

6.1 ENTREPRENEURSHIP DEVELOPMENT AND MANAGEMENT

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Periods per week 5 - -

RATIONALE

In the present day scenario, it has become imperative to impart entrepreneurship and management concepts to students so that a significant percentage of them can be directed towards setting up and managing their own small enterprises. This subject focuses on imparting the necessary competencies and skills of enterprise set up and its management.

DETAILED CONTENTS

SECTION – A ENTREPRENEURSHIP

1. Introduction (23 periods)
 - Concept /Meaning and its need
 - Qualities and functions of entrepreneur and barriers in entrepreneurship
 - Sole proprietorship and partnership forms of business organisations
 - Schemes of assistance by entrepreneurial support agencies at National, State, District level: NSIC, NRDC, DC:MSME, SIDBI, NABARD, Commercial Banks, SFC's TCO, KVIB, DIC, Technology Business Incubator (TBI) and Science and Technology Entrepreneur Parks (STEP)

2. Market Survey and Opportunity Identification (17 periods)
 - Scanning of business environment
 - Salient features of National and State industrial policies and resultant business opportunities
 - Types and conduct of market survey
 - Assessment of demand and supply in potential areas of growth
 - Identifying business opportunity
 - Considerations in product selection

3. Project report Preparation (14 periods)
 - Preliminary project report
 - Detailed project report including technical, economic and market feasibility
 - Common errors in project report preparations
 - Exercises on preparation of project report

SECTION –B MANAGEMENT

4. Introduction to Management (06 periods)
 - Definitions and importance of management
 - Functions of management: Importance and Process of planning, organising, staffing, directing and controlling
 - Principles of management (Henri Fayol, F.W. Taylor)
 - Concept and structure of an organisation
 - Types of industrial organisations
 - a) Line organisation
 - b) Line and staff organisation
 - c) Functional Organisation

5. Leadership and Motivation (05 periods)
- a) Leadership
- Definition and Need
 - Qualities and functions of a leader
 - Manager Vs leader
 - Types of leadership
- b) Motivation
- Definitions and characteristics
 - Factors affecting motivation
 - Theories of motivation (Maslow, Herzberg, McGregor)
6. Management Scope in Different Areas (10 periods)
- a) Human Resource Management
- Introduction and objective
 - Introduction to Man power planning, recruitment and selection
 - Introduction to performance appraisal methods
- b) Material and Store Management
- Introduction functions, and objectives
 - ABC Analysis and EOQ
- c) Marketing and sales
- Introduction, importance, and its functions
 - Physical distribution
 - Introduction to promotion mix
 - Sales promotion
- d) Financial Management
- Introductions, importance and its functions
 - Elementary knowledge of income tax, sales tax, excise duty, custom duty and VAT
7. Miscellaneous Topics (05 periods)
- a) Customer Relation Management (CRM)
- Definition and need
 - Types of CRM
- b) Total Quality Management (TQM)
- Statistical process control
 - Total employees Involvement
 - Just in time (JIT)
- c) Intellectual Property Right (IPR)
- Introductions, definition and its importance
 - Infringement related to patents, copy right, trade mark

Note: In addition, different activities like conduct of entrepreneurship awareness camp extension lecturers by outside experts, interactions sessions with entrepreneurs and industrial visits may also be organised.

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.

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, New Delhi.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
1	23	30
2	17	20
3	14	15
4	6	10
5	5	05
6	10	15
7	5	05
Total	80	100

6.2 ADVANCED MACHINE DESIGN

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RATIONALE

This is the second course for the students of Mechanical Engineering. Application of the basic design principles for the component design of different machine parts should be emphasized.

DETAILED CONTENTS

1. Introduction (02 period)
 - Review of the design principle under static, impact and cyclic loading

2. Design of power transmission systems (20 period)
 - (i) Design of flat belts, V belts selection procedure
 - Design of pulleys
 - Design of chain drives
 - Design of rope drives
 - (ii) Manufacturing methods of gear
 - Gear tooth profiles
 - Types of gear drives, selection of gear drives
 - Design of spur gears, helical, bevel and worm gears

3. Selection of rolling contact bearing (10 period)
 - Types of rolling contact bearing, their nomenclature Selection of bearing from SKF or TATA bearing of simple kind like ball, roller under axial and or thrust loading

4. Journal bearing (05 period)
 - Sliding contact bearing, terms used in journal bearing, Explain the use of Design charts

