introduction 8.2 Stages of piping inspection 8.3 DT and NDT methods. 8.4 Defects and its precautions 8.5 Role of piping inspection 8.6 Acceptance standards	4
9	**Piping Economics** 9.1 Scope and Importance 9.2 Costing 9.3 Estimation 9.4 MTO calculation from given blueprint 9.5 Cost reduction area. 9.6 Piping tender	3

NOTES:

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REFERANCE BOOKS:-

SR. NO.	BOOK NAME	AUTHOR NAME
1)	Piping Design For Process Plant	Howard F. Rase
2)	Design Of Piping System	Pollman Power Product
3)	Piping Standards And Codes	Bis, Bs, Asme, Api
4)	Piping Handbook	Iit, Bombay-Piping Cell
5)	Ndt) Technique	Aws Hand Book
6)	Postening & Joining	Robet O. Parmley
7)	Piping Hand Book	Mohinder L. Wayar
8)	Inspection Of Industrial Plant	L. Pillbotocogh

GUJARAT TECHNOLOGICAL UNIVERSITY

DIPLOMA IN FABRICATION ENGINEERING

SEMESTER- VIII

Subject Name: Industrial & Offshore Structure Fabrication
(Elective I -Theory)
Subject Code: 385519

Sr. No.	Course Content	Hrs.
1	**Introduction To Industrial & Offshore Structure Fabrication** 1.1 Know the (5P) Purpose, Planning, Procedure, Problem solving Performance of learning this Subject 1.2 Need, Scope & importance of Industrial & Offshore Structure Fabrication in industries 1.3 Need of attitude, Knowledge & skill required for engineer for application of Industrial & Offshore Structure Fabrication in industry 1.4 History, Concept and definition of Industrial & Offshore Structure Fabrication 1.5 Need, salient features, benefits and function areas of Industrial & Offshore Structure Fabrication 1.6 Prepare CV of Industrial & Offshore Structure Fabrication engineer 1.7 Role of this subject in your golden future(Why and how to learn this subject)	2
2	**Introduction to Structural Fabrication** 2.1 Classification of structural engineering 2.2 Classification of industrial and offshore steel structures 2.3 Classification of industrial and offshore structural members. 2.4 Materials used for industrial and offshore structures.	4
3	**Fundamentals of industrial steel structure design** 3.1 Type and meaning of different codes and stresses acting on industrial steel structure and offshore structures, such as - Wind load - Dead load - Live load - Snow load - Seismic load - Temperature effect and forces and effects related with offshore structures fabrication. 3.2 Meaning of different methods of design, such as - Simple design - Semi rigid design - Fully rigid design - Plastic design 3.3 Needs of stable structures. 3.4 Types of connections used for industrial steel structural member, such as - Riveted	9

	- Bolted - Pin - Welded 3.5 Factors affecting selection of connection 3.6 Advantages and limitation of each connection.	
4	**Design of industrial steel structure.** 4.1 Elements of industrial steel structure. 4.2 Factors affecting on design consideration of each steel structural member. 4.3 Types of industrial truss and selection criteria for truss. 4.4 Simple design example of industrial steel structures (Such as industrial shed) 4.5 Fabrication methods and procedures for industrial steel structures. 4.6 Erection method and procedure for industrial structure.	6
5	**Material handling equipment structure fabrication.** 5.1 Classification 5.2 Materail properties and selection 5.3 Loads and stresses acting on M/H equipment structure. 5.4 Site fabrication requirement 5.5 Structural fabrication sequence 5.6 Inspection procedure.	4
6	**Design of Transmission towers**. 6.1 Types of transmission tower. 6.2 Elements of transmission tower. 6.3 Types of loads and stresses acting on transmission tower. 6.4 Design consideration of each elements of transmission tower. 6.5 Simple design example of transmission tower (Such as electrical transmission tower) 6.6 Fabrication methods and procedure for transmission tower. 6.7 Erection method and procedure for transmission tower. 6.8 Coded design as per BIS 800, 801, & 802.	5
7	**Design of offshore structure.** 7.1 Types of offshore structure. 7.2 Elements of offshore structure 7.3 Types of loads and stresses acting on offshore structures. 7.4 Design consideration of each elements of offshore structures. 7.5 Simple design example of offshore structure. (Such as offshore plate form) 7.6 Fabrication methods and procedure for offshore structure. 7.7 Erection method and procedure for offshore structure. 7.8 Codes and standards for offshore structures.	6

