

4.1 GENERIC SKILLS AND ENTREPRENEURSHIP DEVELOPMENT

L T P
3 - -

RATIONALE

Generic Skills and Entrepreneurship Development is one of the courses from “Human Science” subject area. Generic skills have emerged as an important component of employability skills, which enable an individual to become and remain employable over lifetime and to lead happy and prosperous life. Entrepreneurship development aim at developing conceptual understanding for setting-up one’s own business venture/enterprise. This aspect of Human Resource Development has become equally important in the era, when wage employment prospects have become meager.

Both the subject areas are supplementary to each other and soft skills are required to be developed in diploma passouts for enhancing their employability and self confidence.

DETAILED CONTENTS

1. Introduction to Generic Skills (4 hrs)
 - 1.1 Importance of Generic Skill Development (GSD)
 - 1.2 Global and Local Scenario of GSD
 - 1.3 Life Long Learning (LLL) and associated importance of GSD.
2. Managing Self (8 hrs)
 - 2.1 Knowing Self for Self Development
 - Self-concept, personality, traits, multiple intelligence such as language intelligence, numerical intelligence, psychological intelligence etc.
 - 2.2 Managing Self - Physical
 - Personal grooming, Health, Hygiene, Time Management
 - 2.3 Managing Self – Intellectual development
 - Information Search: Sources of information
 - Listening: Effective Listening
 - Speaking: Effective Oral Communication
 - Reading: Purpose of reading, different styles of reading, techniques of systematic reading; Note Taking: Importance and techniques of note taking
 - Writing: Correspondence - personal and business

Note: Practical sessions should be coupled with teaching of effective listening, speaking, reading and writing.

2.4 Managing Self – Psychological

- Stress, Emotions, Anxiety-concepts and significance (Exercises related to stress management)
- Techniques to manage the above

3. Managing in Team (6 hrs)

- 3.1 Team - definition, hierarchy, team dynamics
- 3.2 Team related skills- sympathy, empathy, co-operation, concern, lead and negotiate, work well with people from culturally diverse background
- 3.3 Communication in group - conversation and listening skills

4 Task Management (3 hrs)

- 4.1 Task Initiation, Task Planning, Task execution, Task close out
- 4.2 Exercises/case studies on task planning towards development of skills for task management

5. Problem Solving (5 hrs)

- 5.1 Prerequisites of problem solving- meaningful learning, ability to apply knowledge in problem solving
- 5.2 Different approaches for problem solving.
- 5.3 Steps followed in problem solving.
- 5.4 Exercises/case studies on problem solving.

6. Entrepreneurship

- 6.1 Introduction (22 hrs)
 - Concept/Meaning and its need
 - Competencies/qualities of an entrepreneur
 - Entrepreneurial Support System e.g., District Industry Centres (DICs), Commercial Banks, State Financial Corporations, Small Industries Service Institute (SISIs), Small Industries Development Bank of India (SIDBI), National Bank of Agriculture and Rural Development (NABARD), National Small Industries Corporation (NSIC) and other relevant institutions/organizations at State/National level.
- 6.2 Market Survey and Opportunity Identification (Business Planning)
 - How to start a small scale industry
 - Procedures for registration of small-scale industry
 - List of items reserved for exclusive manufacture in small-scale industry
 - Assessment of demand and supply in potential areas of growth.
 - Understanding business opportunity
 - Considerations in product selection
 - Data collection for setting up small ventures.

6.3 Project Report Preparation

- Preliminary Project Report
- Techno-Economic Feasibility Report
- Exercises on Preparation of Project Report in a group of 3-4 students

INSTRUCTIONAL STRATEGY

This subject will require a blend of different teaching and learning methods beginning with lecture method. Some of the topics may be taught using question answer, assignment, case studies or seminar. In addition, expert lectures may be arranged from within the institution or from management organizations. Conceptual understanding of Entrepreneurship, inputs by teachers and outside experts will expose the students so as to facilitate in starting ones own business venture/enterprise. The teacher will discuss success stories and case studies with students, which in turn, will develop managerial qualities in the students. There may be guest lectures by successful diploma holding entrepreneurs and field visits also. The students may also be provided relevant text material and handouts.