5. Design of brakes (10 period)
 - Different types of braking systems Braking materials Design of simple shoe and band brake

6. Design of flywheels (10 period)
 - Function of flywheel, Stresses in flywheel, Design of flywheel

7. Designing clutches
 - Design procedure for positive clutches, Design of friction clutches, Design of cone clutch

INSTRUCTIONAL STRATEGY

Teacher should lay emphasis on conceptual understanding and design aspects of various parts/components. Various models should be demonstrated in the class to explain mechanism

RECOMMENDED BOOKS

1. Machine Design- Fundamentals and Practices, by P C Gope, PHI Learning Pvt Limited, New Delhi. 2012
2. A Text Book of Machine Design by RS Khurmi & JKGupta, Eurasia Publishing House, Pvt. Ltd., New Delhi
3. Introduction to Machine Design by VB Bhandari, TMH, Delhi
4. Theory of Machines by PL Ballaney, Khanna Publishers, New Delhi
5. Theory of Machines by DR Malhotra & HC Gupta, Satya Prakashan, Delhi

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time allotted (period)	Marks Allotted (%)
1	2	05
2	20	25
3	10	20
4	05	10
5	10	10
6	10	10
7	15	20
Total	72	100

RATIONALE

The development of automobile industry direct and indirect dependence of the present day society on the services of its products has made the knowledge of the technology imperative, this subject deals with automotive needs.

DETAILED CONTENTS

1. INTRODUCTION (06 Periods)

- 1.1 Definitions and specifying an automobile
- 1.2 Automobile development and scope
- 1.3 Components of an automobile
- 1.4 Classification of automobiles
- 1.5 Layout of chassis
- 1.6 Types of drives-front wheel, rear wheel, four wheel left hand, right hand
- 1.7 Body or super structure

2. TRANSMISSION SYSTEM (20 Periods)

2.1 CLUTCH

- 2.1.1 Function
- 2.1.2 Constructional details of single plate and multi plate friction clutch
- 2.1.3 Centrifugal and semi centrifugal clutch
- 2.1.4 Hydraulic operation of single plate clutch
- 2.1.5 Clutch troubles

2.2 GEAR BOX

- 2.2.1 4-speed gear box
- 2.2.2 Gear ratios
- 2.2.3 Working of sliding mesh, constant mesh and synchromesh 4-speed gear box
- 2.2.4 Torque converter and overdrive
- 2.2.5 Transfer box

2.3 Propeller shaft and rear axle

- 2.3.1 Function
- 2.3.2 Universal joint
- 2.3.3 Final drive and differential assembly
- 2.3.4 Front driving axles
- 2.3.5 Real axle drives and different types of rear axles

2.4 WHEELS AND TYRES

- 2.4.1 Types of wheels- disc wheel, wire wheel and alloy cast wheel
- 2.4.2 Types of tyres used in Indian vehicles
- 2.4.3 Toe in, Toe out, camber, caster, kingpin inclination
- 2.4.4 Tubeless tyres

- 3. STEERING SYSTEM** **(11 Periods)**
- 3.1 Function and principle
 - 3.2 Ackerman and Davis steering gears
 - 3.3 Types of steering gears – worm and ball nut, worm and wheel, worm and roller, rack and pinion type
 - 3.4 Power steering
 - 3.5 Wheel balancing
 - 3.6 Wheel alignment
- 4. BRAKING SYSTEM** **(11 Periods)**
- 4.1 Constructional details and working of mechanical, hydraulic and vacuum brake
 - 4.2 Details of master cylinder, wheel cylinder
 - 4.3 Concept of brake drum, brake lining and brake adjustment
 - 4.4 Air brake, Emergency and Parking brake
 - 4.5 Anti-lock braking system
- 5. SUSPENSION SYSTEM** **(07 Periods)**
- 5.1 Function
 - 5.2 Types
 - 5.3 Working of coil spring, leaf spring, rubber springs
 - 5.4 Shock absorber- telescopic type
 - 5.5 Air suspension
 - 5.6 Strut suspension
- 6. BATTERY** **(09 Periods)**
- 6.1 Principles of battery operation
 - 6.2 Constructional details of lead acid cell battery
 - 6.3 Specific gravity of electrolyte – effect of temperature on specific gravity
 - 6.4 Capacity and efficiency of battery
 - 6.5 Battery charging, chemical reactions during charge and discharge
 - 6.6 Maintenance of Batteries
 - 6.7 Checking of batteries for voltage and specific gravity
 - 6.8 Battery leakage test
- 7. DYNAMO and ALTERNATOR** **(08 Periods)**
- 7.1 DYNAMO
 - 7.1.1 Function and details
 - 7.1.2 Regulator – voltage current and compensated type
 - 7.1.3 Cutout – construction, working and their adjustment
 - 7.2 ALTERNATOR
 - 7.2.1 Construction and working
 - 7.2.2 Charging of battery from alternator