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REFERANCE BOOKS:-

SR. NO.	BOOK NAME	AUTHOR NAME
1)	Design Of Steel Structures	RAMCHANDRA (STANDARDS BOOK HOUSE)
2)	Design Of Steel Structures	DUGGAL (THM)
3)	Design Of Steel Structures	NEGI (THM)
4)	Steel Design Manual	CONSTRUCTIONAL STEEL RESEARCH DEVELOPMENT ORGANIZATION (BSP PROFF BOOK, OXFORD, LONDON)
5)	Basic Structures Analysis	C.S.REDDY (TMH)
6)	Steel Structures Data Bool D 1.1	ASME
7)	Materials Handling Equipment	RUDANKO
8)	Material Handling Equipment	NPC

GUJARAT TECHNOLOGICAL UNIVERSITY

DIPLOMA IN FABRICATION ENGINEERING

SEMESTER- VIII

Subject Name: Coating Painting & Corrosion Control (Elective II -Theory)
Subject Code: 385521

Sr. No.	Course content	Hrs
1	**INTRODUCTION** 1.9 Know the (5P) Purpose, Planning, Procedure, Problem solving Performance of learning this object 1.10 Need, Scope & importance of Coating Painting& corrosion control in industries 1.11 Need of attitude, Knowledge & skill required for supervisor for application of Coating, Painting & Corrosion control 1.12 History, Concept and definition of coating painting & corrosion control 1.13 Need, salient features, benefits and function areas of Coating & Painting 1.14 Function of department 1.15 Quality of corrosion engineer/porting inspector 1.16 Role of NACE, SSPC 1.17 Human relation and team work 1.18 Practical maths 1.19 Prepare CV of painting and coating engineer 1.20 Role of this subject in your golden future(Why and how to learn this subject)	2
2	**CORROSION AND CORROSION CONTROL** 2.1 Definition of eight types of corrosion 2.2 Basic principle or Mechanism 2.3 Environment and corrosion 2.4 Effect of corrosion - Safety, cost, appearance 2.5 Corrosion control - Design, inhibitors, material selection, cathodic protection - Protective coatings, Alteration, of the environment	8
3	**COATING AND INSPECTION** 3.1 Coating introduction 3.2 Coating and Role of inspector 3.3 Environmental test instruments 3.4 Coating specification 3.5 Inspection procedure 3.6 Records and documentation	8
4	**SURFACE PREPARATION** 4.1 Over view 4.2 Surface preparation method	7

5	**COATING APPLICATION** 5.1 Application by brush roller and mitt 5.2 Application by conventional spray 5.3 Application by air less spray	9

NOTES:

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B. FOR PAPER SETTER/MODERATOR.

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REFERANCE BOOKS:

SR.NO.	BOOK NAME	AUTHOR NAME
1)	Training Material	Nace Level-1
2)	Codes And Standards SSPC, ASTM, SIS, BIS, ISO, NACE	--
3)	Corrosion Metal/Environment Reaction	Shreir
4)	Hand Book Of Stainless Steel	Peckner And Bernstein
5)	Metals Hand Book - I	ASM
6)	Corrosion Engineering	Raj Narayan
7)	Corrosion	Phontena And Green

GUJARAT TECHNOLOGICAL UNIVERSITY

DIPLOMA IN FABRICATION ENGINEERING

SEMESTER- VIII

Subject Name: Vehicle Body Building and Painting (Elective II -Theory)
Subject Code: 385523

