



SCHEME FOR SIXTH SEMESTER- MECHANICAL ENGINEERING (TOOL AND DIE)

Sr.No	Subject	Study Scheme			EVALUATION SCHEME						Total Marks
					INTERNAL ASSESSMENT		EXTERNAL ASSESMENT (EXAMINATION)				
					Theory	Practical	Written Paper		Practical		
					Max. Marks	Max. Marks	Max. Marks	Hrs.	Max. Marks	Hrs.	
Hrs/Week											
L T P											
6.1*	Forging & Casting Design and Drawing	3	-	4	-	50	100	3	-	-	125
6.2*	Inspection and Quality and Control	4	-	2	25	25	100	3	50	3	200
6.3*	Industrial Engineering	4	-	-	25	-	100	3	-	-	125
6.4*	Entrepreneurship Development and Management	3	-	-	25	-	100	3	-	-	125
6.5*	Employability Skills- II	-	-	2	-	25	-	-	50	3	75
6.6*	Tool Room Practice	-	-	4	-	50	-	-	50	3	100
7.7*	Project Work	-	-	8	-	100	-	-	100	3	200
# Student Centred Activities		-	-	6	-	25	-	-	-	-	25
Total		14	-	26	75	275	400	-	250	-	1000

* Common with other diploma programmes

** Common with diploma in Mechanical Engineering and Production Engineering.

+ The Question paper will consist of 2 parts: Section A and Section B. Section A will contain theory contents to the extent of 50%. Section B will contain design and Drawing to the extent of 50%.

Student Centred Activities will comprise of co-curricular activities like extension lectures, library studies, games, Hobby clubs e.g. photography, painting, singing, seminars, declamation contests, educational field visits, N.C.C.,NSS, Cultural Activities, Civil Defence/Disaster Management activities etc.



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SYLLABUS: Polytechnic (T&D)

Department: Mechanical Engineering –6th Semester

Subject: Forging and Casting Design and Drawing (Theory)

Subject Code: 120151

Detailed Contents

Unit No. 1 Introduction to Die Casting Process

Topic No.1: Gravity Die Casting, Pressure Die Casting

Topic No.2: Investment, Centrifugal, Vacuum Casting

Topic No.3: Furnace and its types

Unit No. 2 Die Casting Machines

Topic No.4: Classification and Specification of Machines

Topic No.5: Parts and their Functions.

Topic No.6: Locking, Injection & Ejection Unit.

Unit No. 3 Die Casting Dies

Topic No.7: Gravity Die Casting Main parts, Top Gating, Side Gating, Bottom Gating, Runner, Riser,

Topic No.8: Book type mould, Rack & Pinion Mould, Draft Angle,

Topic No.9: Pressure Die Casting: Types, Main Parts, Parting Line, Runner Layout, Gating Formula, Location of Vents, Core Shrinkage, Overflow, Sprue, Ejectors

Unit No. 4 Forging

Topic No.10: Various processes of Forging

Topic No.11: Forging Equipments

Topic No.12: Forging Die Features

Unit No. 5 Forging Machines

Topic No.13: Types, Specification & Function of various parts of machine

Unit No. 6 Forging Dies

Topic No.14: Closed, Upsetting, Open, Extrusion Dies., Cold Forging

Topic No.15: Design of Component Drawing

Topic No.16: Design Considerations for Forging Tools such as Fuller, Edger, Bender, Blocker, Finisher

Unit No. 7 Maintenance and Storage

Topic No.17: Maintenance, Safety and Storage of Forging Die Tools

Topic No.18: Material, Handling of Dies.