8. LIGHTING SYSTEM and ACCESSORIES

(08 Periods)

- 8.1 Lighting system
- 8.2 Wiring circuit
- 8.3 Headlight, aiming of headlights
- 8.4 Lighting switches
- 8.5 Direction indicators
- 8.6 Windscreen wiper
- 8.7 Horn
- 8.8 Speedometer
- 8.9 Heater
- 8.10 Air conditioning
- 8.11 Temperature indicator

LIST OF PRACTICALS

1. WHEEL BALANCING
2. WHEEL ALIGNMENT
3. SUSPENSION SYSTEM SERVICING
4. RETREADING AND RECAPPING OF TYRES
5. AUTOMOTIVE BRAKE SERVICE
6. A/C SYSTEM SERVICE
7. CLUTCH TROUBLES AND CLUTCH SERVICE
8. SERVICING OF FUEL INJECTION PUMP
9. STUDY OF MPFI SYSTEM

RECOMMENDED BOOKS

1. Automobile Engineering vol. 1 by Dr. Kirpal Singh; Standard Publishers and Distributors, Delhi
2. Automobile Engineering by Dr. PS Gill
3. Automobile Engineering Vol. 1 by GBS Narang; khanna Publishers, Delhi

SUGGESTED DISTRIBUTION OF MARKS

TOPIC NO.	TIME ALLOTTED (Periods)	MARKS ALLOTTED (%)
1	6	6
2	20	25
3	11	12
4	11	12
5	7	8
6	9	14
7	8	14
8	8	9
TOTAL	80	100

RATIONALE

A diploma holder in mechanical engineering is supposed to manage the power generating plant. In Uttaranchal state, hydropower potential is supposed to be very large. Therefore, he must have relevant knowledge and skills about various power plants e.g. steam power plant, nuclear power plant, hydro power plant, diesel engine power plant and gas turbine power plant. Hence this subject is offered.

DETAILED CONTENTS

1. Introduction

(08 Periods)

Sources of energy fuels, flowing stream of water, solar rays, wind, terrestrial heat, ocean tides and waves Concept of power station, central and industrial power station, captive power station, classification of power station with respect to prime mover steam, IC engine, gas turbine and hydro power station, scope in Uttaranchal state

2. Steam Power Plant

(20 Periods)

2.1 Parameters of power cycle- thermal efficiency, work ratio, specific steam Consumption Rankine cycle flow diagram, representation on thermodynamic planes, thermal efficiency, effect on change of condenser pressure, boiler pressure, degree of super heat on thermal efficiency Reheat cycle, simple regenerative cycle, (No numerical)

2.2 Steam prime movers

Concept of a prime mover, steam turbine- advantages as a prime mover, principle elements of a steam turbine and functions –nozzles, blades, rotor, shaft, casing, shaft seals, diaphragm, bearings, steam control, oil system Governing of steam turbines- classification of steam turbines Starting and stopping procedures for turbines, precautions during running Performance of steam turbine, Thermal efficiency, efficiency ratio, mechanical efficiency, steam rate

2.3 Steam Condensing Equipment

Functions of condensers, classification, surface condenser components and their functions Condenser auxiliaries- hot well, condensate pump, vacuum pump, air ejector, circulating pump, atmospheric relief valve Requirement of a good condensing system Cooling towers- purpose and types

2.4 Steam power station control

Effect of load variation of various parameters, types of control systems-area and centralized, basic components of a control system, compressed air and electrical control systems, controls and instruments in a modern central station control room Working of feed water control system and steam temperature control system Records maintained in a steam power station and their purpose

3. Nuclear Power Plant

(18 Periods)