Sr. no.	Course Content	Hrs.
1	**Introduction to Vehicle Body Building and Painting** 1.1 Know the (5P) Purpose, Planning, Procedure, Problem solving Performance of learning this Subject 1.2 Need, Scope & importance of Vehicle body building and painting in industries 1.3 Need of attitude, Knowledge & skill required for engineer for application of Vehicle body building and painting in industry 1.4 History, Concept and definition of Vehicle body building and painting 1.5 Need, salient features, benefits and function areas of Vehicle body building and painting 1.6 Prepare CV of Vehicle body building and painting engineer 1.7 Role of supervisor on shop floor 1.8 Concept of energy efficient vehicles	2
2	**Vehicle Body Building Terminology** 2.1 Classification of Coachwork type; styling forms, coach and bus body style, layout of cars, buses and coach with different sitting and loading capacity commercial vehicle types, Vans and pickups 2.2 Terms used in body building construction, Angle of approach, Angle of departure, Ground clearance, cross bearers, Floor longitudes, Posts, seat rail, waist rail, cant rail, roof sticks, roof longitude, rub rail, skirt rail, truss panel, wheel arch structure, wheel arch, post diagonals, gussets 2.3 Aerodynamics Basics,Vehicle drag and types,Various types of forces and moments, effects of forces and moments	4
3	**Body building** 3.1Types (i) Passenger vehicle(Air condition passenger vehicle i.e. CAR/Buses). (ii) Goods carriervehicles (iii)Tankers vehicles(i.e. Tanks for LPG handling) (iv)Refrigerated vehicle s for milk/food 3.2 Load acting upon various types of vehicle body. 3.3 Structure for various types of vehicle body. 3.4 Commercial forms of metals used in body building-their standards. 3.5 Introduction of noise and vibration and their causes and remedies 3.6 Factors affecting selection of material of various vehicle body.	7

	3.7 Material selection of vehicle body. Aluminum, alloys, steel, alloy steels, plastics, metal matrix, composite, structural timbers Properties, glass reinforce plastics, high strength composite, thermo plastics, ABS, styrenes, load barring plastics, semi rigid PUR foams and sandwich panel construction	
5	**Interior Ergonomics** 5.1 Introduction of interior ergonomics 5.2 Ergonomics system design, Seating dimensions, seat comfort, suspension seats, split frame seating, back passion reducers, dashboard instruments, commercial vehicle cabin ergonomics, Mechanical package layout, goods vehicle layout 5.3Visibility, Drivers visibility, methods of improving visibility, Window winding and seat adjustment mechanisms 5.4 Space utilization	4
6	**Fabrication** 6.1 Various joining process used in vehicle body building (SMAW, TIG, MIG, Spot, Seam, Riveting, Adhesive Welding) 6.2 Various cutting methods and equipments used for materials and their block diagram, working. 6.3 Forming methods and equipments used-types, block diagrams and working. 6.4Sheet metal joining method and related equipments used-types, block diagrams and working. 6.5 Inspection, codes and standards. 6.6 costing of vehicle body building 6.7 process planning	7
7	**Repairing of body of vehicle.** 7.1 Need for repairing. 7.2 Repairing equipment for body-types, sketches and working. 7.3 Repairing techniques- types, applications. 7.4 Gas welding techniques- types, applications. 7.5 Inspection techniques.	5
8	**Painting and corrosion** 8.1 Definition and objectives of painting. 8.2 Paints available in the market – types, applications. 8.3Element of painting. 8.4 Paint of new vehicles and process. 8.5 Surface treatment and its stage. 8.6 Painting methods, working. (i) manual (ii) spray painting 8.7 Types of paint and repaint process and inspection. 8.8 Paint defects and correction 8.9 Causes of corrosion. 8.10 Types of corrosion. 8.11 Corrosion prevention methods.	6

Notes:

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e. Submit solution / answer keys along with distribution of marks in each question for the paper being submitted

Reference Books:

Sr. No.	Book name	Author
1	I.E	Barnesss
2	Work Study & method study	I.L.O
3	Painting manuals	Berger paints
4	Sheet metal working	Audels
5	Vehicle body repair	F. John
6	**Automotive chassis**	by P.M. Heldt, Chilton & Co, 1970
7	**Hand book on vehicle body design**	SAE publication
8	**Aerodynamics of Road Vehicles,**	Ed W.H. Hucho, 4th Edition, Butter worths 1987
9	Welding Process	O.P.Khanna