STUDY SCHEME			EVALUATION SCHEME						Total Marks
			Internal Assessment		External Assessment (Examination)				
Hrs/week			Theory	Practical	Written Paper		Practical		
L	T	P	Max. Marks	Max. Marks	Max. Marks	Hrs	Max. Marks		Hrs
3	-	4	-	50	100	3	-	-	150

RECOMMENDED BOOKS

1. Forging handbook-forging methods by A. Thomas, Drop Forging Research Association, Sheffield Street, Sheffield.
2. Forging die design and practice by R. Sharam, S.N. Parsad, N.P. Saxena; S. Chand and Company. New Delhi.
3. Die, Mould and Jigs by V. Vladimi Rov, MIR. Publisher.
4. Forging and Forming metal by S.E. Rusinoff, S. Chand and Company, New Delhi.
5. Forging handbook by T.E. Byrer, American Society for metal.
6. Handbook of Die Design by Ivana Suchy; Mc Graw Hill.



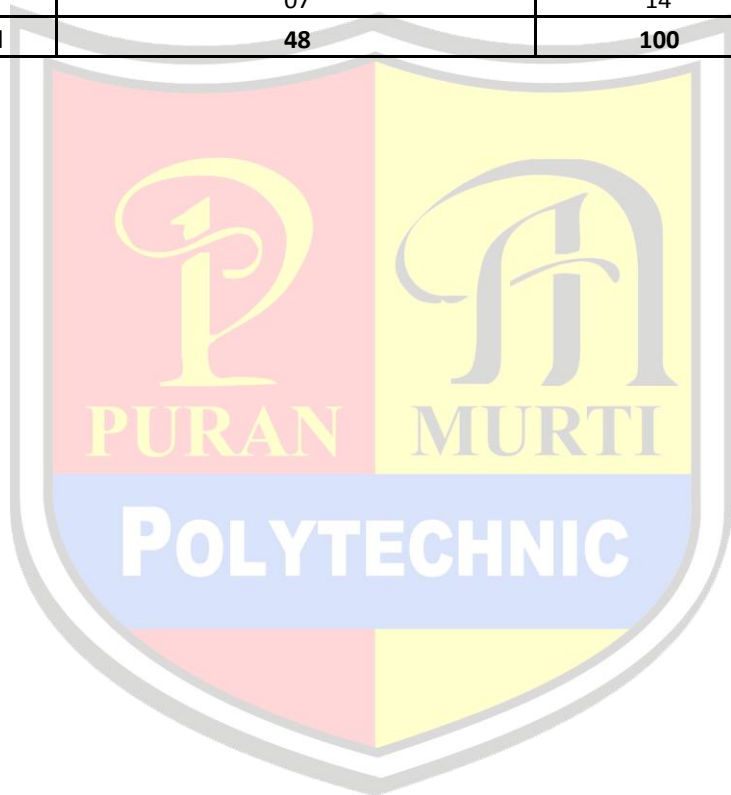
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SUGGESTED DISTRIBUTION OF MARKS

Unit No.	Time Allotted for Lectures (Periods)	Marks Allotted (%)
1	02	04
2	03	06
3	12	24
4	06	12
5	04	10
6	10	20
7	04	10
8	07	14
Total	48	100





Detailed Contents

Unit No. 1 Inspection

- Topic No.1: Introduction
- Topic No.2: company standard, line and wavelength standard
- Topic No.3: Planning of inspection
- Topic No.4: Types of inspection
- Topic No.5: factors influencing the quality of manufacture

Unit No. 2 Measurement and Gauging

- Topic No.6: Basic principles used in measurement and gauging
- Topic No.7: Study of various measuring instruments
- Topic No.8: Limit gauges
- Topic No.9: Geometrical parameters and errors, comparators,
- Topic No.10: Study of procedure for alignment test, Testing and maintenance of measuring instruments

Unit No. 3 Statistical Quality Control

- Topic No.11: Basic statistical concepts, Introduction to control charts and its application
- Topic No.12: Sampling plans, Inspection plan format and test reports

Unit No. 4 Modern Quality Concepts

- Topic No.13: Concept of total quality management (TQM), National and International Codes
- Topic No.14: ISO-9000, concept and its evolution
- Topic No.15: QC tools, Introduction to Kaizen, 5S

