12. STUDY AND EVALUATION SCHEME

THIRD SEMESTER

Sr. No.	SUBJECTS	STUDY SCHEME Periods/Week		Credits (C) L+P = C	MARKS IN EVALUATION SCHEME						Total Marks of Internal & External
					INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT			
		L	P		Th	Pr	Tot	Th	Pr	Tot	
3.1	Industrial/In-house Training-I	-	2	0+1=1	-	40	40	-	60	60	100
3.2	Strength of Materials	3	2	3+1=4	40	40	80	60	60	120	200
3.3	Mechanical Engineering Drawing II	-	6	0+3=3	-	40	40	-	60	60	100
3.4	Thermodynamics - I	3	2	3+1=4	40	40	80	60	60	120	200
3.5	Workshop Technology – II	3	-	3+0=3	40	-	40	60	-	60	100
3.6	Basics of Electrical and Electronics Engineering	2	-	2+0=2	40	-	40	60	-	60	100
3.7	Workshop Practice – II	-	6	0+3=3	-	40	40	-	60	60	100
3.8	Open Elective (MOOCs[+]/Offline)	2	-	2+0=2	40	-	40	60	-	60	100
	# Student Centered Activities(SCA)	-	4	-	-	-	-	-	-	-	-
	Total	**13**	**22**	**22**	200	200	400	300	300	600	1000

+ Assessment of Open Elective through MOOCs shall be based on assignments out of 100 marks.

Student Centered Activities will comprise of co-curricular activities like extension lectures on Constitution of India, Electoral Literacy, Motor Vehicles (Driving) Regulations 2017 etc., games, hobby clubs e.g. photography etc., seminars, declamation contests, educational field visits, N.C.C., NSS, Cultural Activities and self-study etc.

THIRD SEMESTER

3.1 INDUSTRIAL/IN-HOUSE TRAINING- I

L   P
-   2

RATIONALE

This Industrial training / In – house training is very important to give industrial exposure to the students. It will help the students to understand the working environment of relevant industries. The student will learn to work in team to solve the industrial problems. It will also give exposure about the present and future requirements of the relevant industries. It will also help the students in development of required competencies and skills for employment and start – ups.

COURSE OUTCOMES

After undergoing the subject, the students will be able to:
CO1:   Understand the working environment of industries.
CO2:   Take necessary safety precautions and measures.
CO3:   Learn about present and future requirement of industries.
CO4:   Work in team for solving industrial problems.
CO5:   Develop competencies and skills required by relevant industries.
CO6:   Develop writing, speaking and presentations skills.

PRACTICAL EXERCISES

1.   Report writing based on industrial training.
2.   Preparation of Power Point Slides based on industrial training.
3.   Power Point Presentation based on industrial training.
4.   Internal Evaluation based on quality of Report, PPT preparation, PPT presentation and answer to queries.
5.   Internal Evaluation based on quality of Report, PPT preparation, PPT presentation and answer to queries

GUIDELINES

In this session students will be evaluated based on Industrial training / In – house training report and their presentation using Power Point Presentation about the knowledge and skills gained during the training. The Head of the department can create coordinators by assigning 5 - 6 students to each. The coordinators may guide the students in preparing the PPTs for final presentation. The coordinator may consider the following performance parameters for assessment of the students out of 100 marks:

	Parameter	Weightage
i	Punctuality & Behavior	20%
ii	Report Writing	30%
iii	Presentation	30%
iv	Viva - voce	20%

3.2 STRENGTH OF MATERIALS

L   P
3   2

RATIONALE

Diploma holders in this course are required to analyze reasons for failure of different components and select the required material for different applications. For this purpose, it is essential to teach them concepts, principles, applications and practices covering stress, strain, bending moment, shearing force, shafts, columns and springs. It is expected that efforts will be made to provide appropriate learning experiences in the use of basic principles in the solution of applied problems to develop the required competencies.