Equivalence between mass and energy- Atomic structure of matter, atomic nomenclature, nuclear reactions- fission, fusion, mass defect, binding energy, chain reaction, methods of control of rate of fusion reaction, types of nuclear materials, fissile and fertile materials Nuclear reactors- elements and functions of different elements, classification on the basis of different criteria Nuclear power stations employing boiling water reactor, candu type reactor-system components, advantages and disadvantages Comparison of nuclear power station with a steam power station Health hazards, safety precautions

4. Diesel Engine Power Plant

(08 Periods)

Advantages and disadvantages of diesel engine. Essential elements of diesel power plant. Fuel injection system performance, testing of diesel engine power plant

5. Gas Turbine Power Plant

(08 Periods)

Brayton cycle- schematic diagram, thermal efficiency. Advantages of gas turbines over diesel engines. Classification of gas turbines, advantages and disadvantages methods of improving thermal efficiency, Important parts and their functions, Essential auxiliaries and controls for gas turbine power plant. Fuel for gas turbines

6. Hydro Power

(18 Periods)

Advantages, basic elements, dams, head works, water turbines, classification of water turbines, speed and pressure control, plant auxiliaries, plant operation, potential in Uttarakhand state, detailed working

INSTRUCTIONAL STRATEGY

Treatment of the subject will be subjected to analysis and examples. One visit to Power plant station is compulsory.

List of Practicals:-

The student will visit to different power plant station and prepare a report. The Evaluation of internal and external marks will be based on report as well as viva-voice.

RECOMMENDED BOOKS

1. A course in Power Plant Engineering by S. Domkundwar & Arora; Dhanpat Rai and sons
2. Power Plant Engineering by G.B.S Narang
3. Power plant engineering by G.R. Nagpal; S.K. Khanna Publishers, Delhi

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time allotted (Period)	Marks Allotted (%)
1	08	10
2	20	30
3	18	20
4	08	10
5	08	10
6	18	20
Total	80	100

6.5 MECHATRONICS

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RATIONALE

The mechatronics, the integration of electronic, of electrical engineering, computer technology and control engineering with mechanical engineering is increasingly forming a crucial part in design, manufacture and maintenance of wide range of engineering products and processes. The diploma holders need skills and knowledge that are not confined to a single subject area. They need to be capable of operating and communicating across a range of engineering disciplines and linking those having more specialized skills. So it is important to introduce this subject.

DETAILED CONTENTS

1- Introduction (05 Periods)

Introduction to Mechatronics General Behaviour of Mechatronic system & Measurement systems . Idea of different types of Control system as open Loop & Close loop. The Mechatronics approach

2- Sensing Elements and transducers (20 Periods)

- Resistive sensing elements: potentiometers, strain gauges,
- Pressure Sensing Elements : Diaphragm, Borden and bellows tube, Load cell/Pressure cell
- Capacitive sensing elements: variable separation, area and dielectric
- Inductive sensing elements: variable reluctance and LVDT displacement sensors
- Electromagnetic sensing elements: velocity sensors
- Thermoelectric sensing elements: laws, thermocouple characteristics, installation problems
- Liquid level and flow sensing elements
- Elastic sensing elements : sensing elements for force, torque, acceleration,
- Piezoelectric sensing elements: static and dynamic characteristics
- Electrochemical sensing elements: PH meter, solid state gas sensors
- Photo sensing elements : Basic principle and characteristics of photo sources and photo detector,
- Digital Transducer element, Micro sensor, smart sensors

3- Signal Recording and Display (15Periods)

- Recording Requirements
- Analog Recorders
- Graphics Recorders
- Strip Chart Recorders
- Types of Strip Chart Recorders
- Galvanometer Type Recorders
- Null Type Recorders
- Potentiometric Recorders
- Segmental Displays
- Dot Matrices

- 4- Mechanical Actuation Systems (05Periods)**
 Mechanical systems Types of motion Kinematic chains Cams Gear trains Ratchet and pawl Belt and chain drives Bearing Mechanical aspects of motor selection Simple problems
- 5- Electrical Actuation System (05Periods)**
 Electrical systems Mechanical switches Solid- state switches Solenoids D.C. motors A.C. motors Stepper motors simple Problems
- 6- Basic System Models (05Periods)**
 Mathematical models Mechanical systems building blocks Electrical system building blocks Fluid system building blocks Thermal system building blocks Simple Problems
- 7- Pneumatic & Hydraulic control system (15 Periods)**
- Brief Idea and Introduction of following control techniques
 - ON-OFF Control
 - Proportional
 - Integral
 - Derivative
 - PI
 - PD
 - PID
- Controller**
- Block Diagram & Circuits of pneumatic & hydraulic PI,PD & PID controller, Controller
 - Electronic Controller/Automatic Controller
- 8- Programmable Logic Controller (PLC) (05Periods)**
 Introduction of PLC, Block Diagram of PLC, Characteristics function of PLC ,Use of PLC in Mechanical Industry
- 9- Robotix (05Periods)**
 General Idea of robot, Brief Description and applications of Hexa Pod, Line follower, Automatic Management and blue boltz robots, Application of robot in Mechanical system, control Mechanism.

