Sardar Patel University, Balaghat (M.P.)

Curriculum

For

Diploma

Mechanical Engineering

From Session: 2024-25

SARDAR PATEL UNIVERSITY, BALAGHAT (MP)

School of Engineering and Technology

Syllabus

Subject: PROCESS PLANNING ESTIMATING AND COSTING

Subject Code: DME-051

Course: Diploma Branch: Mechanical Semester: V

Academic Session: 2024-25

Course Content

Course Objectives

1. Predict the parameters to evolve the cost of any product.
2. Estimate the cost of a product based on manufacturing methods.
3. Estimate the machining time to manufacture a given product.
4. Discuss the steps involved in process planning.
5. Determining the Manufacturing Sequence and prepare the documents for process planning

UNIT-I

Introduction to Planning: - Process engineering, its scope and relation with product engineering and manufacturing, production system, types and characteristics.

Selecting and Planning the Process of Manufacturing: - Function, fundamental rules for the manufacturing process, basic design of product, influence of process engineering on product design, rechecking specifications, how materials selected affect process cost, using materials more economically, material cost balance sheet, eliminating operations, combined operations, selecting the process tooling, availability of equipment, make or buy decisions.

UNIT-II

Determining the Manufacturing Sequence: - Operation, classifications and the manufacturing sequence, purpose of major process sequence. **Operation Routing: -** Routing uses, routing descriptions.

Elements of Costs and their Allocation: - Definition and objective of Estimating & costing, desirable conditions for a costing system, advantages of costing, elements of cost, direct material cost, direct labour cost, direct expenses, prime cost overheads, indirect materials, indirect labour, indirect expenses administrative and selling expenses, analysis of total cost fixed cost and variable cost. Break even analysis.

UNIT-III

Depreciation: - Definition & Concept, causes of depreciation methods of depreciation calculation.

Profit: - Profit methods of increasing profit, effects of the methods on production, market and sales.

Budget: - Definition, departmental budget and purpose of budgetary control.

Overhead Allocation: - Definition and classification of overheads, methods of overheads allocation viz-direct material cost, direct labour cost, man hour rate and machine hour rate, selection of appropriate method limitation of various methods.

Actual Cost Estimation: Process Materials and Manpower - Terminology associated with estimation, Calculation of volume, weight and cost of materials.

UNIT-IV

Machine Shop: Process, Materials and Man power - Terminology used in machine shop estimation, use of standard table to determine time elements for various machining processes, use of formulas to calculate actual machining time for different operations of machine tools, Calculation of production operation time per product per cycle, batch production time,

Welding shop: - process, materials and Man-power Gas and Arc. Welding terminology, production operation time, labour cost, materials cost, cost elements, batch production cost.

UNIT-V

Forging Shop: - Process, Materials and Man power - Forging gross and net weight of forging, forging losses, materials cost, labour cost and batch production cost.

Foundry Shop: - Process, Materials and Man- power - Pattern cost, production time for casting, material cost of casting, moulding cost, batch production time.

Sheet Metal Shop Estimation: - Sheet Metal shop labour cost, materials cost, production time in piece work.

Reference Books:

- Cost Control by G. R. Sharma. (National Productivity Council)
- Engineer' s Glude to Costing (Institute of cost works Accounts)
- Mechanical Estimating And Costing by T.R. Banga and & S.C.Sharma (Khanna Pub.)
- Mechanical Estimation and Costing by R.L. Shrimali & P.C. Jain (Jain Pub. House)
- Mechanical Estimation And Costing (Resource Persons of Hill Publishing Co. T.T.T.L, Madars Tata McGraw Hill)
- Machine Shop Estimation by Nordoff.
- Learing Packing In Costing And Estimating (T.T.T.I. Bhopal Publication)

Course Outcomes:

1. Understand the role of process engineering in manufacturing and its influence on product design and material selection.
2. Learn how to determine the manufacturing sequence, classify operations, and apply operation routing for process planning.
3. Grasp the concepts of cost elements, allocation, and perform break-even analysis in manufacturing processes.
4. Calculate depreciation, analyze profit methods, and understand overhead allocation in various manufacturing setups.
5. Estimate costs for machine shop, welding, forging, foundry, and sheet metal operations, considering material, labor, and production time.