COURSE OUTCOMES

After undergoing this course, the students will be able to:
C01:   Interpret various concepts and terms related to strength of materials
CO2:   Calculate stresses in thin cylindrical shells.
CO3:   Calculate energy stored by materials subjected to axial loads.
CO4:   Calculate moment of inertia of different sections.
CO5:   Draw and calculate bending moment and shear force diagrams of beam under given loading
CO6:   Interpret the concept of bending and torsion and calculate stresses on different section of materials.
CO7:   Calculate critical axial loads on column under different end constraints.
CO8:   Determine the various parameters in closed coil helical and laminated springs
C09:   Perform various tests related to strength on various machines as per Indian Standards.

DETAILED CONTENTS

UNIT I
1.   Stresses and Strains
1.1.   Basic concept of load, stress and strain
1.2.   Tensile, compressive and shear stresses
1.3.   Linear strain, Lateral strain, Shear strain, Volumetric strain.
1.4   Concept of Elasticity, Elastic limit and limit of proportionality
1.5   Hook's Law, Elastic Constants and their relation (without derivation)

1.6.   Stress-strain curve for ductile and brittle materials

1.7   Nominal stress

1.8   Yield point, plastic stage

1.9   Ultimate stress and breaking stress

1.10   Percentage elongation

1.11   Proof stress and working stress

1.12.   Factor of safety

1.13   Poisson's Ratio

1.14   Thermal stress and strain

1.15   Longitudinal and circumferential stresses in seamless thin walled cylindrical shells.

1.16   Introduction to Principal stresses

2.   Resilience

2.1   Strain Energy, Resilience, proof resilience and modulus of resilience

2.2   Strain energy due to direct stresses and Shear Stress

2.3   Stresses due to gradual, sudden and falling load.

UNIT II
3.   Moment of Inertia

3.1.   Concept of moment of inertia and second moment of area

3.2   Radius of gyration

3.3   Theorem of perpendicular axis and parallel axis (with derivation)

3.4   Second moment of area of common geometrical sections: Rectangle, Triangle, Circle (without derivation); Second moment of area for L,T and I section

3.5   Section modulus

UNIT III
4.   Bending Moment and Shearing Force

4.1   Various types of beams and form of loading

4.2   End supports-Roller, hinged and fixed

4.3   Concept of bending moment and shearing force

4.4   B.M. and S.F. Diagram for simply supported beam with and without overhang subjected to concentrated and U.D.L and cantilever beam.

UNIT IV

5. **Bending Stresses**

5.1 Concept of Bending stresses

5.2. Theory of simple bending, Derivation of Bending Equation

5.3. Use of the equation $\frac{M}{I} = \frac{\sigma}{y} = \frac{E}{R}$

5.4. Concept of moment of resistance

5.5. Bending stress diagram

5.6 Section modulus for rectangular, circular and symmetrical I section.

5.7. Calculation of maximum bending stress in beams of rectangular, circular, and T section.

6 **Columns**

6.1. Concept of column, modes of failure

6.2. Types of columns, modes of failure of columns

6.3. Buckling load, crushing load

6.4. Slenderness ratio

6.5. Effective length

6.6 End restraints

6.7 Factors effecting strength of a column

6.8 Strength of column by Euler Formula without derivation

6.9. Rankine Gourdan formula (without derivation)

UNIT V

7. **Torsion**

7.1. Concept of torsion, difference between torque and torsion.

7.2. Derivation of Torsion Equation, use of torsion equation for circular shaft, (solid and hollow)

7.3. Comparison between solid and hollow shaft with regard to their strength and weight.

7.4. Concept of mean and maximum torque

7.5 Power transmitted by shaft

8. **Springs**

8.1. Closed coil helical springs subjected to axial load and calculation of Stress deformation, Stiffness and angle of twist and strain energy, Strain energy and proof resilience.