GUJARAT TECHNOLOGICAL UNIVERSITY

DIPLOMA IN FABRICATION ENGINEERING

SEMESTER- VIII

Subject Name: Advance Sheet Metal Fabrication (Elective II -Theory)
Subject Code: 385525

Sr. No.	Course Content	Hrs.
1	**INTRODUCTION TO ADVANCE SHEET METAL FABRICATION** 1. 1 Know the (5P) Purpose, Planning, Procedure, Problem solving Performance of learning this Subject 1. 2 Need, Scope & importance of Advance Sheet Metal Fabrication in industries 1. 3 Need of attitude, Knowledge & skill required for engineer for application of Advance Sheet Metal Fabrication in industry 1. 4 History, Concept and definition of Advance Sheet Metal Fabrication 1. 5 Need, salient features, benefits and function areas of Advance Sheet Metal Fabrication 1. 6 Prepare CV of Advance Sheet Metal Fabrication engineer 1. 7 Role of this subject in your golden future(Why and how to learn this subject) 1. 8	2
2	**SHEET METAL INDUSTRIES** 2.1 Types of Sheet metal products and application. 2.2 Types of furniture structure, fixtures and it Application Domestic, Medical (Dental, Orthopadic) gymnasium, amusement park, gadashial, etc. 2.3 Specific Market 2.4 Market	5
3	**TOOLS AND EQUIPMENT** 3.1 Types 3.2 Specification and selection 3.3 Working principle 3.4 Function 3.5 Advantages and limitation 3.6 Application	5
4	**FABRICATION PROCESS** 4.1 Design consideration (space and cost saving, ergonomics, durability and esthetic appearance safety consideration.) 4.2 Selection of fabrication process and consumable 4.3 Factors affecting fabrication process	7

	4.4 Stage wise inspection 4.5 Types of defects-causes and Remedies. 4.6 Testing and final inspection. 4.7 Record keeping-types and necessity.	
5	**SURFACE TREATMENT** 5.1 Importance 5.2 Surface preparation methods and processes 5.3 Plating, Powder coating, Chromium plating-selection, application, defect or causes, its causes and remedies.	5
6	**ESTIMATION AND COSTING** 6.1 Costing and estimation method 6.2 Cost reduction 6.3 Economy	5
7	**INTERIOR DESIGN & DECORATION** 7.1 Trends 7.2 Market requirement 7.3 Role of furniture 7.4 Colour matching and selection 7.5 Human needs and comfort.	7

NOTES:

A. FOR STUDENTS.

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GUJARAT TECHNOLOGICAL UNIVERSITY

DIPLOMA IN FABRICATION ENGINEERING

SEMESTER- VIII

Subject Name: Mechanical Behavior and Testing of Materials
(Elective II -Theory)
Subject Code: 385527

Sr. No.	Course Content	Hrs.
1	**INTRODUCTION TO MECHANICAL BEHAVIOR AND TESTING MATERIALS** 1.1 Know the (5P) Purpose, Planning, Procedure, Problem solving, Performance of learning this Subject 1.2 Need, Scope & importance of Mechanical Behavior and Testing of Material 1.3 Need of attitude, Knowledge & skill required for engineer for application of Mechanical Behavior and Testing of Material in industry 1.4 History, Concept and definition of Mechanical Behavior and Testing of Material 1.5 Need, salient features, benefits and function areas of Mechanical Behavior and Testing of Material 1.6 Prepare CV of Vehicle Mechanical Behavior and Testing of Material 1.7 Role of this subject in your golden future(Why and how to learn thissubject)	2
2	**DISLOCATIONS** 2.1 Properties and sources of dislocations. 2.2 Dislocation reaction and interactions. 2.3 Techniques for observation of dislocation.	4
3	**ELASTIC AND PLASTIC DEFORMATION** 3.1 Mechanisms of plastic deformation in single crystals and polycrystalline materials. 3.2 Super plasticity. 3.3 Strengthening mechanisms in solids. Recovery, recrystallization and grain growth.	5
4	**VIBRATION** 4.1 Importance of material testing. 4.2 Classification of various types of testing methods. Selection of testing methods. 4.3 Importance of calibration of testing instruments. 4.4 Calibration methods and standard for various tests.	5
5	**TENSILE TESTING** 5.1 Engineering stress-strain curve. 5.2 Tensile properties. 5.3 True stress strain curve.	4