SARDAR PATEL UNIVERSITY, BALAGHAT (MP)

School of Engineering and Technology

Syllabus

Subject: Machine Tool Technology, Subject Code: DME-052

Course: Diploma Branch: Mechanical Semester: V

Academic Session: 2024-25

Course Content

Course Objectives

1. Understand the Concept and Basic Mechanics of Metal Cutting
2. Know the Working of Standard Machine Tools Such As Lathe, Milling, Reciprocating Machine tools and demonstrate the need of such machine tools for sustainable development
3. Selection of super finishing process for an application and understand the impact of such process in environmental context
4. Expose and appreciate the application UN conventional machining process area and understand the impact of such process in environmental context

UNIT-I

Introduction: - Concept of machine tool technology, needs, area of use etc.

Metal Cutting Theory: - Stages in cutting, factors affecting cutting, types of chips, built up edge (BUE) formation conditions and effect upon surface finish, definition of cutting force, feed force, and radial force with the help of merchant circle diagram. Power requirement for each type of force. Tool geometry and influence of tool angles, desirable properties of cutting tool materials and their influences on the choice of tool material. Primary and secondary function of cutting fluids and properties of cutting fluids commonly used types of cutting fluids. Cutting variables, tool wear and tool life. Taylor's tool life equation and cutting speed calculation. Economy of metal cutting.

UNIT-II

Lathe: - Basic difference between centre, turret and Capston lathes, constructional details and specification. Working principles and features of mechanical hydraulic and electrical copying system, rate of production, skill requirement, accuracy and cost of production. Working principles and types of automatic lathes, work holding and tool holding and tooling used for Capston and turret lathes, operation planning and tool layout for internal, external threading.

Shaper, Drilling & Boring Machine: - Shaper- Construction, operation. application, Types of Drilling Machines, construction, operation and application, Horizontal and vertical boring machines constructional features, Jig boring machine, its construction, operation and application.

UNIT-III

Milling Machines: - Define milling, Classification of milling machines, Principles, parts and their functions, types of table movement in universal milling machine, specifications of milling M/C. Conventional and climb milling, different milling operations and their application, milling cutters and tool angles, specification and cutter materials, use of arbor, collets and adopters machine attachments, methods of mounting the cutter, work holding devices, dividing heads. Direct, simple and differential indexing, selection of cutters, speed feed, procedure for setting up operations and inspections, maintenance of milling.

UNIT-IV

Grinding Machines and Finishing processes:- Definition of grinding and cutting action in grinding, types of abrasive materials and their properties, binding materials, grinding wheel classification and standard marking system, conditions for selection of grinding wheels. Balancing of grinding wheels, glazing and loading, methods of dressing and tracing, Principles of working of grinding machines, types of grinding process, functions of tool and work holding devices, feed arrangement, and table drive in surface and cylindrical grinders.

Types of lubricants and coolants used in grinding, grinding defects, their remedy and safety practices. Definition of honing, lapping, super finishing methods, equipments involved, Materials used, tolerances obtained and limitations, applications of honing and lapping processes

Special purpose Machines: - Difference between forming and generation of gears, principle of gear shaping, hobbing and shaving, rate of production accuracy and limitations. Thread production : thread rolling and thread milling.

Broaching Machines: Definition of Broaching, types of broaches, broaching machines, advantages and limitations.

UNIT-V

Jigs and Fixtures: - Functions of Jigs and fixtures, 3-2-1 principle of location, Design criteria for simple jigs and fixtures

Machine Tool Drives:- Requirements of machine tools, elements of machine tools and their purpose Drive Systems : Stepped and step less drives, advantages and limitations of the gear box drives, function of feed box, types of feed gear boxes, working and advantages. Principle of straight line motion, multihandle, single lever and pre-selective control system

Plastic Moulding: - Types of plastic, Compression moulding, Transfer moulding , Injection moulding, Blow moulding, Vacuum forming, Extrusion

List of Experiments:

1. Measuring of angles of a single point tool with reference to main plane with the aid of tin templates.
2. Grinding of single point (H.S.S.) tools.
3. Practice of taper turning and screw cutting on a centre lathe
4. Practice of making the pins or rivets of any size on a capstan lathe.
5. Demonstration of making a flanged bush on a capstan lathe including setting.
6. Practice of drilling, boring and reaming on a lathe.
7. Practice of mounting cutters on the milling m/c and setting of m/s.