Unit No. 5 Instrumentation

- Topic No.16: Measurement of mechanical quantities

STUDY SCHEME			EVALUATION SCHEME						Total Marks
			Internal Assessment			External Assessment (Examination)			
Hrs/week			Theory	Practical	Written Paper		Practical		
L	T	P	Max. Marks	Max. Marks	Max. Marks	Hrs	Max. Marks	Hrs	
4	-	-	25	-	100	3	-	-	
125									

Text BOOKS

1. Inspection and Quality Control by North Publication
2. Inspection and Quality Control by Ishaan Publication

RECOMMENDED BOOKS

1. Statistical Quality Control by M.Mahajan: Dhanpat Rai and Sons, Delhi
2. Engineering Metrology by RK Jain
3. Engineering Metrology by RK Rajput; SK Kataria and Sons
4. Production Planning Control and Management by KC Jain & Aggarwal; Khanna Publishers, New Delhi.

SUGGESTED DISTRIBUTION OF MARKS

Unit No.	Time Allotted for Lectures (Periods)	Marks Allotted (%)
1	02	04
2	03	06
3	12	24
4	06	12
5	04	10
6	10	20
7	04	10
8	07	14
Total	48	100



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Subject: Inspection And Quality Control (Practical)

Subject Code: 31762(P)

List of Practical

1. Use of dial indicator for measuring taper
2. Use of combination set, bevel protector and sine bar for measuring taper
3. Measurement of thread characteristic using vernier and gauges
4. Use of slip gauge in measurement of center distance between two pins.
5. Use of slip gauge in measurement of center distance between two pins.
6. Plot frequency distribution for 50 turned components
7. With the help of given data, plot X, R, P and C charts

STUDY SCHEME			EVALUATION SCHEME						Total Marks
			Internal Assessment		External Assessment (Examination)				
Hrs/week			Theory	Practical	Written Paper		Practical		
L	T	P	Max. Marks	Max. Marks	Max. Marks	Hrs	Max. Marks	Hrs	
-	-	4	-	25	-	-	50	3	75





Detailed Contents

Unit No.1: Productivity

Topic No.1: Introduction to productivity, factors affecting productivity,

Topic No.2: Measurement of productivity, causes of low productivity and methods to improve productivity

UNIT NO.2 Work Study

Topic No.3: Definition and scope of work study

Topic No.4: Inter-relation between method study and work measurement;

Topic No.5: Human aspects of work study; Role of work study in improving productivity

UNIT NO.3 Method Study

Topic No.6: Objectives and procedure for Method analysis

Topic No.7: Information collection and recording techniques.

UNIT NO.4 Motion Analysis

Topic No.8: Principles of Motion analysis; Therbligs and SIMO charts;

Topic No.9: Normal work area and design of work places. Ergonomics

UNIT NO.5 Work Measurement

Topic No.10: Objectives; work measurement techniques, stop watch time study; principle

Topic No.11: equipment used and procedure; systems of performance rating; calculation of basic times;

Topic No.12: various allowances; calculation of standard time, work sampling standard data and its usage

UNIT NO.6 Wages and Incentive Schemes

Topic No.13: Introduction to wages, Wage payment for direct and indirect labor wage payment plans

Topic No.14: and incentives, various incentive plans, incentives for indirect labor.

UNIT NO.7 Production Planning and Control

Topic No.13: Introduction, objectives and components (functions) of P.P.C, Advantages of production planning and Production Control, stages of P.P.C, process planning,

Topic No.14: routing, scheduling, dispatching and follow up, routing purpose, route sheets, scheduling – purpose, machine loading chart, Gantt chart, dispatching

Topic No.15: purpose, and procedure, follow up – purpose and procedure. CPM/PERT technique,

Topic No.16: drawing of simple networks and critical time calculation. Production

Topic No.17: Control in job order, batch type and continuous type of productions.