8.2. Determination of number of plates of laminated spring (semi elliptical type only)

PRACTICAL EXERCISES

1.   Tensile test on bars of Mild steel and Aluminum.
2.   Bending test on a steel bar or a wooden beam.
3.   Impact test on metals
      a) Izod test
      b) Charpy test
4.   Torsion test of solid specimen of circular section of different metals for determining modulus of rigidity.
5.   To plot a graph between load and extension and to determine the stiffness of a helical spring.
6.   Hardness test on different metals.

Note : All the tests need to be done as per prescribed Indian Standards.

RECOMMENDED BOOKS

1.   RS Khurmi, "Strength of Materials", S.Chand & Co, New Delhi.
2.   Dr. Kirpal Singh, "Mechanics of Materials", Standard Publishers Distribution, New Delhi.
3.   Birinder Singh, "Strength of Materials", Katson Publishing House, New Delhi.
4.   D.R. Malhotra and H.C.Gupta, "Elements of SOM", Satya Prakashan, New Delhi.

INSTRUCTIONAL STRATEGY

This is hands-on practice based subject and topics taught in the class should be practiced in the lab regularly for development of required skills in the students. This subject contains five units of equal weightage.

3.3 MECHANICAL ENGINEERING DRAWING II

L   P
-   6

RATIONALE

Diploma holders in Mechanical Engineering are required to interpret drawings and therefore it is essential that they have skills of preparing drawings and sketches of mechanical components. This subject aims at development of drawing skills in the students.

COURSE OUTCOMES

After undergoing this course, the students will be able to:

CO1: Interpret different limits and fits of components

CO2: Draw different kind of machine components like bearings, brackets, pulleys, pipe joints and lathe tool holder.

CO3: Read and interpret drawings of mechanical components

CO4: Prepare assembly drawings of mechanical machine parts like jig, vices and screw jack

CO5: Prepare assembly drawings of boiler and I.C. engine parts.

CO6: Interpret gear terminology and draw spur gear teeth profile.

DETAILED CONTENTS

1. **Limit, fits and tolerance**   **(02 sheet)**

   Need of limit, fits and tolerance, Maximum limit of size, minimum limit of size, tolerance, allowance, deviation, upper deviation, lower deviation, fundamental deviation, clearance, maximum clearance, minimum clearance. Fits – clearance fit, interference fit and transition fit. Hole basis system, shaft basis system, tolerance grades, calculating values of clearance, interference, hole tolerance, shaft tolerance with given basic size for common assemblies like $H_7/g6$, $H_7/m6$, $H_8/p6$. Basic terminology and symbols of geometrical dimensioning and tolerances. Surface finish representation

2. **Drawing of the following with complete dimensions, tolerances, bill of material and surface finish representation.**

2.1   Universal coupling and Oldham coupling (Assembly)   **(02 sheets)**

2.2   Bearings   **(04 sheets)**

2.2.1   Bushed Bearing (Assembly Drawing)

2.2.2   Ball Bearing and Roller Bearing (Assembled Drawing)

2.2.3   Plummer Block (Detail and Assembly Drawing)

2.2.4   Foot step Bearing (Assembled Drawing)

2.3   Pipe Joints   (03 sheets)

2.3.1   Types of pipe Joints, Symbol and line layout of pipe lines

2.3.2   Expansion pipe joint (Assembly drawing)

2.3.3   Flanged pipe and right angled bend joint (Assembly Drawing)

2.4   Reading and interpretation of mechanical components and assembly drawings

2.5   Sketching practice of wall bracket.   (01 sheet)

3.   Drilling Jig (Assembly Drawing)   (01 sheet)

4.   Machine vices (Assembly Drawing)   (03 sheets)
         Lathe Tool Holder (Assembly Drawing)
         Lathe tail stock (assembly drawing)

5.   I.C. Engine Parts   (03 sheets)
         Piston
         Connecting rod (Assembly Drawing)
         Crankshaft and flywheel (Assembly Drawing)

6.   Boiler Parts   (02 sheets)
         Steam Stop Valve (Assembly Drawing)
         Blow off cock. (Assembly Drawing)

7.   Mechanical Screw Jack (Assembled Drawing)   (01 sheet)

8.   Gears   (02 sheets)
         Gear, Types of gears, Nomenclature of gears and conventional representation
         Draw the actual profile of involute teeth of spur gear by approximate method and base
         circle method.

