



**SCHEME FOR
SIXTH SEMESTER (AIRCRAFT MAINTENANCE ENGINEERING)**

Sr. No	Subject	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	
6.1	Turbo Propeller and Turbo Jet Engine - II	5	-	2	25	25	100	3	50	3	200
6.2	Aircraft Avionics	3	-	2	25	25	100	3	50	3	200
6.3 *	Employability Skills – II	-	-	2	-	25	-	-	50	3	75
6.4 *	Environmental Education	3	-	-	25	-	100	3	-	-	125
6.5 *	Entrepreneurship Development and Management	3	-	-	25	-	100	3	-	-	125
6.6	Project-Oriented Professional Training	-	-	16	-	100	-	-	100	3	200
Student Centred Activities #		-	-	4	-	25	-	-	-	-	25
Total		14	-	26	100	200	400	-	250	-	950

* Common with other diploma programmes

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.



SYLLABUS: Polytechnic (AME)

Department: Aircraft Maintenance Engineering– 6th Semester

Subject: Turbo Propeller and Turbo Jet Engine- II (Theory)

Subject Code:

DETAILED CONTENTS

Unit No.1. Gas turbine fuels, fuel system & controls.

Unit No.2. Starting and ignition system.

Unit No.3. Lubricants and lubricating system.

Unit No.4. Thrust augmentation including water methanol/power boosting system and after burner or reheat engines.

Unit No.5. Thrust reversal system.

Unit No.6. Dressing and installation of gas turbine engines.

Unit No.7. Operation, Maintenance and Overhaul of gas turbine engines.

Unit No.8. Ground running and power assessment procedure.

Unit No.9. Engine controls and rigging.

Unit No.10. Specific engine P & W PIGA series engine.

Topic No.1: Construction features, air system

Topic No.2: Fuel system, oil system, ignition system, starting system, exhaust system,

Topic No.3: Propeller system, indication system, fire protection system, anti- icing/de-icing system

Topic No.4: Engine installation procedure engine control and rigging procedures power assessment Engine trimming

Unit No.11. Engine inspection procedure

Topic No.5: Compressor inspection and maintenance.

Topic No.6: Hot section inspection: inspection of combustion chamber

Topic No.7: Inspection of nozzle guide vanes, inspection of turbine

Topic No.8: inspection of temperature indication system, inspection of exhaust system.

Unit No.12. Effects of sound and air pollutions on human beings due to light and heavy aircrafts

STUDY SCHEME	EVALUATION SCHEME								Total Marks
	Internal Assessment			External Assessment (Examination)					
	Theory			Practical	Written Paper		Practical		
L	T	P	Max. Marks	Max. Marks	Max. Marks	Hrs	Max. Marks	Hrs	
5	-	-	25	-	100	3	-	-	125

INSTRUCTIONAL STRATEGY

Teacher should introduce basic concepts and salient features of engine components of jet propelled engines which are operated in atmosphere to the students. They should familiarize students with advanced jet propulsion methods like hypersonic propulsion. Use simulation methods to demonstrate actual working of an engine. Teacher should discuss actual jet engine problems and their impact on engine performance.

TEXT BOOKS:

1. General Hand Books of Airframe and Power Plant Mechanics, U.S. Dept. of Transportation, Federal Aviation Administration, The English Book Store, New Delhi, 1995.
2. Aircraft Power Plants by Mekinley, J.L. and Bent, R.D; McGraw-Hill, 1993.
3. Gas Turbine Technology by Treager, S.; McGraw-Hill, 1997.
4. Airframe and Power Plant Mechanics (EA-AC 65-9A)-General Hand Book.