Topic No.18: Difference between these controls

UNIT NO Estimating and Costing

Topic No.19: Introduction, purpose/functions of estimating, costing concept, ladder and elements of cost

Topic No.20: difference between estimation and costing. Overheads and their types,

Topic No.21: estimation of material cost, estimation of cost for machining processes, numerical problems

STUDY SCHEME			EVALUATION SCHEME						Total Marks
			Internal Assessment		External Assessment (Examination)				
Hrs/week			Theory	Practical	Written Paper		Practical		
L	T	P	Max. Marks	Max. Marks	Max. Marks	Hrs	Max. Marks	Hrs	
4	-	-	25	-	100	3	-	-	125

Text BOOKS

1. Industrial Engineering by Eagle Publication
2. Industrial Engineering by North Publication

RECOMMENDED BOOKS

1. Work Study and Ergonomics by S Dalela and Sourabh
2. Industrial Engineering and Management by O.P. Khanna Dhanpat Rai and Sons, Delhi.123
3. Industrial Engineering and Management by M. Mahajan; Dhanpat Rai and Sons, New Delhi.



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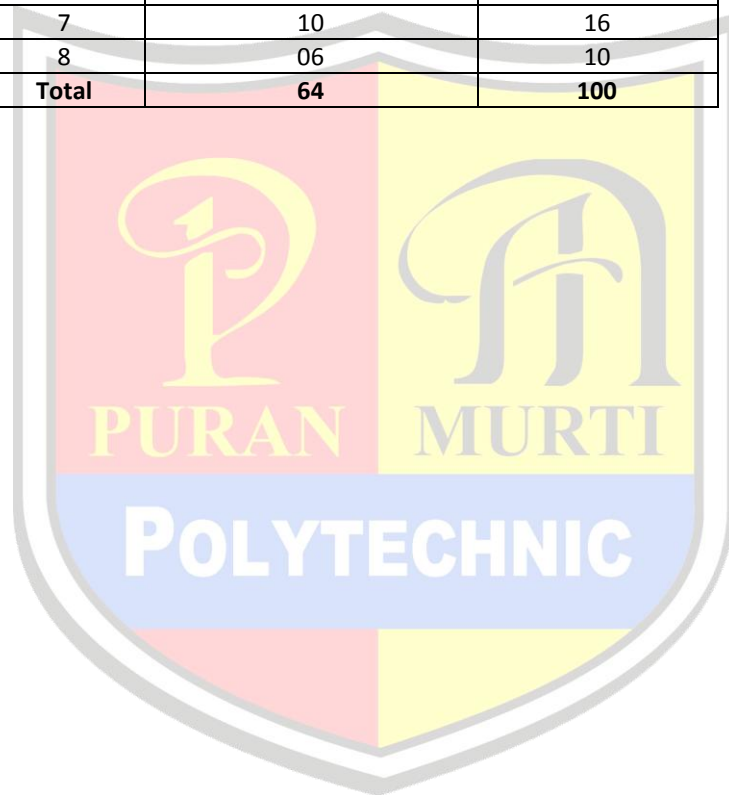
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INSTRUCTIONAL STRATEGY

1. Teacher should use models and encourage students to develop some other suitable model.
2. The teacher should observe and redress the difficulties faced by students in performing the work while working on ergonomically good and poorly designed workstation.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs.)	Marks Allotted (%)
1	06	10
2	14	20
3	08	12
4	06	10
5	10	16
6	04	06
7	10	16
8	06	10
Total	64	100





Detailed Contents

Unit No. 1 Introduction

- Topic No.1: Concept /Meaning and Its Need, Qualities And Functions Of Entrepreneur And Barriers In Entrepreneurship
- Topic No.2: Sole Proprietorship and Partnership Forms Of Business Organization Schemes Of Assistance By Entrepreneurial Support
- Topic No.3: Agencies At National, State, and District Level: Nsic, Nrdc, Sidbi, Nabard, Commercial Banks, SFC's

Unit No. 2

- Topic No.4: Scanning of Business Environment
- Topic No.5: Salient Features of National and State Industrial Policies and Resultant Business Opportunities
- Topic No.6: Types and Conduct of Market Survey, Assessment Of Demand And Supply In Potential Areas Of Growth
- Topic No.7: Identifying Business Opportunity Considerations In Product Selection