RECOMMENDED BOOKS

1.   P.S. Gill, "Machine Drawing", S.K. Kataria and Sons, Ludhiana.
2.   R.K. Dhawan, "A Text Book of Machine Drawing", S. Chand and Co. Ltd New Delhi.
3.   N.D. Bhatt, "Machine Drawing", Charotar Book Depot, Anand.
4.   Bhattacharya, "Machine Drawing", Oxford Press, New Delhi.

INSTRUCTIONAL STRATEGY

The teachers should first demonstrate then assist the students to prepare drawing   sheets.

Note:-

(1)   First angle projection should be followed, 20% of drawings may be prepared in third angle projection.
(2)   SP-46-1988 should be followed.
(3)   The drawing should include discussion with tolerances, whenever necessary and material list as per BIS / ISO specifications.
(4)   At least 18 sheets may be prepared covering all the topics.

3.4 THERMODYNAMICS - I

L   P
3   2

RATIOANLE

A diploma holder in this course is supposed to maintain steam generators, turbines, compressors and other power plant equipment. Therefore, it is essential to impart him basic concepts of thermodynamics, steam generators, steam turbines, and compressors and about IC engines.

COURSE OUTCOMES

After undergoing this subject, the students will be able to:
CO1:   Apply thermodynamic laws.
CO2:   Solve basic problems of gas equation using perfect gas laws.
CO3:   Explain the working, construction and applications of steam boilers and steam generators
CO4:   Determine various properties of Steam
C05:   Determine enthalpy, specific heat capacity of an ideal and real gas.
CO6:   Explain the working, construction and application of air compressor.

DETAILED CONTENTS

UNIT I
1.   Fundamental Concepts
Thermodynamic state and system, boundary, surrounding, universe, thermodynamic systems – closed, open, isolated, adiabatic, homogeneous and heterogeneous, macroscopic and microscopic, properties of system – intensive and extensive, thermodynamic equilibrium, quasi – static process, reversible and irreversible processes, Zeroth law of thermodynamics, definition of properties like pressure, volume, temperature, enthalpy and internal energy.

2.   Laws of Perfect Gases
Definition of gases, explanation of perfect gas laws – Boyle's law, Charle's law, Avagadro's law, Regnault's law, Universal gas constant, Characteristic gas constants and its derivation.
Specific heat at constant pressure, specific heat at constant volume of a gas, derivation of an expression for specific heats with characteristics, simple numerical problems on gas equation.

UNIT II

3.   Thermodynamic Processes

Types of thermodynamic processes – isochoric, isobaric, isothermal, adiabatic, isentropic, polytropic and throttling processes, equations representing the processes

Derivation of work done, change in internal energy, change in entropy, rate of heat transfer for the above processes

UNIT III

4.   Laws of Thermodynamics

Laws of conservation of energy, first law of thermodynamics (Joule's experiment) and its limitations, Steady flow energy equation, Application of steady flow energy equation for turbines, pump, boilers, compressors, nozzles, and evaporators.

Heat source and sink, statements of second laws of thermodynamics: Kelvin Planck's statement, Classius statement, equivalency of statements, Perpetual motion Machine of first kind, second kind, Carnot engine, Introduction of third law of thermodynamics, concept of irreversibility and concept of entropy.

UNIT IV

5.   Steam Generators

Uses of steam, classification of boilers, comparison of fire tube and water tube boilers. Construction and working of Nestler boiler, Babcock & Wilcox Boiler. function of various boiler mounting and accessories, Introduction to modern boilers – Benson boiler.