	5.4 Factors affecting tensile properties. Tensile testing machines.	
6	**HARDNESS TESTING** 6.1 Various hardness tests. 6.2 Advantages and limitation of various hardness tests. 6.3 Micro hardness testing.	3
7	**IMPACT TESTING** 7.1 Types of impact tests and their relative merits and demerits. 7.2 Ductile-brittle transitionsbehavior and its significance.	4
8	**FATIGUE TESTING** 8.1 S-N curves. 8.2 Mechanisms of fatigue in metals. 8.3 Factors affecting fatigue properties.	4
9	**CREEP TESTING** 9.1 Typical creep curve. 9.2 Mechanism of creep deformation in metals. 9.3 Factors affecting creep behavior	5

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Reference Book:

Sr. No.	Book name	Author
1	Material Science	O.P.Khanna

GUJARAT TECHNOLOGICAL UNIVERSITY

DIPLOMA IN FABRICATION ENGINEERING

SEMESTER- VIII

Subject Name: Sales and Marketing Management (Elective II -Theory)
Subject Code: 385529

Sr. No.	Course content	Hrs
1.	**PERSONAL SELLING AND MARKETTING STRATEGY** 1.1 Know the (5P) Purpose, Planning, Procedure,Problem solving, Performance of learning this subject 1.2 Need, Scope & importance of Sales and Marketing Management in industries 1.3 Need of attitude, Knowledge & skill required for engineer for application of Sales and Marketing 1.4 History, Concept and definition of Sales and Marketing Management 1.5 Need, salient features, benefits and function areas of Sales and Marketing 1.6 Sales management and business enterprise 1.7 Sales management 1.8 Personal selling and salesmanship 1.9 Selling, personal selling objective 1.10 Prepare CV of sales and marketing engineer 1.11 Role of this subject in your golden future(Why and how to learn this subject) 1.12 Cases study	2
2.	**ORGANIZING THE SALES EFFORT** 2.1 Effective sales officer 2.2 Sales department relation 2.3 Cases	7
3.	**SALES FORCE MANAGEMENT** 3.1 Personal management in the selling field 3.2 Selecting sales personal 3.3 Planning sales training programme 3.4 Motivating sales personnel 3.5 Compensating sales personnel 3.6 Sales meeting 3.7 Cases	10
4.	**CONTROLLING THE SALES EFFORT** 4.1 Sales budget 4.2 Quotas 4.3 Sales control and cost analysis 4.4 Cases	8

5.	**INTERNATIONAL SALES MANAGEMENT** 5.1 Introduction 5.2 ISM and culture 5.3 Head office influence on overseas selling activities 5.4 Sales training presentation and evaluation 5.5 Cases	9

NOTES:

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REFERANCE BOOKS:

SR.NO.	BOOK NAME	AUTHOR NAME
1)	Sales management decision, strategies and eases	-Richard still, - Edward cundiff, - Norman goveni

GUJARAT TECHNOLOGICAL UNIVERSITY

DIPLOMA IN FABRICATION ENGINEERING

SEMESTER- VIII

Subject Name: Quality, Productivity & Safety Management
(Elective II -Theory)
Subject Code: 385531