8. Practice of up milling and down milling operation.
9. Practice of cutting the spur gear on milling machine.
10. Practice on a shaper square block on a shaper and milling machine (Comparison of surface produced).
11. Surface grinding or tapping on a flat surface.
12. Practice of cutting a helical gear on a milling m/c.
13. Performance test of a lathe by making a long mandrel.

Reference Books:

- Workshop Technology Vol. I & II by Hajra Chaudhary, (Media Promoters & Publishers Pvt. Ltd. Mumbai)
- Workshop Technology Vol. I , II and III by W.A.J. Chapman, (ELBS)
- Manufacturing Processes & Systems by Phillip F. Ostwald & Jairo Minoz (John Willey & Sons.)
- Production Technology – HMT Handbook (HMT)
- Production Technology by Jain Gupta, (Khanna Publishers, New Delhi)
- Manufacturing Processes by Begeman Amstead, (Wiley.)
- Manufacturing Processes by Rusinoff, (Tata McGraw Hill Publishing Co. Ltd.)
- Advanced Manufacturing Technology by Kalpakjian (Addison Wesley)
- Manufacturing Technology – Metal Cutting & Machine Tools by P. N. Rao (TMH).
- Workshop Technology Vol. II by Bawa H. S. (TMH).
- Manufacturing Science and Technology Vol. I & II. By Suresh Dalela (Umesh Publication).
- Workshop Technology Vol. I and II by B. S. Raghuvanshi (Dhanpat Rai & Sons).
- Production Technology by R. K. Jain (Khanna Publishers, Delhi).
- Vijayvargiya P.N."Machine Tool" Shilp Vigyan (Hindi) (Deepak Prakashan, Morar Gwalior)

Course Outcomes:

1. Understand machine tool technology and metal cutting theory, including cutting forces and tool geometry.
2. Analyze metal cutting processes, chip formation, cutting variables, tool wear, and calculate cutting speeds.
3. Learn construction, working principles, and applications of lathe, shaping, drilling, and boring machines.
4. Comprehend milling machine operations, components, cutters, work-holding devices, and indexing techniques.
5. Master grinding and finishing processes, including honing, lapping, and super finishing techniques.

SARDAR PATEL UNIVERSITY, BALAGHAT (MP)

School of Engineering and Technology

Syllabus

Subject: Engineering Measurements and Maintenance Practices,

Subject Code: DME-053, Course: Diploma Branch: Mechanical Semester: V

Academic Session: 2024-25

Course Content

Course Objectives

1. Explain linear dimension using instrument, comparator and gauges.
2. Measure angle, screw thread geometry, surface finish, geometrical attributes
3. Explain limit, fit, tolerance and gauging.
4. Force, torque, pressure, strain, speed, displacement, flow, humidity, temperature measurement using instrument and gauges.

UNIT-I

Inspection: - Meaning and application of inspection, concept of inspection as applied in industries. Effect of absence of inspection in an industry. Classification, function, meaning and advantages of each concept of inspection applied to metrology. Definition & meaning of precision. Accuracy and error, Interchangeability and selective assembly.

General Measurement Concept: - Limits fits and tolerances, selection of fit, calculation of fundamental deviation, tolerance and limits, selection of limits, tolerances and allowances.

UNIT-II

Linear Measurement: - Standards of length, classification of linear measuring instrument, classification and use of slip gauges, wringing process, micrometers, vernier height gauge, dial vernier and dial height gauge, finding least count, precautions. Dial gauge-types, construction, principle, accuracy and precautions, comparators - principle, types, working and field of application of Mechanical, electrical, optical and pneumatic comparators.

Angular Measurement: - Need of angular measurement, various instruments used. Methods of measurement and field of application of protractor, angle gauges, Sine bars, spirit levels, clinometers and angle dekkor.

UNIT-III

Straightness, Flatness, Squareness and Roundness Testing: - General concept straight edge method, light gap and feeler gauge method, wedge method, use of V- Block and dial indicator for checking roundness.

Surface Roughness: - Definition of primary and secondary texture, CLA value, R.M.S value, Types of surfaces measuring instrument, working principle of Tomlinson mechanical surface finish recorder.