REFERENCE BOOKS:

1. Mechanics & Thermodynamics of Propulsion by Hill, P.G. & Peterson, C.R.; Addison – Wesley Longman INC, 1999.
2. Aerospace Propulsion System by James Award
3. Gas Turbine Theory by Cohen, H. Rogers, G.F.C. and Saravana muttoo, H.I.H.; Longman, 1989.
4. Aero thermodynamics of Aircraft Engine Components by Oates, G.C.; AIAA Education Series, New York, 1985.
5. Jet Engine, 5th Edition by Rolls Royce; Rolls Royce Technical Publications, 2005.
6. Gas Turbine, Jet and Rocket Propulsion by Mathur, M.L. and Sharma, R.P.; Standard Publishers & Distributors, Delhi, 1999.
7. Aerospace Propulsion System by James Award.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	08	10
2	04	06
3	04	06
4	04	06
5	08	10
6	08	10
7	06	08
8	06	08
9	04	04
10	16	16
11	08	10
12	04	06
Total	80	100



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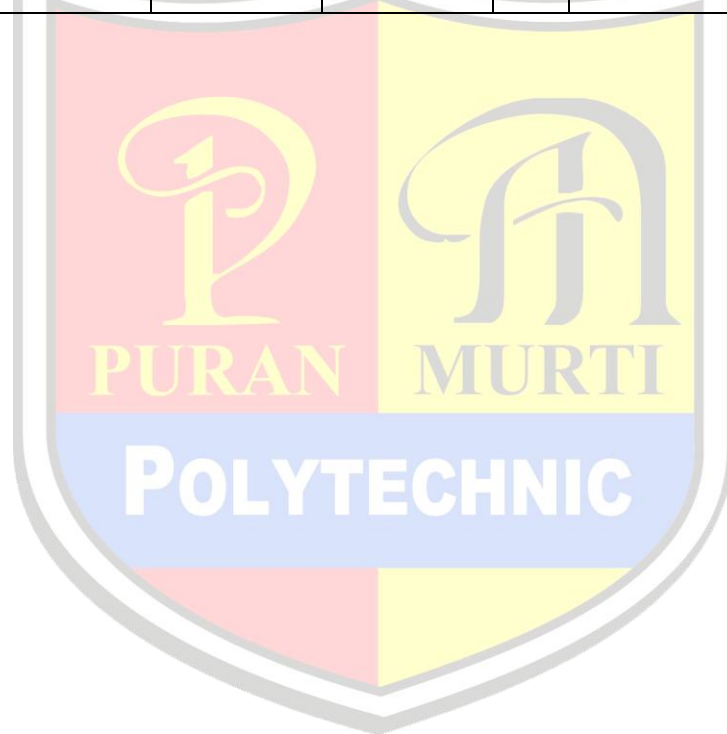
Subject: Turbo Propeller and Turbo Jet Engine- II (Theory)

Subject Code:

LIST OF PRACTICALS

1. Condition monitoring of a Jet Engine.
2. Inspection of accessories gear system.
3. Functional test of fuel system including fuel nozzle.
4. Functional check of temperatures indication system.
5. Rigging procedure of engine and propeller control.
6. Functional test of ignition igniter

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	
-	-	2	-	25	-	-	50	3	75





DETAILED CONTENTS

Unit No.1 Introduction to Avionics Sub Systems and Electronic Circuits

- Topic No.1: Typical avionics subsystems
- Topic No.2: Amplifier, oscillator
- Topic No.3: Aircraft communication system
- Topic No.4: Transmitter, receiver, antenna

Unit No.2 Avionics Technology

- Topic No.5: The nature of microelectronic devices: Processors , Memory devices
- Topic No.6: Digital data buses
- Topic No.7: Data bus examples – integration of aircraft systems
- Topic No.8: Regional aircraft/business jets, Fibre-optic buses
- Topic No.9: Avionics packaging – Line Replaceable Units
- Topic No.10: Typical LRU architecture
- Topic No.11: Environmental conditions, Integrated Modular Avionics

Unit No.3 Navigation System and Radar

- Topic No.12: Electrical diagram and identification scheme
- Topic No.13: Circuit controlling devices
- Topic No.14: Power utilization-typical application to avionics
- Topic No.15: Need for avionics in civil and military aircraft
- Topic No.16: Gyroscopic versus inertial platform
- Topic No.17: Structure of stable platform, inertial navigation units
- Topic No.18: Inertial alignment, inertial interface system
- Topic No.19: Importance of compass swing