RECOMMENDED BOOKS

1. Soft Skills for Interpersonal Communication by S. Balasubramanian Published by Orient BlackSwan, New Delhi.
2. Generic skill Development Manual, MSBTE, Mumbai.
3. Lifelong learning, Policy Brief (www.oecd.org)
4. Lifelong learning in Global Knowledge Economy, Challenge for Developing Countries – World Bank Publication
5. Towards Knowledge Society, UNESCO Paris Publication
6. Your Personal Pinnacle of Success by DD Sharma, Sultan Chand and Sons, New Delhi
7. Human Learning, Ormrod
8. A Handbook of Entrepreneurship, Edited by BS Rathore and Dr JS Saini; Aapga Publications, Panchkula (Haryana)
9. Entrepreneurship Development by CB Gupta and P Srinivasan, Sultan Chand and Sons, New Delhi
10. Handbook of Small Scale Industry by PM Bhandari

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (hrs)	Marks Allotted (%)
1.	4	5
2.	8	15
3.	6	10
4.	3	10
5.	5	10
6.	22	50
Total	48	100

4.2 METROLOGY AND QUALITY CONTROL

L T P
4 - 2

RATIONALE

Metrology is the science of measurement, Diploma holders in this course are responsible for ensuring process and quality control by making measurements and carrying out inspection of various parameters. For this purpose, knowledge and skills about various measuring instruments are required. The aim of this subject is to develop knowledge and skills regarding various measuring instruments amongst the students.

DETAILED CONTENTS

1. Introduction (06 hrs)
 - 1.1 Definition of metrology
 - 1.2 Standard of measurement
 - 1.3 Types of Errors - Controllable and random errors
 - 1.4 Precision, accuracy, sensitivity, hysteresis, response time, repeatability, calibration, uncertainty of measurement, interchangeability.
 - 1.5 Standardization and standardizing organizations

2. Linear and Angular Measurement (18 hrs)
 - 2.1 Construction features and use of instruments for non precision linear measurement: steel rule, callipers, surface plate, angle plate, V-block.
 - 2.2 Construction features and use of instruments for precision measurements : vernier calipers, vernier height and depth gauges, micrometers.
 - 2.3 Slip gauges, Indian standards of slip gauges, sets of slip gauges, use of slip gauges.
 - 2.4 Cylinder bore gauges, feeler and wire gauges. Checking flatness, roundness and squareness
 - 2.5 Comparators – Characteristics, uses, working principles of different types of comparators: mechanical, electrical, electronics and pneumatic
 - 2.6 Construction and use of instruments for angular measurements: bevel protector, sine bar, angle gauges, clinometer, angle dekker. Optical instruments for angular measurement, auto collimator.

3. Measurement of Surface Finish (06 hrs)
 - 3.1 Terminology of surface roughness.
 - 3.2 Concept of primary texture and secondary texture.
 - 3.3 Factors affecting surface finish.
 - 3.4 CLA, RMS and RA value.
 - 3.5 Principle and operation of stylus probe instruments. Tomlinson surface meter and Taylor surface talysurf.

4. Measurements of Screw threads and Gauges (08 hrs)
 - 4.1 Measurement of screw threads- Introduction, measurements of external and core diameters, checking of pitch and angle of threads with gauges.
 - 4.2 Measurements of gears (spur) – Measurement of tooth thickness, pitch,
 - 4.3 Profile projector, Coordinate Measuring Machine (CMM), Tool maker's microscope.

5. Instrumentation (08 hrs)
 - 5.1 Various types of instruments used for mechanical quantities such as displacement, velocity, acceleration, speed and torque. Use of transducers and electronic counters, stroboscope, vibrating reeds and tachometers.
 - 5.2 Strain gauge – use of strain gauge and load cells

6. Quality Control (18 hrs)
 - 6.1. Quality control, SQC, function of quality control, quality cost, factors affecting quality of product.
 - 6.2. Inspection need, types of inspection and stages of inspection
 - 6.3. Statistical Quality Control – Definition
 - 6.4. Process Capability
 - 6.5. Introduction to Control Charts(X bar, R,p,c) and their simple applications
 - 6.6. Concepts of ISO 9000, ISO 14000
 - 6.7. Total Quality Management - QC tools, Kaizan, 5S,