Screw Thread Measurement: - Types of screw threads, threads nomenclatures, errors in screw thread, equipment required for measuring pitch, effective diameter and angle- procedure, advantages, limitation and precautions of each method

Limit Gauges: - Definition of gauge and gauging, types according to use (shop inspection and reference gauge), limit gauges for specific use - screw pitch gauge, template feeler gauge, working tolerance of gauges, maximum and minimum metal conditions to tolerance. Taylor's principle for design of ' Go ' and ' No Go' gauges. Calculation of gauge dimensions form formula given in IS 3455 and selection of parameters necessary for calculation.

UNIT-IV

Transducers: - Meaning, function, primary and secondary transducers. Classification- mechanical electrical, active, passive. Comparison of electrical and mechanical transducers, Working principle and application of resistance type, inductance type, capacitance type and piezo electric type.

Temperature measurement: - Principle on which temperature measuring devices work- example of each type. Comparison of resistance thermometer and thermistor. Thermocouple- Principle, material, and working. Working principle of optical and radiation pyrometers.

UNIT-V

Introduction to Plant Maintenance: Introduction to maintenance, its need and scope, functions of the maintenance department. Different maintenance practices, procedure of corrective or break down maintenance, scheduled maintenance, preventive maintenance and predictive maintenance

Fault Tracing: - Trouble Shooting and Remedies, Sequence of activities in fault finding, methods and procedures of repair, various measures to prevent repetition of similar faults. Various remedial actions.

List of Experiments:

1. Study of different types of fit with their practical application
2. Study of Indian standards IS: 919 recommended for limits and fits.
3. Demonstration of selective assembly.
4. Demonstration of Concept of interchangeability using different job
5. Measurement of diameter, Length, Thickness etc using different caliper and steel rule.
6. Measurement of Various parameters of different objects using varnier caliper & Micrometer
7. Measurement of Various parameters of different objects using combination set.
8. Measure the unknown angle with the help of the Sin Bar & a Slip gauge set

Reference Books:

- Engineering Metrology. By R.K. Jain (Khanna Pub. Delhi)
- Engineering Metrology. by I.C. Gupta (DANPAT RAI & SONS)
- Inspection & Gauging by Kennedy (The Industrial Press, 93, Wortinstreet, New york)
- Engineering Metrology by K.J. Hume. (Macdonald & Co. Ltd. London)

- Practical Metrology by K.J. Hume. (Macdonald & Co. Ltd. London)
- Hand book of Industrial Metrology by R.S.T.M.E. (Prentice Hall of India)
- A Metrology & Gauging S.A.J. Parsons. (Macdonald & Erass. Ltd. London).
- Industrial Instrumentation by D.P. Eckman (Wiley Easter Ltd. New Delhi)
- Measurement Techniques in Mechanical Engineering by R.J. Sweeny (Jon wiley & Sons, New York Addson Wesley Pub. London)
- Mechanical Measurement by Becjwith Buck (Addson Wesley Pub. London)
- Instruments for Measurement Control by W.G. Holzbock (Rainold Pub. Co-operation)
- Mechanical & Industrial Measurement R.K. Jain (Khanna Publishers New Delhi)
- IS Code: 2986, 5979, 5876, 5939
- Maap Vigyan Avum Yantrikaran (Hindi) by Yogendra Varshneya. (Deepak Prakashan, Morar,Gwalior)
- Industrial maintenance – H.P. Garg (S. Chand & Company Lt)

Course Outcomes:

1. Understand the role and significance of inspection in industrial applications.
2. Learn the concept of precision, accuracy, errors, and interchangeability in measurement systems.
3. Apply knowledge of limits, fits, and tolerances in engineering designs.
4. Master the use of linear measurement tools, including micrometers, vernier gauges, and slip gauges.
5. Comprehend the methods and tools for angular measurement and their industrial applications.

SARDAR PATEL UNIVERSITY, BALAGHAT (MP)

School of Engineering and Technology

Syllabus

Subject: Design Of Machine Elements, Subject Code: DME-054

Course: Diploma Branch: Mechanical Semester: V

Academic Session: 2024-25

Course Content

Course Objectives

1. To recognize the type of stresses that is occurring in a particular physical system.
2. To apply appropriate simplifying mathematical model of a physical machine components.
3. To recognize the particular design problem regime that is present in a typical engineering system.
4. To recognize the type of failure in a Multi DOF system and will be able to recognize the life and condition of the system.