Unit No.4 Electronic Flight Control System

- Topic No.20: Fly-by-wire system: - basic concept and features
- Topic No.21: Pitch and Roll rate: - command and response
- Topic No.22: Control laws, frequency response of a typical Fly By Wire actuator
- Topic No.23: Cooper harper scale, redundancy and failure survival
- Topic No.24: Common mode of failures and effects analysis

Unit No.5 Flight Deck and Cockpits

- Topic No.25: Control and display technologies
- Topic No.26: Cathode Ray Tube, Light Emitting Diode
- Topic No.27: Plasma panel - Touch screen
- Topic No.28: Direct voice input (DVI) – Civil cockpit and military cockpit
- Topic No.29: Multi function display, Head Up Display
- Topic No.30: Multi Function Keyboard

Unit No.6. Avionics Systems Integration

- Topic No.31: Avionics equipment fit
- Topic No.32: Electrical data bus system
- Topic No.33: Communication systems, navigation systems
- Topic No.34: Flight control systems, radar, electronic warfare
- Topic No.35: Fire control systems, avionics system architecture–data buses MIL–STD 1553 B.

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	



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INSTRUCTIONAL STRATEGY

Teachers should:

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

TEXT BOOKS

1. Introduction to Avionics Systems by R P G Collinson; Kulwar Academic Publishers, 2003
2. Aircraft Electrical System by E H J Pallett; Pitman Publishers, 1976
3. Avionics Systems by Middleton, D.H., Ed.; Longman Scientific and Technical Longman Group UK Ltd., England, 1989.
4. Digital Avionic Systems by Spitzer, C.R.; Prentice Hall, Englewood Cliffs, N.J., USA, 1987.
5. Navigation by R.B. Underdown & Tony Palmer; Black Well Publishing 2001.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (hrs)	Marks Allotted (%)
1.	04	08
2.	10	22
3.	08	18
4.	08	16
5.	10	20
6.	08	16
Total	48	100



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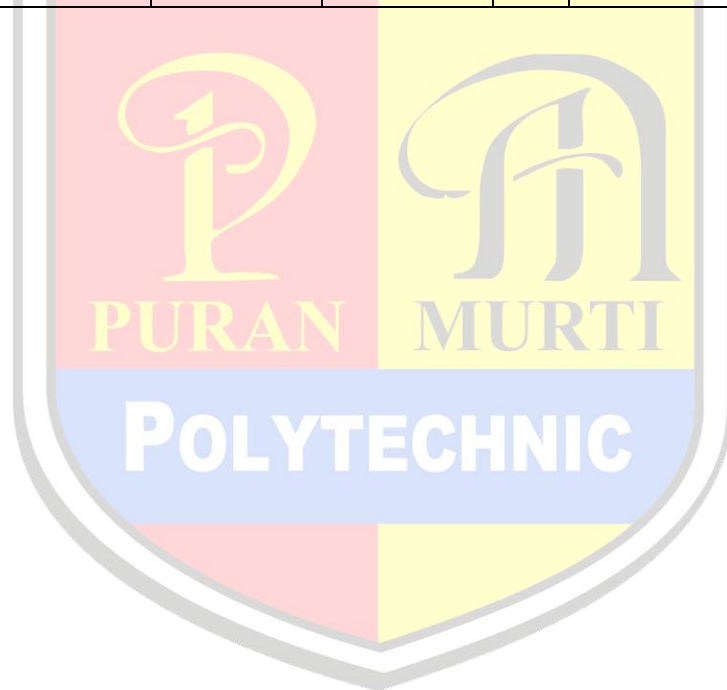
Subject: Aircraft Avionics (Practical)

Subject Code:

LIST OF PRACTICALS

1. Study and demonstration of electronics flight systems.
2. Study and demonstration of communication and navigational systems.
3. Study and demonstration of Pitch and roll system.
4. Study and demonstration of amplifiers and oscillator of aircraft.
5. Study and demonstration of transmitters & antennas.