LIST OF PRACTICALS

1. Internal and external measurements with vernier calliper and microscope
2. Measurement of linear dimensions with height gauge and depth gauge.
3. Measurement of flatness, concentricity with dial indicator
4. Use of feeler gauge, wire gauge, radius gauge and fillet gauges for checking of standard parameters.
5. Use of plain plug and ring gauge, taper plug and ring gauge, thread plug and ring gauge and snap gauges.
6. Measurement of Angle using;
 - i) Cylindrical rollers and spherical balls and slip gauges
 - ii) Bevel protector
 - iii) Sine Bar/Sine Table , Slip Gauges, Height Gauge and dial indicator.
 - iv) Angle deckor.
7. Measurement of spur gear characherstics;
 - i) Measurement over teeth (M.O.T) by using flange/Disc micrometer.
 - ii) P.C.D run-out using bench centre, mandrel, cylindrical pin and dial indicator.
 - iii) Composite error using Gear Roller Tester and Master Gear.
8. Measurement of thread parameters by using tool maker's microscope.

9. Measurement of effective diameter of external threads by 2-wire and 3-wire method.
10. Measurement of cylindrical bore using cylinder bore gauge for bore diameter, ovality and taper.
11. Measurement of worn out IC engine piston clearance between cylinder and piston.
12. Measurement of surface roughness using surface roughness tester.
13. Measurement of co-ordinates of two or more than two holes using surface plate, angle plate, Height Gauge, dial indicator and slip gauges.
14. Measurement of a profile using profile projector.
15. Study and use of Auto-Collimator.

INSTRUCTIONAL STRATEGY

1. Demonstrate use of various measuring instruments while imparting theoretical instructions.
2. Stress should be laid on correct use of various instruments.

RECOMMENDED BOOKS

1. Engineering Metrology by RK Jain; Khanna Publishers, New Delhi.
2. A Text Book of Production Engineering by RC Sharma; S Chand and Company, New Delhi.
3. Metrology Laboratory Manual by M Adithan and R Bahl; NITTTR, Chandigarh.
4. Engineering Metrology by RK Rajput; SK Kataria and Sons, Ludhiana.
- 5.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	06	10
2	18	26
3	06	10
4	08	12
5	08	12
6	18	30
Total	64	100

4.3 THERMODYNAMICS-II

L T P
4 - 2

RATIOANLE

A diploma holder in this course is supposed to know about testing of IC Engines, fuel supply, ignition system, cooling and lubrication of engines and gas turbines. Hence this subject

DETAILED CONTENTS

1. IC Engines (09 hrs)
 - 1.1 Introduction
 - 1.2 Working principle of two stroke and four stroke cycle, SI engines and CI engines, Otto cycle, diesel cycle and dual cycle
 - 1.3 Location and functions of various parts of IC engines and materials used for them
2. Fuel Supply and Ignition System in Petrol Engine (08 hrs)
 - 2.1 Concept of carburetion
 - 2.2 Air fuel ratio
 - 2.3 Simple carburetor and its application, MPFI, Common rail system, super charging and turbo charger
 - 2.4 Description of battery coil and magneto ignition system, fault finding and remedial action in ignition system
3. Fuel System of Diesel Engine (06 hrs)
 - 3.1 Components of fuel system
 - 3.2 Description and working of fuel feed pump
 - 3.3 Fuel injection pump
 - 3.4 Injectors
4. Cooling and Lubrication (10 hrs)
 - 4.1 Function of cooling system in IC engine
 - 4.2 Air cooling and water cooling system, use of thermostat, radiator and forced circulation in water cooling (description with line diagram)
 - 4.3 Function of lubrication
 - 4.4 Types and properties of lubricant
 - 4.5 Lubrication system of engine
 - 4.6 Fault finding in cooling and lubrication and remedial action
5. Testing of IC Engines (09 hrs)
 - 5.1 Engine power - indicated and brake power
 - 5.2 Efficiency - mechanical, thermal. relative and volumetric
 - 5.3 Methods of finding indicated and brake power
 - 5.4 Morse test for petrol engine