UINT-I

Introduction to Machine Design: Machine and machine elements, bolt, nut, axle, shaft, bearing, coupling, clutch, belt, rope, chain, gear etc. Specific purpose of piston connecting rod, crank shaft, turbine blade etc. Factors influencing design of machine elements - Strength stiffness, light weight, wear resistance minimum size, availability, processibility, safety, compliance with standards. Basic design procedure. Selection of mechanism, material, shape and size. Preliminary design, applying checks, revision of design final design. Factors influencing selection of materials. Type of failures, types of forces. Types of loading. Safe design stress and factors of safety.

UNIT-II

Design of Machine Elements Subjected to Direct and Shear Loads: Introduction members subjected to direct loads – bolt, column, rod, cotter and knuckle joints, members subjected to shear loads rivet, cotter knuckle pin, root of threaded bolt, coupling, bolt, key. Function, application and design of knuckle and cotter joint.

Design of Machine Elements Subjected to Bending Moment, Twisting Moment and Combined Bending and Twisting Moment: Introduction to pure bending, fundamental equation of pure bending viz: M/I = f/y = E/ R Design of shaft, key, flange coupling, leaf and helical spring, pulley arms, axle

UNIT-III

Design of Riveted Joint: Type of fastening - temporary and permanent, types of riveted joint - lap and butt joint, definition of common terms like pitch, back pitch, efficiency, margin. Modes of failure of riveted joints.

Design of Simple Welded Joints: Definition of welding advantages of welding over riveted joints, types of welded joints, strength of the butt weld, types of fillet joints and strength of fillet joint problem solving.

Design of Threaded Joints: Types of threads and their proportions, Types of bolts, proportion of nut and bolt dimensions, design of bolt, designation of threads as per I.S. codes.

UNIT-IV

Design of Clutch: Pivots and Collars friction. Horse power lost assuming uniform pressure and uniform wear. Clutch- need, classification and construction and working of single and multi plate clutches, horse power transmitted by single and multi plate clutches.

UNIT-V

Selection of Rolling and Sliding contact Bearing: Types of rolling contact bearing , Ball bearing Roller bearing, bearing designation, bearing installation. Application of bearing. Basic principle of Hydro dynamic and Hydro static bearing. Bearing modulus and Bearing characteristics number.

List of Experiments:

1. To determine the diameter of the shaft by using Soderberg and Goodman's relation.
2. To design of shaft by under bending, twisting and axial loading.
3. To design of shaft by under bending, twisting and axial loading.
4. Design the multi plate clutch.
5. To design of drum brake.
6. Designing and Sketching of Helical Gear.
7. Designing and Sketching of Flat Belt Pulley.

Reference Books:

- Machine Design by Sharma and Agrawal.
- Machine Design by R.K. Jain.
- Machine Design by Shigley..
- Machine Design by R S Khurmi
- Introduction to Machine Design by Bhandari Tata Mcgraw Hill
- Machine Design by Pandya and Shah

Course Outcomes:

1. Understand the fundamentals of machine elements and factors influencing their design.
2. Design machine elements subjected to direct and shear loads, such as bolts, columns, and joints.
3. Apply the principles of bending, twisting, and combined stresses to the design of shafts, couplings, and springs.
4. Analyze and design riveted, welded, and threaded joints, considering different modes of failure.
5. Design clutches, understanding the principles of friction, power transmission, and types of clutches.

SARDAR PATEL UNIVERSITY, BALAGHAT (MP)

School of Engineering and Technology

Syllabus

Subject: CAD/CAM/CIM, Subject Code: DME-055

Course: Diploma Branch: Mechanical Semester: V

Academic Session: 2024-25

Course Content

Course Objectives:

1. The student able to know about the CAD/CAM software.
2. Computer graphics, drafting, numerical control, group technology.
3. CIM and computer aided quality controls

UNIT – I

Introduction: Computers in Industrial Manufacturing, Product cycle, CAD / CAM Hardware, Basic structure, CPU, Memory types, input devices, display devices, hard copy devices, and storage devices. Information requirements of mfg organizations; business forecasting and aggregate production plan; MPS, MRP and shop floor/ Production Activity Control (PAC); ; terms like CAD, CAE, CAM, CAP, CAPP, CATD and CAQ.