6.   Properties of Steam

Formation of steam and related terms, thermodynamic properties of steam, steam tables, sensible heat, latent heat, internal energy of steam, entropy of water, entropy of steam, T- S diagrams, Mollier diagram (H – S Chart), Expansion of steam, Hyperbolic, reversible adiabatic and throttling processes, determination of quality of steam (dryness fraction),

UNIT V

7.   Ideal and Real Gases

Concept of ideal gas, enthalpy and specific heat capacities of an ideal gas, P – V – T surface of an ideal gas, triple point, real gases, Vander-Wall's equation

8.   Air Compressors

Functions of air compressor – uses of compressed air, type of air compressors

Single stage reciprocating air compressor, its construction and working, representation of processes involved on P – V diagram, calculation of work done.

Multistage compressors – advantages over single stage compressors, use of air cooler, condition of minimum work in two stage compressor (without proof).

Rotary compressors – types, working and construction of centrifugal compressor, axial flow compressor, vane type compressor

PRACTICAL EXERCISES

1. Determination of temperature by
1.1 Thermocouple
1.2 Pyrometer
1.3 Infrared thermometer
2. Study the working of Nestler boiler.
3. Study of working of high pressure boiler.
4. Demonstration of mountings and accessories on a boiler.
5. Determination of dryness fraction of steam using calorimeter.
6. Demonstrate the working of air compressor.

Note : Industrial visit may be planned to show working of boilers.

RECOMMENDED BOOKS

1. PK Nag, "Engineering Thermodynamics", Tata McGraw Hill, Delhi.
2. Roy Chaudhary, "Basic Engineering Thermodynamics", Tata McGraw Hill, Delhi.
3. CP Arora, "Engineering Thermodynamics", Tata McGraw Hill, Delhi.
4. VP Vasandani and DS Kumar, "A Treatise on Heat Engineering", Metropolitan Book Company.

INSTRUCTIONAL STRATEGY

This is hands-on practice based subject and topics taught in the class should be practiced in the lab regularly for development of required skills in the students. This subject contains five units of equal weightage.

3.5 WORKSHOP TECHNOLOGY-II

L   P
3   -

RATIOANLE

Diploma holders are responsible for supervising production processes to achieve production targets and for optimal utilization of resources. For this purpose, knowledge about various manufacturing processes is required to be imparted. Hence the subject of workshop technology.

COURSE OUTCOMES

After undergoing the subject, students will be able to:

CO1: Demonstrate applications of various welding processes.

CO2: Explain the process of pattern making, moulding and casting

CO3: Explain procedure of various types of NDT for welding and casting.

C04: Explain the working of various machining processes such as shaping, planning, milling and broaching

C05: Understand functions and operations of various jigs and fixtures.

DETAILED CONTENTS

UNIT I
1.   Welding

Resistance welding: Principle, advantages, limitations, working and applications of spot welding and seam welding

Other Welding Processes: Principle, advantages, limitations, working and applications of Shielded metal arc welding, submerged arc welding. Welding defects, methods of controlling welding defects and inspection of welded joints.

Modern Welding Methods: Methods, Principle of operation, advantages, disadvantages and applications of, Tungsten inert gas (TIG) welding, Metal inert gas (MIG) welding, Thermit welding, Electro slag welding, Electron beam welding, Ultrasonic welding, Laser beam welding, Robotic welding

UNIT II

2.   Foundry Techniques

2.1.   Pattern Making

Types of pattern, Pattern material, Pattern allowances, Pattern codes as per B.I.S., Introduction to cores, core boxes and core materials, Core making procedure, Core prints, positioning of cores

2.2.   Moulding and Casting

Moulding Sand: Properties of moulding sand, their impact and control of properties viz. permeability, refractoriness, adhesiveness, cohesiveness, strength, flowability, collapsibility, Various types of moulding sand, Testing of moulding sand.

Mould Making: Types of moulds, Step involved in making a mould, Molding boxes, hand tools used for mould making, Molding processes: Bench molding, floor molding, pit molding and machine molding.

Casting Processes: Charging a furnace, melting and pouring both ferrous and non ferrous metals, cleaning of castings, Principle, working and applications of Die casting: hot chamber and cold chamber, Centrifugal casting

Gating and Risering System: Elements of gating system, Pouring basin, sprue, runner, gates, Types of risers, location of risers, Directional solidification.