			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	
-	-	2	-	25	-	-	50	3	75



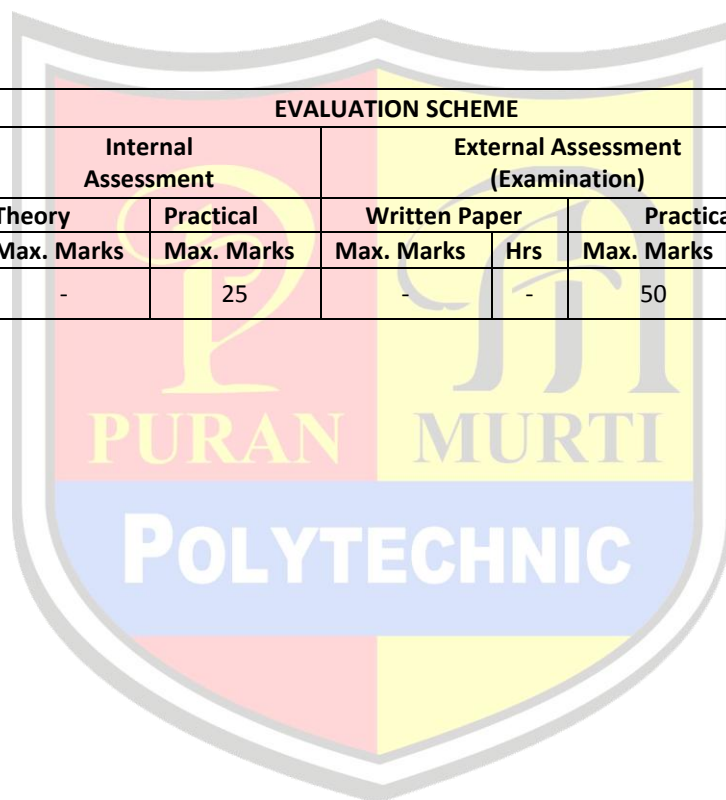


DETAILED CONTENTS

1. Oral Practice

- i) Mock interview
- ii) Preparing for meeting
- iii) Group discussion
- iv) Seminar presentation
- v) 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	
-	-	2	-	25	-	-	50	3	75





DETAILED CONTENTS

Unit No.1 Definition, Scope and Importance of Environmental Education

Unit No.2 Basics of ecology, biodiversity, eco system and sustainable development

Unit No.3 Sources of pollution

Topic No.1: Natural and manmade, causes, effects

Topic No.2: Control measures of pollution (air, water, noise, soil, radioactive and nuclear)

Topic No.3: Their units of measurement

Unit No.4 Solid waste management – Causes, effects and control measures of urban and industrial waste

Unit No. 5 Mining and deforestation – Causes, effects and control measures

Unit No.6 Environmental Legislation

Topic No.4: Water (prevention and control of pollution) Act 1974

Topic No.5: Air (Prevention and Control of Pollution) Act 1981 and Environmental Protection Act 1986

Topic No.6: Role and Function of State Pollution Control Board

Topic No.7: Environmental Impact Assessment (EIA)

Unit No.7 Role of Non-conventional Energy Resources (Solar Energy, Wind Energy, Bio Energy, Hydro Energy)

Unit No.8 Current Issues in Environmental Pollution

Topic No.8: Global Warming, Green House Effect

Topic No.9: Depletion of Ozone Layer, Recycling of Material

Topic No.10: Environmental Ethics, Rain Water Harvesting

Topic No.11: Maintenance of Groundwater, Acid Rain, Carbon Credits

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

INSTRUCTIONAL STRATEGY

In addition, different activities pertaining to Environmental Education like expert lectures, seminar and awareness camps etc. may also be organized.

TEXT BOOKS:

1. Environmental and Pollution Awareness by Sharma BR; Satya Prakashan, New Delhi.
2. Environmental Protection Law and Policy in India by Thakur Kailash; Deep and Deep Publications, New Delhi.
3. Environmental Engineering and Management by Suresh K Dhamija; SK Kataria and Sons, New Delhi.
4. Environmental Science by Deswal and Deswal; Dhanpat Rai and Co. (P) Ltd. Delhi.
5. Engineering Chemistry by Jain and Jain; Dhanpat Rai and Co. (P) Ltd. Delhi.
6. Environmental Studies by Erach Bharucha; UGC University Press
7. Basic Environmental Engineering by R.C. Gaur; New Age International Publishers, New Delhi.