Computer Graphics: Raster scan graphics coordinate system, database structure for graphics modeling, transformation of geometry, 3D transformations, mathematics of projections, clipping, hidden surface removal. ; PDM, PIM, EDM; define EDM, features of EDM

UNIT–II

Geometric modeling: Requirements, geometric models, geometric construction models, curve, Constructive Solid Geometry (CSG); representation methods, surface representation methods, modeling facilities desired. Wire-frame modeling, definition of point, line and circle; polynomial curve fitting; introduction to rapid prototyping.

UNIT–III

Drafting and Modeling systems: Basic geometric commands, layers, display control commands, editing, dimensioning, and solid modeling.

Numeric control and part programming: NC, , CNC, DNC, NC modes, NC elements, NC machine tools, structure of CNC machine tools, features of Machining center, turning center, CNC Part Programming fundamentals, manual part programming methods, Computer Aided Part Programming.

UNIT–IV

Group Technology: Part family, coding and classification, production flow analysis, advantages and limitations, Computer Aided Processes Planning, Retrieval type and Generative type. Importance of batch and job shop production; merits of converting zigzag process layout flow to smooth flow in cellular layout, Production Flow Analysis (PFA) and clustering methods;

UNIT–V

Computer Aided Quality Control: Terminology in quality control, the computer in QC, contacts inspection methods, noncontact inspection methods-optical, noncontact inspection methods non optical, computer aided testing, integration of CAQC with CAD/CAM.
Computer integrated manufacturing systems: Types of Manufacturing systems, Machine tools and related equipment, material handling systems, computer control systems, and human labor in the manufacturing systems, CIMS benefits.
A case study on a Robot and AGV programming

List of Experiments:
1. 2D and 3D modeling on CAD software
2. Use of CAM software for writing CNC programs.
3. Study of automatic and semi automatic control system and writing the electrical analogy.
4. Production & layout for GT for group of jobs to be manufactured
5. A case study / tutorial using CAPP Software
6. Writing M & G codes for given operations (Turning, Step Turning, Drilling etc).

Reference Books:

1. CAD / CAM / CIM / Radhakrishnan and Subramanian / New Age Publishers
2. Principles of Computer Aided Design and Manufacturing /Farid Amirouche /Pearson Edu
3. CAD/CAM: Concepts and Applications/Alavala/ PHI Publishers
4. Computer Numerical Control Concepts and programming / Warren S Seames / Thomson Publishers
5. CAD/CAM Principles and Application, P.N.Rao Mc Graw Hill
6. Cad Cam, Deepak Prakashan
7. CAD / CAM Theory and Practice / Ibrahim Zeid / TMH Publishers
8. CAD / CAM /A Zimmers & P.Groover/PE/PHI Publishers
9. Automation, Production systems & Computer integrated Manufacturing/ Groover/ Pearson Education

Course Outcomes:
1. Understand the role of computers in industrial manufacturing and the basics of CAD/CAM hardware.
2. Explain geometric modeling techniques, including wireframe and solid modeling.
3. Apply basic geometric commands, dimensioning, and solid modeling in drafting systems.
4. Demonstrate knowledge of numeric control, CNC programming, and machine tool structures.
5. Analyze group technology and computer-aided process planning methods for improved production layouts.

SARDAR PATEL UNIVERSITY, BALAGHAT (MP)

School of Engineering and Technology

Syllabus

Subject: Industrial Training, Subject Code: DME-056P

Course: Diploma Branch: Mechanical Semester: V

Academic Session: 2024-25

Objective of Industrial Training:
The objective of undertaking industrial training is to provide work experience so that student's engineering knowledge is enhanced and employment prospects are improved. The student should take this course as a window to the real World and should try to learn as much as possible from real life experiences by involving and interacting with industry staff. Industrial training also provides an opportunity to students to select an engineering problem and possibly an industry guide for their Major Project in final semester.

Scheme of Studies: Duration: Minimum 2 weeks in summer break after VI semester, assessment to be done in VII semester

Scheme of Examination: For the assessment of industrial training undertaken by the students, following components are considered with their weightage.