- 5.5 Heat balance sheet
 - 5.6 Concept of pollutants in SI and CI engines, pollution control, norms for two or four wheelers - EURO - 1, EURO - 2, methods of reducing pollution in IC engines, alternative fuels like CNG, LPG, Hydrogen
6. Steam Turbines and Steam Condensers (10 hrs)
- 6.1 Function and use of steam turbine
 - 6.2 Steam nozzles - types and applications
 - 6.3 Steam turbines - impulse, reaction, simple and compound, construction and working principle
 - 6.4 Governing of steam turbines
 - 6.5 Function of a steam condenser, elements of condensing plant
 - 6.6 Classification - jet condenser, surface condenser
 - 6.7 Cooling pond and cooling towers
7. Gas Turbines and Jet Propulsion (12 hrs)
- 7.1 Classification, open cycle gas turbine and closed cycle gas turbine, comparison of gas turbines with reciprocating IC engines, applications and limitations of gas turbine
 - 7.2 Open cycle constant pressure gas turbines - general layout, PV and TS diagram and working of gas turbine
 - 7.3 Closed cycle gas turbines, PV and TS diagram and working
 - 7.4 Principle of operation of ram-jet engine and turbo jet engine - application of jet engines
 - 7.5 Rocket engine - its principle of working and applications
 - 7.6 Fuels used in jet propulsion

LIST OF PRACTICALS

1. Dismantle a two stroke engine, note the function and material of each part, re-assemble the engine.
2. Dismantle a single cylinder diesel engine. Note the function of each part, re-assemble the engine.
3. Study of battery ignition system of a multi-cylinder petrol engine stressing ignition timings, setting, fixing order and contact breaker; gap adjustment.
4. Study of cooling of IC engine.
5. Study of lubricating system of IC engine.
6. Determination of BHP by dynamometer.
7. Morse test on multi-cylinder petrol engine.
8. Local visit to roadways or private automobile workshops.
9. Study of steam turbines through models and visit.
10. Study of steam condensers through model and visits.

INSTRUCTIONAL STRATEGY

1. Use computer based learning aids for effective teaching-learning
2. Expose students to real life problems
3. Plan assignments so as to promote problem solving abilities and develop continued learning skills

RECOMMENDED BOOKS

1. Elements of Heat Engines by Pandey and Shah; Charotar Publishing House, Anand.
2. Thermal Engineering by PL. Ballaney; Khanna Publishers, New Delhi.
3. Engineering Thermodynamics by Francis F Huang; McMillan Publishing Company, Delhi.
4. Engineering Thermodynamics by CP. Arora; Tata McGraw Hill Publishers, New Delhi.
5. Thermal Engineering by RK Purohit; Standard Publishers Distributors, New Delhi.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	09	15
2	08	12
3	06	10
4	10	15
5	09	15
6	10	15
7	12	18
Total	64	100

4.4 STRENGTH OF MATERIALS

L T P
4 - 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.

DETAILED CONTENTS

1. Stresses and Strains (08 hrs)
 - 1.1. Concept of load, stresses and strain
 - 1.2. Tensile compressive and shear stresses and strains
 - 1.3. Concept of Elasticity, Elastic limit and limit of proportionality.
 - 1.3.1. Hook's Law
 - 1.3.2. Young Modulus of elasticity
 - 1.3.3. Nominal stress
 - 1.3.4. Yield point, plastic stage
 - 1.3.5. Ultimate strength and breaking stress
 - 1.3.6. Percentage elongation
 - 1.3.7. Proof stress and working stress
 - 1.3.8. Factor of safety
 - 1.3.9. Shear modulus
 - 1.4. Longitudinal and circumferential stresses in seamless thin walled cylindrical shells (derivation of these formulae not required)
2. Resilience (06 hrs)
 - 2.1. Resilience, proof resilience and modulus of resilience
 - 2.2. Strain energy due to direct stresses
 - 2.3. Stresses due to gradual, sudden and falling load.

- 3 Moment of Inertia (06 hrs)
- 3.1. Concept of moment of Inertia and second moment of area
 - 3.2. Radius of gyration , section modulus
 - 3.3. Theorem of perpendicular axis and parallel axis (without derivation)
 - 3.4. Second moment of area of common geometrical sections: Rectangle, Triangle, Circle (without derivation) Second moment of area for I,T, L, Z section.
4. Bending Moment and Shearing Force (10 hrs)
- 4.1 Concept of beam and form of loading
 - 4.2 Concept of end supports-Roller, hinged and fixed
 - 4.3 Concept of bending moment and shearing force
 - 4.4 B.M. and S.F. Diagram for cantilever and simply supported beams with and without overhang subjected to concentrated and U.D.L.
5. Bending stresses (08 hrs)
- 5.1 Concept of Bending stresses
 - 5.2. Theory of simple bending
 - 5.3. Use of the equation $f/y = M/I = E/R$
 - 5.4. Concept of moment of resistance
 - 5.5. Bending stress diagram
 - 5.6. Calculation of maximum bending stress in beams of rectangular, circular, and T section.
 - 5.7 Permissible bending stress Section modulus for rectangular, circular and symmetrical I section.
- 6 Columns (08 hrs)
- 6.1. Concept of column, modes of failure
 - 6.2. Types of columns
 - 6.3. Buckling load, crushing load
 - 6.4. Slenderness ratio
 - 6.5. Factors effecting strength of a column
 - 6.6 End restraints
 - 6.7 Effective length
 - 6.8 Strength of column by Euler Formula without derivation
 - 6.9. Rankine Gourdan formula (without derivation)