Melting Furnaces: Construction and working of Pit furnace, Cupola furnace, Crucible furnace – tilting type, Electric furnace

Casting Defects: Different types of casting defects, Non destructive testing (NDT) of castings: die penetration test, radiography, magnetic particle inspection and ultrasonic inspection.

UNIT III

3.   Shaping, Slotting and Planing

3.1   Working principle and construction of shaper, slotter and planer

3.2   Type of shapers and slotters

3.3   Type of planers

3.4   Quick return mechanism applied to shaper and planer machine.

3.5   Work holding devices used on shaper and planer

3.6   Types of tools used and their geometry.

3.7   Specification of shaper and planer.

3.8   Speeds and feeds in above processes.

4   Broaching

4.1   Introduction to broaching

4.2   Nomenclature of broach tools, types and material

4.3   Types of broaching machines – single ram and duplex ram horizontal type, vertical type pull up, pull down and push down.

UNIT IV

5.   Milling

5.1   Milling methods - up milling and down milling

5.2   Specification and working principle of milling machine

5.2   Classification, brief description and applications of milling machines

5.3   Details of column and knee type milling machine

5.4   Milling machine accessories and attachment – Arbors, adaptors, collets, vices, circular table,   indexing head and tail stock, vertical milling attachment, rotary table.

5.5   Identification of different milling cutters and work mandrels

5.7   Work holding devices

5.8   Milling operations – face milling, angular milling, form milling, straddle milling and gang   milling.

5.9   Cutting parameters

UNIT V

6   Jigs and Fixtures

6.1   Importance and use of jigs and fixtures, difference between jig and fixture.

6.2   Principal of location

6.3   Locating and clamping devices

6.4   Types of jigs – drilling jig, template jig and plate jig

6.5   Types of fixtures – Milling and welding fixture

RECOMMENDED BOOKS

1.   BS Raghuvanshi, "Workshop Technology", Dhanpat Rai and Sons Delhi.

2.   SK Choudhry and Hajra, "Elements of Workshop Technology", Asia Publishing House.

3.   RL Aggarwal and T Manghnani,"Welding Engineering", Khanna Publishers, Delhi.

4.   PC Sharma, "A Text Book of Production Engineering", S Chand and Company Ltd. Delhi.

5.   PN Rao, "Manufacturing Technology, Vol I and II", Tata McGraw Hill, Delhi.

6.   KP Sinha and DB Goel, "Foundry Technology", Roorkee Publishing House, Roorkee.

INSTRUCTIONAL STRATEGY

Teachers should lay special emphasis in making the students conversant with concepts, principles, procedures and practices related to various manufacturing processes. Use of audio-visual aids/video films should be made to show specialized operations. This subject contains five units of equal weightage.

3.6 BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING

L   P

2   -

RATIONALE

The objective of this course is to impart fundamental knowledge and skills regarding basic electrical and electronics engineering, which diploma holders will come across in their professional life. This course will provide the students to understand the basic concepts and principles of a.c. fundamentals, electromagnetic induction, transformers, motors, distribution system, domestic installation, electrical safety etc. The students will also learn basic electronics along with their applications.

COURSE OUTCOMES:

After undergoing this course, the students will be able to:

CO1:   Interpret various electrical quantities.

CO2:   Improve power factor in a given circuit.

CO3:   Explain construction, working principle, and applications of transformer.

CO4:   Identify different wires of distribution system.

CO5:   Describe the working of single phase and three phase motors.

CO6:   Follow electrical safety measures.

CO7:   List the applications of diodes and ICs.

DETAILED CONTENTS

UNIT I

1.   Basic Electrical Quantities

Definition of voltage, current, power and energy with their units, name of instruments used for measuring above quantities, connection of these instruments in an electric circuit. Difference between ac and dc. Various applications of electricity.