SUGGESTED DISTRIBUTION OF MARKS

Topic 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: Entrepreneurship Development and Management (Theory)

Subject Code:

DETAILED CONTENTS

Unit No.1 Introduction

- Topic No.1: Concept /Meaning and its need
- Topic No.2: Qualities and functions of entrepreneur and barriers in Entrepreneurship
- Topic No.3: Sole proprietorship and partnership forms of business Organizations
- Topic No.4: Schemes of assistance by entrepreneurial support Agencies at National, State, District level NSIC, NRDC
- Topic No.5: DC: MSME
- Topic No.6: SIDBI, NABARD, Commercial Banks,
- Topic No.7: SFC's TCOs, KVIB, DIC,
- Topic No.8: Technology Business Incubator (TBI)
- Topic No.9: Science and Technology Entrepreneur Parks (STEP).

Unit No.2 Market Survey and Opportunity Identification

- Topic No.10: Scanning of business environment
- Topic No.11: Salient features of National and State industrial policies and resultant business opportunities
- Topic No.12: Types and conduct of market survey
- Topic No.13: Assessment of demand and supply in potential areas of Growth
- Topic No.14: Identifying business opportunity
- Topic No.15: Considerations in product selection

Unit No.3 Project report Preparation

- Topic No.16 Preliminary project report
- Topic No.17 Detailed project report including technical, economic and market feasibility
- Topic No.18 Common errors in project report preparations
- Topic No.19 Exercises on preparation of project report

SECTION –B MANAGEMENT

Unit No.4 Introduction to Management

- Topic No.20: Definitions and importance of management
- Topic No.21: Functions of management: Importance and Process of Planning, organizing, staffing, directing and controlling
- Topic No.22: Principles of management (Henri Fayola, F.W. Taylor)
- Topic No.23: Concept and structure of an organization
- Topic No.24: Types of industrial organizations: Line organization, Line and staff organisation, Functional Organisation

Unit No.5 Leadership and Motivation

- Topic No.25: Leadership: Definition and Need, Qualities and functions of a leader, Manager Vs leader, Types of leadership
- Topic No.26: Motivation: Definitions and characteristics, Factors affecting motivation, Theories of motivation (Maslow, Herzberg, McGregor)

Unit No.6 Management Scope in Different Areas

- Topic No.:27 Human Resource Management: Introduction and objective, Introduction to Man power planning, recruitment And selection, Introduction to performance appraisal methods
- Topic No.28: Material and Store Management: Introduction functions, and objectives, ABC Analysis and EOQ
- Topic No.29: Marketing and sales: Introduction, importance, and its functions, Physical distribution, Introduction to Promotion mix, Sales promotion
- Topic No.30: Financial Management: Introductions, importance and its functions, Elementary knowledge of income tax, sales tax, excise duty, custom duty and VAT

Unit No.7 Miscellaneous Topics

- Topic No.31: Customer Relation Management (CRM): Definition and need, Types of CRM
- Topic No.32: Total Quality Management (TQM): Statistical process control, Total employees Involvement, Just in time (JIT)
- Topic No.33: Intellectual Property Right (IPR): Introductions, definition and its importance, Infringement related to patents, Copy right, trade Mark



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

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.

REFERENCE BOOKS

1. Soft Skills for Interpersonal Communication by S.Balasubramaniam; 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

TEXT BOOKS:

1. A Handbook of Entrepreneurship, Edited by BS Rathore and Dr JS Saini; Aapga Publications, Panchkula (Haryana)
2. Entrepreneurship Development by CB Gupta and P Srinivasan, Sultan Chand and Sons, New Delhi
3. Handbook of Small Scale Industry by PM Bhandari

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	14	28
2	10	20
3	08	16
4	04	10
5	03	06
6	06	14
7	03	06
Total	48	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 and better services
- Projects related to quality assurance
- Projects related to estimation and economics of production and services
- Projects connected with repair and maintenance of plant and equipment and aircraft
- 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	Satis- factory	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



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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 criteria 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 criteria 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	
-	-	16	-	100	-	-	100	3	200