- 7 Torsion (08hrs)
- 7.1 Concept of torsion- difference between torque and torsion.
 - 7.2 Use of torque equation for circular shaft
 - 7.3 Comparison between solid and hollow shaft with regard to their strength and weight.
 - 7.4 Power transmitted by shaft
 - 7.5 Concept of mean and maximum torque
8. Springs (10 hrs)
- 8.1. Closed coil helical springs subjected to axial load and impact load
 - 8.2 Stress deformation
 - 8.3 Stiffness and angle of twist and strain energy
 - 8.4 Proof resilience
 - 8.5 Laminated spring (semi elliptical type only)
 - 8.6 Determination of number of plates

LIST OF PRACTICALS

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

INSTRUCTIONAL STRATEGY

1. Expose the students to real life problems.
2. Plan assignments so as to promote problem solving abilities and develop continued learning skills.

RECOMMENDED BOOKS

1. SOM by Birinder Singh,; Katson Publishing House, New Delhi.
2. SOM by RS Khurmi; S.Chand & Co; New Delhi
3. Elements of SOM by D.R. Malhotra & H.C.Gupta; Satya Prakashan, New Delhi.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	08	12
2	06	10
3	06	10
3	10	16
4	08	12
5	08	12
6	08	12
7	10	16
Total	64	100

4.5 WORKSHOP TECHNOLOGY-II

L T P
4 - 6

RATIONALE

Diploma holders are responsible for supervising production processes to achieve production targets and for optimal utilization of resources. For this purpose, knowledge about various machining processes, modern machining methods, processing of plastic, tools, jigs and fixtures and processing of plastics is required to be imparted. Hence the subject of workshop technology.

DETAILED CONTENTS

1. Cutting Tools and Cutting Materials (06 hrs)
 - 1.1. Cutting Tools - Various types of single point cutting tools and their uses, Single point cutting tool geometry, tool signature and its effect, Heat produced during cutting and its effect, Cutting speed, feed and depth of cut and their effect
 - 1.2 Cutting Tool Materials - Properties of cutting tool material, Study of various cutting tool materials viz. High-speed steel, tungsten carbide, cobalt steel cemented carbides, stellite, ceramics and diamond.
2. Lathe (10 hrs)
 - 2.1 Principle of turning
 - 2.2 Description and function of various parts of a lathe
 - 2.3 Classification and specification of various types of lathe
 - 2.4 Drives and transmission
 - 2.5 Work holding devices
 - 2.6 Lathe tools: Parameters/Nomenclature and applications
 - 2.7 Lathe operations :- Plain and step turning, facing, parting off, taper turning, eccentric turning, drilling, reaming, boring, threading and knurling, form turning, spinning.
 - 2.8 Cutting parameters – Speed, feed and depth of cut for various materials and for various operations, machining time.
 - 2.9 Speed ratio, preferred numbers of speed selection.
 - 2.10 Lathe accessories:- Centers, dogs, different types of chucks, collets, face plate, angle plate, mandrel, steady rest, follower rest, taper turning attachment, tool post grinder, milling attachment, Quick change device for tools.
 - 2.11 Brief description of capstan and turret lathe, comparison of capstan/Turret lathe, work holding and tool guiding devices in capstan and turret lathe.
3. Drilling (08 hrs)
 - 3.1 Principle of drilling.
 - 3.2 Classification of drilling machines and their description.