Unit No. 3

- Topic No.8: Meaning of Project Report, Significance Of Project Report
- Topic No.9: Preliminary Project Report, Detailed Project Report
- Topic No.10: Feasibility Study, Common Errors In Project Formulation

Unit No. 4

- Topic No.11 Definitions and Importance Of Management, Functions Of Management
- Topic No.12: Principles of Management (Henri Fayol, F.W, Concept and Structure Of An Organization Or Levels Of Management
- Topic No.13: Types of Industrial Organizations

Unit No. 5

- Topic No.14: Leadership, Importance of Leadership, Characteristics of Leaders and Types of Leadership
- Topic No.15: Difference between Manager and Leader, Definitions of Motivation, Characteristics of Motivation
- Topic No.16: Factors Affecting Motivation Theories of Motivation (Maslow, Herzberg)

Unit No. 6

- Topic No.17 Human Resource Management Manpower Planning Recruitment
- Topic No.18: Performance Appraisal Materials Management Inventory Management Marketing Management
- Topic No. 19 Sales Promotion Financial Management Taxation

Unit No. 7

- Topic No.20: Customer Relation Management (CRM) & Total Quality Management (TQM)
- Topic No.21 Intellectual Property Right (IPR)
- Topic No.22: Construction, Working And Operation Of Centrifugal Pump. Performance

STUDY SCHEME			EVALUATION SCHEME						Total Marks
			Internal Assessment		External Assessment (Examination)				
Hrs/week			Theory	Practical	Written Paper		Practical		
L	T	P	Max. Marks	Max. Marks	Max. Marks	Hrs	Max. Marks	Hrs	
3	-	-	25	-	100	3	-	-	125

Text BOOKS

1. Entrepreneurship Development by BSW Publication
2. Entrepreneurship Management by Eagle Publication



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RECOMMENDED BOOKS

1. A Handbook of Entrepreneurship, Edited by BS Rathore and Dr JS Saini; Aapga Publications, Panchkula (Haryana)
2. Entrepreneurship Development published by Tata McGraw Hill Publishing Company Ltd., New Delhi
3. Entrepreneurship Development in India by CB Gupta and P Srinivasan; Sultan Chand and Sons, New Delhi
4. Entrepreneurship Development - Small Business Enterprises by Poornima M Charantimath; Pearson Education, New Delhi
5. Entrepreneurship: New Venture Creation by David H Holt; Prentice Hall of India Pvt. Ltd., New Delhi
6. Handbook of Small Scale Industry by PM Bhandari
7. Principles and Practice of Management by L M Prasad; Sultan Chand & Sons, NewDelhi.

INSTRUCTIONAL STRATEGY

Some of the topics may be taught using question/answer, assignment or seminar method. The teacher will discuss stories and case studies with students, which in turn will develop appropriate managerial and entrepreneurial qualities in the students. In addition, expert lecturers may also be arranged from outside experts and students may be taken to nearby industrial organisations on visit. Approach extracted reading and handouts may be provided.

SUGGESTED DISTRIBUTION OF MARKS

Unit No.	Time Allotted for Lectures (Periods)	Marks Allotted (%)
1	04	08
2	07	16
3	08	16
4	08	16
5	05	15
6	06	15
7	10	16
Total	48	100



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Subject: Employability Skills – II (Practical)