2.   AC Fundamentals

Electromagnetic induction-Faraday's Laws, Lenz's Law; Fleming's rules, Principles of a.c. Circuits; Alternating emf, Definition of cycle, frequency, amplitude and time period.   Concept of electrical power, Concept of phase and phase difference. Concept of resistance, inductance and capacitance in simple a.c. circuit. Concept of three phase system; star and delta connections; voltage and current relationship (no derivation)

UNIT II

3.   Transformer

Working principle and construction of single phase transformer, transformer ratio, emf equation, tapping of transformer, power transformer, auto transformer and distribution transformer (brief idea and difference between them), cooling of transformer, applications of various types of transformers.

4.   Distribution System

Difference between high and low voltage distribution system, identification of three-phase wires, neutral wire and earth wire in a low voltage distribution system. Identification of voltages between phases and between one phase and neutral. Difference between three-phase and single-phase supply

UNIT III

5.   Electric Motor

Description and applications of single-phase and three-phase motors. Introduction to DC motor and its applications, Difference between ac and dc motor, Connection and starting of three-phase induction motors by DOL and star-delta starter. Changing direction of rotation of a given 3 phase induction motor. Motors used for driving pump,   compressor and e vehicles.

UNIT IV

6.   Domestic Installation

Distinction between light-fan circuit and single phase power circuit, sub-circuits, various accessories and parts of domestic electrical installation. Different types of wires and their IS specification, Identification of wiring systems. Colour coding of electrical wires.

7.   Electrical Safety

Electrical shock and precautions against shock, treatment of electric shock, concept of fuses and their classification, concept of earthing and various types of earthing, brief description of range of protective devices like MCB, ELCB, and RCB

UNIT V

8.   Basic Electronics

Concept of semi conductor, types- P and N type. Diodes and their applications, Transistor – PNP and NPN. Their characteristics and uses. Introduction to integrated circuit (IC), Different types of ICs used in electric drives and their control circuit.

RECOMMENDED BOOKS

1.   P.S. Dhogal, "Basic Electrical Engineering", Tata McGraw Hill Publishers, New Delhi.
2.   B. L. Thareja, "A Text Book of Electrical Technology Vol. I and II", S Chand and Co., New Delhi.
3.   J. B. Gupta, "Basic Electrical Engineering", S. Kataria and Sons, Delhi.
4.   N.N. Bhargava and Kulshreshta, "Basic Electronics and Linear Circuits", Tata McGraw Hill, New Delhi.
5.   S. K. Sahdev, "Electronic Principles", Dhanpat Rai and Sons, New Delhi.
6.   V. K. Mehta, "Principles of Electrical and Electronics Engineering", S. Chand and Company Ltd.. New Delhi.

INSTRUCTIONAL STRATEGY

The teacher should give emphasis on understanding of concept and various terms used in the subject. This is theoretical subject and contains five units of equal weight age.

3.7 WORKSHOP PRACTICE - II

L   P

-   6

RATIONALE

Diploma holders are responsible for supervising production processes to achieve production targets and for optimal utilization of resources. For this purpose, skills in operating various machines are required to be developed. Hence the subject of workshop practice.

COURSE OUTCOMES

After undergoing the subject, the students will be able to:

CO1:   Prepare jobs on lathe, shaper, planer and milling machines.

C02:   Carry out welding of parts.

C03:   Carry out pattern making, moulding and casting operations.

PRACTICAL EXERCISES

Advance Turning Shop

1.   Exercise of boring with the help of boring bar
2.   Exercises on internal threading on lathe machine
3.   Preparing a composite job involving turning, taper turning, external thread cutting and knurling.
4.   Eccentric turning job on a lathe using 4-Jaw chuck.
5.   Resharpening of single point cutting tool with given geometry

Machine Shop

1   Prepare a V-Block up to ± 0.5 mm accuracy on shaper machine
2   Exercise on key way cutting and spline cutting on shaper machine.
3   Produce a rectangular slot on one face with a slotting cutter
4   Produce a rectangular face using a planer machine
5   Produce a rectangular block using a milling machine with a side and face cutter
6   Exercise on milling machine to produce a spur gear