- 3.3 Various operation performed on drilling machine – drilling, spot facing, reaming, boring, counter boring, counter sinking, hole milling, tapping.
 - 3.4 Speeds and feeds during drilling, impact of these parameters on drilling, machining time.
 - 3.5 Types of drills and their features, nomenclature of a drill
 - 3.6 Drill holding devices.
 - 3.7 Types of reamers.
4. Boring (06 hrs)
- 4.1 Principle of boring
 - 4.2 Classification of boring machines and their brief description.
 - 4.3 Specification of boring machines.
 - 4.4 Boring tools, boring bars and boring heads.
 - 4.5 Description of jig boring machine.
5. Shaping, Planing and Slotting (10 hrs)
- 5.1 Working principle of shaper, planer and slotter.
 - 5.2 Type of shapers
 - 5.3 Type of planers
 - 5.4 Quick return mechanism applied to shaper, slotter and planer machine.
 - 5.5 Work holding devices used on shaper, planer and slotter.
 - 5.6 Types of tools used and their geometry.
 - 5.7 Specification of shaper, planer and slotting machine.
 - 5.8 Speeds and feeds in above processes.
6. Broaching (06 hrs)
- 6.1 Introduction
 - 6.2 Types of broaching machines – Single ram and duplex ram horizontal type, vertical type pull up, pull down, push down.
 - 6.3 Elements of broach tool, broach tooth details – nomenclature, types, and tool material.
7. Jigs and Fixtures (08 hrs)
- 7.1 Importance and use of jigs and fixture
 - 7.2 Principle of location
 - 7.3 Locating devices
 - 7.4 Clamping devices
 - 7.5 Types of Jigs – Drilling jigs, bushes, template jigs, plate jig, channel jig, leaf jig.
 - 7.6 Fixture for milling, turning, welding, grinding
 - 7.7 Advantages of jigs and fixtures
8. Cutting Fluids and Lubricants (10 hrs)
- 8.1 Function of cutting fluid
 - 8.2 Types of cutting fluids
 - 8.3 Difference between cutting fluid and lubricant

- 8.4 Selection of cutting fluids for different materials and operations
- 8.5 Common methods of lubrication of machine tools.

PRACTICAL EXERCISES

Turning Shop

- Job 1. Grinding of single point turning tool.
- Job 2. Exercise of simple turning and step turning.
- Job 3. A composite job involving, turning, taper turning, external thread cutting and knurling.

Advance Fitting Shop

- Job 1. Exercise on drilling, reaming, counter boring, counter sinking and tapping
- Job 2. Dove tail fitting in mild steel
- Job 3. Radius fitting in mild steel
- Job 4. Pipe threading with die

Machine Shop

- Job 1. Prepare a V-Block up to ± 0.5 mm accuracy on shaper machine
- Job 2. Exercise on key way cutting and spline cutting on shaper machine.

INSTRUCTIONAL STRATEGY

1. Teachers should lay emphasis in making students conversant with concepts and principles of manufacturing processes.
2. Focus should be on preparing jobs using various machines in the workshop

RECOMMENDED BOOKS

1. Workshop Technology by B.S. Raghuwanshi; Dhanpat Rai and Sons; Delhi
2. Manufacturing Technology by M. Adithan and A.B. Gupta; New Age International (P) Ltd, Delhi.
3. Elements of Workshop Technology by SK Choudhry and Hajra; Asia Publishing House
4. A Text Book of Production Engineering by PC Sharma; S Chand and Company Ltd. Delhi

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	06	10
2	10	18
3	08	12
4	06	10
5	10	15
6	06	10
7	08	10
8	10	15
Total	64	100

4.6 MECHANICAL ENGINEERING DRAWING-II

L T P
- - 7

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 skills and understanding of mechanical engineering drawings.