Sr. No.	Course Content	Hrs.
1	**INTRODUCTION TO QUALITY, PRODUCTIVITY & SAFETY MANAGEMENT** 1. 1 Know the (5P) Purpose, Planning, Procedure, Problem solving Performance of learning this Subject 1. 2 Need, Scope & importance of Quality, Productivity & Safety Management in industries 1. 3 Need of attitude, Knowledge & skill required for engineer for application of Quality, Productivity & Safety Management in industry 1. 4 History, Concept and definition of Quality, Productivity & Safety Management 1. 5 Need, salient features, benefits and function areas of Quality, Productivity & Safety Management 1. 6 Prepare CV of Quality, Productivity & Safety management engineer 1. 7 Role of this subject in your golden future(Why and how to learn this subject)	2
2	**DEFINITION OF PRODUCTION AND PRODUCTIVITY** 2.2 Types of Production 2.3 Concept of Productivity 2.4 Importance of productivity 2.5 Difference between production and productivity 2.6 Tools of productivity 2.7 reasons for low productivity 2.8 Factors that Help Increase Productivity 2.9 Productivity Index 2.10 kinds of productivity measurement	5
3	**3.1 CAUSES OF LOW PRODUCTIVITY AND TECHNIQUES OF THEIR ELIMINATION** 1. Due To Defects In Design Or Specimen Of Product 2. Due To Inefficient Methods Of Manufacture. 3. Mismanagement Of Time On Account Of Management 4. Mismanagement On Account Of Workers **3.2 FACTORS AFFECTING PRODUCTIVITY** 1. Man power 2. Equipment and machines 3. Input materials 4. Time 5. Floor area or space 6. Power of Energy 7. Finance	9

	8. Movement of Man and Material 9. **3.3 TECHNICAL METHODS TO IMPROVE PRODUCTIVITY** 1. Task based productivity 2. Product based technique 3. Technology based methods 4. Materials based technologies 5. Employee based methods **3.4 MAIN CONTRIBUTORS TO PRODUCTIVITY IMPROVEMENT** 1. Human relations 2. Improvement in Existing Methods of production and adoption of latest technology 3. Proper design of the product 4. Cost control 5. Product simplification and standardization 6. Proper planning loading and scheduling 7. Good supervision and management 8. Awareness and training about productivity 9. Inceptive to workers **3.5 ADVANTAGES FROM INCREASED PRODUCTIVITY** Benefits to the Enterprise, Consumers, Workers/Labour, The Nation.	
4	**QUALITY MANAGEMENT** 4.1 Quality Management – A conceptual Frame Work 4.2 Dimensions of Quality 4.3 Costs of Quality 4.4 Quality at Every Stage 4.5 Quality System Standards 4.6 Bureau of Indian Standards (BIS) 4.7 Agmark Grading and Standardization of Agricultural and Allied Commodities 4.8 International Organization for Standardization 4.9 ISO 14000 4.10 COPC-2000 4.11 Quality Specification 4.12 ISO 9000	7
5	**INSPECTION AND QUALITY CONTROLS** 5.1 Introduction 5.2 Definitions Of Inspection 5.3 Need For Inspection 5.4 Planning For Inspection 5.5 Types of Inspection 5.6 Stages of Inspection 5.7 Role of Operator 5.8 Role of inspector in Inspection 5.9 Comparison between 100% Inspection and sampling Inspection 5.10 Quality control (Meaning And Need) 5.11 Inspection, Quality Control and Quality Assurance 5.12 Statistical Quality Control	7

	5.13 Concept of Total Quality Management (TQM) 5.14 Machine Capabilities Studies	
6	**SAFETY MANAGEMENT** 6.1 Safe plan of Action 6.2 Personnel Protective Equipment 6.3 Environmental safety and Health Management 6.4 Safety is Officer Responsibility before, during, after accident 6.5 Handling of Hazardous materials 6.6 Basic safety manual 6.7 Accident investigation 6.8 Safety meeting and conference 6.9 Safety Precaution for Various Equipment and Instruments	6

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REFERANCE BOOKS:-

SR.NO.	BOOK NAME	AUTHOR NAME
1)	PRODUCTION MANAGEMENT	A.P. VERMA S.K. KATARIA & SONS
2)	INDUSTRIAL ENGINEERING & OPERATIONS MANAGEMENT	S. K. SHARMA SAVITA SHARMA S.K. KATARIA & SONS
3)	PRODUCTION & OPERATIONS MANAGEMENT (SECOND EDITION)	KANISHKA BEDI OXFORD