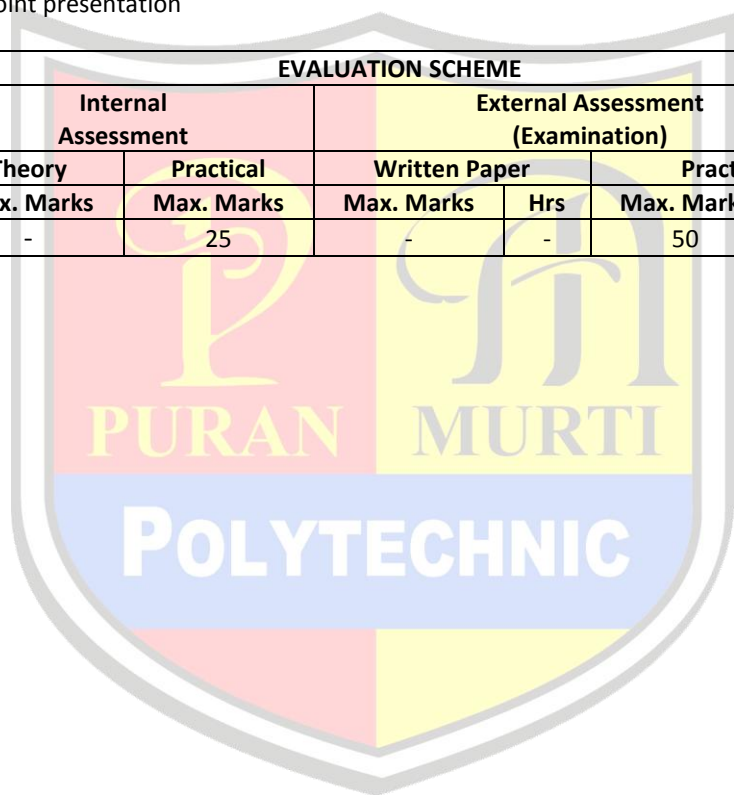
Subject Code: Emp. Skill-II (P)

List of Practical

Oral Practice

1. Mock interview
2. Preparing for meeting
3. Group discussion
4. Seminar presentation
5. Making a presentation
 - a) Elements of good presentation
 - b) Structure and tools of presentation
 - c) Paper reading
 - d) Power point presentation

STUDY SCHEME			EVALUATION SCHEME						Total Marks
			Internal Assessment		External Assessment (Examination)				
Hrs/week			Theory	Practical	Written Paper		Practical		
L	T	P	Max. Marks	Max. Marks	Max. Marks	Hrs	Max. Marks	Hrs	
-	-	4	-	25	-	-	50	3	75





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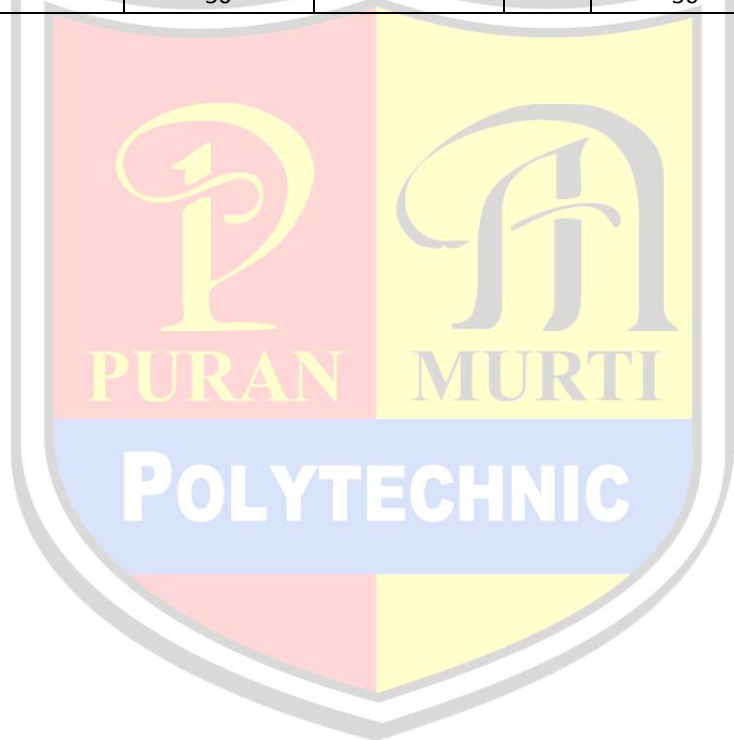
Subject: Tool Room Practice (Practical)

Subject Code: 120153 (P)

List of Practical

1. Fabrication of Press Tool, Washer, Hinge etc.
2. Fabrication of Jigs & Fixture, Drilling Jig and Milling Fixture.
3. Fabrication of Machine moulds, Coaster Cover and Carom board Striker.
4. Fabrication of Die casting dies for Aluminum parts.