DETAILED CONTENTS

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|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| 1. | I.C. Engine Parts | 3 sheets |
| 1.1 | Piston | |
| 1.2 | Connecting rod (Assembly drawing) | |
| 1.3 | Crankshaft and flywheel assembly | |
| 2. | Boiler Parts | 2 sheets |
| 2.1 | Steam Stop Valve (Assembled drawing) | |
| 2.2 | Blow off cock. (Assembled drawing) | |
| 3. | Mechanical Screw Jack (Assembled Drawing) | 1 sheet |
| 4. | Cams | 4 sheets |
| 4.1 | Types of cams and followers (Theoretical) | |
| 4.2 | Profile of cams for imparting following motions with knife edge and roller followers.: | |
| | <ul style="list-style-type: none">• Uniform motion• Simple Harmonic Motion• Uniformity accelerated and retarded motion: | |
| 5. | Gears | 4 sheets |
| 5.1 | Nomenclature of gears and conventional representation | |
| 5.2 | Drawing the actual profile of involute teeth of spur gear by different methods. | |
| 6. | Introduction to CAD Software commands (2D) | (18 hrs) |
| 6.1 | Concept of Computer Aided Drafting (CAD), Tool bars in CAD, software | |
| 6.2 | Drawing commands – point, line, arc, circle, ellipse, polygon | |
| 6.3 | Editing commands – scale, erase, copy, stretch, lengthen and explode, move, array, trim, mirror, chamfer, fillet, rotate | |

- 6.4 Dimensioning and placing text in drawing area
- 6.5 Sectioning and hatching
- 6.6 Inquiry for different parameters of drawing entity
- 6.7 Concept of layers and working on multiple layers

- Note:
- 1. 1st angle projection should be followed. 20% of the drawings may be made using 3rd angle projection.
 - 2. SP- 46-1998 should be followed. The drawings should include dimensions with tolerance wherever necessary and material as per BIS/ISO specifications.
 - 3. Introduction to Auto CAD will be asked only in the practicals. For theory examination, the question will be there only from chapters 1 to 5. In external exam, the students has to draw the drawings only on the drawing sheets.

RECOMMENDED BOOKS

- 1. Machine Drawing by P.S. Gill; S.K. Kataria & Sons, Ludhiana
- 2. A Text Book of Machine Drawing by RK Dhawn; S.Chand & Co. Ltd., New Delhi.
- 3. Machine drawing by N.D Bhatt, Charotar Book Depot, Anand

ENTREPRENEURIAL AWARENESS CAMP

This is to be organized at a stretch for two to three days during fourth semester. Lectures will be delivered on the following broad topics. There will be no examination for this subject

1. Who is an entrepreneur?
2. Need for entrepreneurship, entrepreneurial career and wage employment
3. Scenario of development of small scale industries in India
4. Entrepreneurial history in India, Indian values and entrepreneurship
5. Assistance from District Industries Centres, Commercial Banks. State Financial Corporations, Small industries Service Institutes, Research and Development Laboratories and other financial and development corporations
6. Considerations for product selection
7. Opportunities for business, service and industrial ventures
8. Learning from Indian experiences in entrepreneurship (Interaction with successful entrepreneurs)
9. Legal aspects of small business
10. Managerial aspects of small business

INDUSTRIAL TRAINING

Industrial training, provides an opportunity to students to experience the environment and culture of industrial production units and commercial activities undertaken in field organizations. It prepares student for their future role as diploma engineers in the world of work and enables them to integrate theory with practice.

For this purpose, students at the end of fourth semester need to be sent for industrial training for a minimum of 4 weeks duration to be organised during the semester break starting after IV Semester examinations. The concerned HODs along with other teachers will guide and help students in arranging appropriate training places relevant to their specific branch. It is suggested that a training schedule may be drawn for each student before starting of the training in consultation with the training providers. Students should also be briefed in advance about the organizational setup, product range, manufacturing process, important machines and materials used in the training organization.

Equally important with the guidance is supervision of students training in the industry/organization by the teachers. A teacher may guide a group of 4-5 students. A minimum of one visit per week by the teacher is recommended. Students should be encouraged to write daily report in their diary to enable them to write final report and its presentation later on.

An internal assessment of 50 and external assessment of 50 marks have been provided in the study and evaluation scheme of V Semester. Evaluation of professional industrial training report through viva-voce/presentation aims at assessing students understanding of materials, industrial process, practices in industry/field organization and their ability to engage in activities related to problem solving in industrial setup as well as understanding of application of knowledge and skills learnt in real life situations. The formative and summative evaluation may comprise of weightage to performance in testing, general behaviour, quality of report and presentation during viva-voce examination. It is recommended that such evaluations may be carried out by a team comprising of concerned HOD, teachers and representative from industry. The components of evaluation will include the following.

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|--------------------------------------|-----|
| a) Punctuality and regularity | 15% |
| b) Initiative in learning new things | 15% |
| c) Relationship with workers | 15% |
| d) Industrial training report | 55% |