Advance Welding Shop

1   Practice of electric arc welding/MIG/TIG welding on welding Simulator

2   Exercise on spot welding/seam welding (any utility item)

3   Prepare a lap joint on MIG welding

4   Prepare a butt joint on TIG welding

5   Exercise on Pipe/MS-Plate cutting by chop-saw & disk grinder.

6.   Job on laser welding machine

Pattern Making

1.   Preparation of solid/single piece pattern.

2.   Preparation of two piece/split pattern

3.   Preparation of a pattern on wooden lathe

4.   Preparation of a self cored pattern

5.   Preparation of a core box.

Foundry Shop

1.   Preparation of mould with solid pattern on floor.

2.   Preparation of floor mould of solid pattern using cope.

3.   Preparation of floor mould of split pattern in cope and drag of moulding box.

4.   Moulding and casting of a solid pattern of aluminum

5.   Preparing a mould of step pulley and also preparing core for the same.

6.   Testing of moisture contents and strength of moulding sand.

RECOMMENDED BOOKS

1   BS Raghuvanshi, "Workshop Technology", Dhanpat Rai and Sons, Delhi.

2   SK Choudhry and Hajra, "Elements of Workshop Technology", Asia Publishing House.

3   RL Aggarwal and T Manghnani, "Welding Engineering", Khanna Publishers, Delhi.

4   PC Sharma, "A Text Book of Production Engineering", S Chand and Company Ltd., Delhi.

5   KP Sinha and DB Goel, "Foundry Technology", Roorkee Publishng House, Roorkee.

INSTRUCTIONAL STRATEGY

This is hands-on practice based workshop for development of required skills in the students.

3.8 OPEN ELECTIVE

L   P

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RATIONALE

Open electives are very important and play major role in implementation of National Education Policy. These subjects provide greater autonomy to the students in the curriculum, giving them the opportunity to customize it to reflect their passions and interests. The system of open electives also encourages cross learning, as students pick and choose subjects from the different streams.

COURSE OUTCOMES

At the end of the open elective, the students will be able to:

CO1:   State the basic concepts and principles about the subject of interest.

CO2:   Perform in a better way in the professional world.

CO3:   Select and learn the subject related to own interest.

CO4:   Explore latest developments in the field of interest.

CO5:   Develop the habit of self-learning through online courses.

LIST OF OPEN ELECTIVES

1.   Computer Application in Business
2.   Introduction to NGO Management
3.   Basics of Event Management
4.   Event Planning
5.   Administrative Law
6.   Introduction to Advertising
7.   Moodle Learning Management System
8.   Linux Operating System
9.   E-Commerce Technologies
10.   NCC
11.   Marketing and Sales
12.   Graphics and Animations
13.   Digital Marketing

14. Human Resource Management
15. Supply Chain Management
16. TQM

GUIDELINES

Open Elective shall be offered either in online or offline mode. Online mode open elective shall preferably be through Massive Open Online Courses (MOOCs) from Swayam, NPTEL or any other online portal to promote self-learning. A flexible basket of large number of open electives is suggested which can be modified depending upon the availability of courses at suggested portals and requirements. For online open electives, department coordinators shall be assigned to monitor and guide the group of students for selection of minimum 20 hours duration online course of their choice. For offline open electives, a suitable relevant subject shall be offered by the respective department to the students as per present and future requirements.

Assessment of MOOCs open elective shall be based on continuous evaluation by the respective coordinator. The coordinator shall consider the submitted assignments by the students from time to time during the conduct of MOOCs. The MOOCs assessment shall be conducted by the coordinator along with one external expert by considering submitted assignments out of 100 marks.

Assessment of offline open elective shall be internal and external. The offline open elective internal assessment of 40 marks shall be based on internal sessional tests, assignments etc. and external assessment of 60 marks shall be based on external examination.

SUGGESTED WEBSITES

1. https://swayam.gov.in/