STUDY SCHEME			EVALUATION SCHEME						Total Marks
			Internal Assessment		External Assessment (Examination)				
Hrs/week			Theory	Practical	Written Paper		Practical		
L	T	P	Max. Marks	Max. Marks	Max. Marks	Hrs	Max. Marks	Hrs	
-	-	4	-	50	-	-	50	3	100





Detailed Contents

Project work aims at developing skills in the students whereby they apply the totality of knowledge and skills gained through the course in the solution of particular problem or undertaking a project. The students have various aptitudes and strengths. Project work, therefore, should match the strengths of students. For this purpose, students should be asked to identify the type of project work, they would like to execute. It is also essential that the faculty of the respective department may have a brainstorming session to identify suitable project assignments. The project assignment can be individual assignment or a group assignment. The students should identify the project at least two to three months in advance. The project work identified in collaboration with industry may be preferred.

Each teacher is expected to guide the project work of 5-6 students.

- Projects related to increasing productivity
- Projects related to quality assurance
- Projects related to estimation and economics of production
- Projects connected with repair and maintenance of plant and equipment
- Projects related to identification of raw material thereby reducing the wastage
- Any other related problems of interest of host industry

A suggestive criteria for assessing student performance by the external (personnel from industry) and internal (teacher) examiner is given in table below:

Sr. No.	Performance criteria	Max. marks	Rating Scale				
			Excellent	Very good	Good	Satisfactory	Poor
1.	Selection of project assignment	10	10	8	6	4	2
2.	Planning and execution of considerations	10	10	8	6	4	2
3.	Quality of performance	20	20	16	12	8	4
4.	Providing solution of the problems or production of final product	20	20	16	12	8	4
5.	Sense of responsibility	10	10	8	6	4	2
6.	Self expression/ communication skills	5	5	4	3	2	1
7.	Interpersonal skills/human relations	5	5	4	3	2	1
8.	Report writing skills	10	10	8	6	4	2
9.	Viva voce	10	10	8	6	4	2
Total marks		100	100	80	60	40	20



The overall grading of the practical training shall be made as per following table

	Range of maximum marks	Overall grade
i)	More than 80	Excellent
ii)	65-80	Very good
iii)	50-64	Good
iv)	41-49	Fair
v)	Less than 40	Poor

In order to qualify for the diploma, students must get "Overall Good grade" failing which the students may be given one more chance of undergoing 8 -10 weeks of project oriented professional training in the same industry and re-evaluated before being disqualified and declared "not eligible to receive diploma". It is also important to note that the students must get more than six "goods" or above "good" grade in different performance criteria items in order to get "Overall Good" grade.

Important Notes

1. This criterion must be followed by the internal and external examiner and they should see the daily, weekly and monthly reports while awarding marks as per the above criteria.
2. The criteria for evaluation of the students have been worked out for 100 maximum marks. The internal and external examiners will evaluate students separately and give marks as per the study and evaluation scheme of examination.
3. The external examiner, preferably, a person from industry/organization, who has been associated with the project-oriented professional training of the students, should evaluate the students performance as per the above criteria.
4. It is also proposed that two students or two projects which are rated best be given merit certificate at the time of annual day of the institute. It would be better if specific nearby industries are approached for instituting such awards.

The teachers are free to evolve another criterion of assessment, depending upon the type of project work.

It is proposed that the institute may organize an annual exhibition of the project work done by the students and invite leading Industrial organizations in such an exhibition. It is also proposed that two students or two projects which are rated best be given merit certificate at the time of annual day of the institute. It would be better if specific industries are approached for instituting such awards.

STUDY SCHEME			EVALUATION SCHEME						Total Marks
			Internal Assessment		External Assessment (Examination)				
Hrs/week			Theory	Practical	Written Paper		Practical		
L	T	P	Max. Marks	Max. Marks	Max. Marks	Hrs	Max. Marks	Hrs	
-	-	15	-	100	-	-	100	3	200