INSTRUCTIONAL STRATEGY

1. Use computer based learning aids for effective teaching learning.
2. Students should be taken to various industrial units for clear conception of various topics.
3. Efforts should be made to relate the process of teaching with direct experiences in the industry.

RECOMMENDED BOOKS

- 1- Mechatronics by HMT, Tata McGraw Hill, New Delhi
- 2- Mechatronics: Electronic Control System in Mechanical Engineering by W. Bolton; Pearson Education, Singapore.
- 3- Electronic Instrumentation; by H.S.Kalsi; McGraw-Hill Education India Pvt.Ltd.
- 4- Principles of Measurement Systems by John P.Bently (Pearson)
- 5- Electrical and Electronic Measurements and Instrumentation by A.K.Sawhney; DhanpatRai& Co.
- 6- Instrumentation measurement and Analysis by B.C. Nakra, K.K.Chaudhary
- 7- Optoelectronics An Introduction to Materials and Devices by Singh Jasprit; McGraw Hill

- 8- Instrumentation Devices and Systems by C.S.Ranjan; Tata McGraw Hill
- 9- Instrumentation Devices & Systems by S Ranjan (Tata McGraw-Hill Publishing)
- 10-Process Control by Donald P. Echman

LIST OF PRACTICALS

- 1. Measurement of Displacement using LVDT
- 2. Measurement of Temperature using Thermocouple
- 3. Application of Load Cell/Pressure Cell
- 4. Application of capacitive transducer
- 5. Application of Potentiometer
- 6. Application and use of Photocell
- 7. Application and use of graphic and strip chart recorder
- 8. Experiment of ON-OFF Controller
- 9. Experiment of Pneumatic PID Controller
- 10. Experiment of Hydraulic PID Controller
- 11. Application of PLC
- 12. Study and sketch of a general Robot
- 13. Study of feedback control in a Robot.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time allotted (Period)	Marks Allotted (%)
1	05	08
2	20	20
3	15	16
4	05	08
5	05	08
6	05	08
7	15	16
8	05	08
9	05	08
Total	80	100

6.6 PROJECT WORK

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Periods per week - - 10

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. There should not be more than 3 students if the project work is given for a group. The students should identify or given project assignment 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 repair and maintenance of automobiles
- 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	<i>Excellent</i>
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/project work 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.

6.7 EMPLOYABLE SKILLS

L T P
Periods per week - - 4

RATIONALE

Diploma holders are required to not only possess subject related knowledge but also soft skills to get good jobs and to rise steadily at their workshop. This subject is included to develop employability skills amongst the students

DETAILED CONTENTS

1. Industrial Scenario Engineering Education and expectations of competences from an engineer by employer (04 period)
2. Personality types, characteristic and features for a successful engineer (04 period)
3. Professional Engineer desirable values and ethics and their development. Relation between engineering profession, society and environment (04 period)
4. Managing project (16 period)
 - Leadership
 - Motivation
 - Time management
 - Resource management
 - Computer Software
 - Interpersonal relationship
 - Engineer economics and fundamentals
5. Effective Communication (08 period)
 - Listening
 - Speaking
 - Writing
 - Presentation Technique/Seminar
 - Group discussion
6. Preparing for Employment (08 period)
 - Searching for job/job hunting
 - Resume Writing
 - Interview technique in personal interview telephonic interview, panel interview, group interview, video conference
7. Managing Self (06 period)
 - Managers body, mind, emotion and spirit

- Stress Management
- Conflict resolution

8. Continuing professional development (04 period)
 - Organising learning and knowledge
 - Use of computer for organising knowledge resource
9. Creativity, Innovation and Intellectual property right (06 period)
 - Concept and need in present time for an engineer
10. Basic rules, laws and norms to be adhered by engineers during their working (04 period)