(a) Term Work in Industry	Marks Allotted
Attendance and General Discipline	10
Daily diary Maintenance	10
Initiative and participative attitude during training	10
Assessment of training by Industrial Supervisor	10
Total	40

(b) Practical/Oral Examination (Viva-Voce) in Institution	Marks Allotted
1. Training Report	30
2. Seminar and cross questioning (defense)	30
Total	60

* - Marks of various components in industry should be awarded by the I/c of training in Industry but in special circumstances if not awarded by the industry then faculty in charge /T.P.O. will give the marks.

During training students will prepare a first draft of training report in consultation with section in charge. After training they will prepare final draft with the help of T.P.O. /Faculty of the Institute. Then they will present a seminar on their training and they will face viva-voce on training in the Institute.

Learning through Industrial Training:
During industrial training students must observe following to enrich their learning: Industrial environment and work culture.

- Organizational structure and inter personal communication.
- Machines/equipment/instrument-their working and specifications.
- Product development procedure and phases.
- Project Planning, monitoring and control.
- Quality control and assurance.
- Maintenance system.
- Costing system.
- Stores and purchase systems.
- Layout of Computer/EDP/MIS centers.
- Roles and responsibilities of different categories of personnel.
- Customer services.
- Problems related to various areas of work etc.

Students are supposed to acquire the knowledge on above by-

- Direct Observations without disturbing personnel at work.
- Interaction with officials at the workplace in free/ tea time.
- Study of Literature at the workplace (e.g. User Manual, standards, processes schedules, etc.)
- "Hand's on" experience
- Undertaking/assisting project work.
- Solving problems at the work place.
- Presenting a seminar.
- Participating in group meeting/discussion.
- Gathering primary and secondary data/information through various sources, storage, retrieval and analysis of the gathered data.
- Assisting official and managers in their working.
- Undertaking a short action research work.
- Consulting current technical journals and periodicals in the library.
- Discussion with peers.

Daily Diary- Industrial Training:

Name of the Trainee---------- College ---------- Industry / work place ---------- Week No---------- Department /Section ---------- Date ---------- ----------

Dates	Brief of observations made, work done, problem/project undertaken, discussion held, literature consulted etc.

Signature of Supervisor (TPO/Faculty)	Signature of Trainee	Signature of Official in charge for Trg. In Industry.

Supervision of Industrial Training:

Faculty and TPO are supposed to plan industrial training in such a manner that students get exposure on most of the above area in the field. One faculty member or TPO will plan industrial training of students in consultation with training manager of the industry (work place) as per the predefined objectives of training. Monitoring visits will be made by training and placement officer/faculty in-charge for the group of students, of the college during training.

Guidance to the faculty / TPO for Planning and implementing the Industrial Training:
Keeping in view the need of the contents, the industrial training program, which is spread to minimum 2 weeks duration, has to be designed in consultation with the authorities of the work place; Following are some of the salient points:

- Spelling out the objectives of the industrial training in behavioral terms and same is informed in advance to the 1) students, 2) authorities of the work place and 3) supervising faculty members.
- Discussing and preparing students for the training for which meetings with the students has to be planned.
- Meeting with industrial personnel and orienting them regarding the objective of the training and the expectations of the program.
- Correspondence with the authorities of the work place.
- Orientation classes for students on how to make the training most beneficial- monitoring daily diary, writing weekly reports, how to interact with various categories of industrial personnel, how to behave and undertake responsibilities, how to gather information form the workplace, ethics etc.
- Guiding students to make individual plans (week wise/ day wise) to undertake industrial training.
- Developing a system of maintaining training records, by teachers for every batch of students for convenient retrieval.
- Inviting industrial personnel to deliver lectures on some aspects of training.

Action plan for planning stages at the Institutional Level

S.No.	Activity	Commencing Week	Finishing week	Remark
1.	Meeting with Principal			
2.	Meeting with colleagues			
3.	Correspondence with work place (Industry concerned)			
4.	Meeting with authorities of work place			
5.	Orientation of students for industry training			
6.	Scrutinizing individual training plan of students.			
7.	Commencement of individual training			
8.	First monitoring of industrial training			
9.	Second monitoring of industrial training			
10.	Finalization of Training report			
11.	Evaluation of performance at industry level			
12.	Evaluation of Industry Program in the Institutions.			