Sixth Semester

ENTREPRENEURSHIP DEVELOPMENT AND MANAGEMENT (DME-601)

Discipline Elective (DE): Credit 3(3-0-0)

Objective: 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.

COURSE OUTLINE:

1. Introduction

1.1 Concept /Meaning and its need

1.2 Qualities and functions of entrepreneur and barriers in entrepreneurship

1.3 Sole proprietorship and partnership forms of business organisations

1.4 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

2.1 Scanning of business environment

2.2 Salient features of National and State industrial policies and resultant business opportunities

2.3 Types and conduct of market survey

2.4 Assessment of demand and supply in potential areas of growth 2.5 Identifying business opportunity

2.6 Considerations in product selection

3. Project report Preparation

3.1 Preliminary project report

3.2 Detailed project report including technical, economic and market feasibility

3.3 Common errors in project report preparations

3.4 Exercises on preparation of project report

SECTION –B MANAGEMENT

4. Introduction to Management

4.1 Definitions and importance of management

4.2 Functions of management: Importance and Process of planning, organising, staffing, directing and controlling

4.3 Principles of management (Henri Fayol, F.W. Taylor)

4.4 Concept and structure of an organisation

a) Line organisation b) Line and staff organisation c) Functional Organisation

5. Leadership and Motivation

a) Leadership i) Definition and Need ii) Qualities and functions of a leader iii) Manager Vs leader iv) Types of leadership

b) Motivation i) Definitions and characteristics ii) Factors affecting motivation iii) Theories of motivation (Maslow, Herzberg, McGregor)

6. Management Scope in Different Areas

a) Human Resource Management i) Introduction and objective ii) Introduction to Man power planning, recruitment and selection iii) Introduction to performance appraisal methods

RECOMMENDED BOOKS

1. A Handbook of Entrepreneurship, Edited by BS Rathore and Dr JS Saini; Aapga Publications, Panchkula (Haryana)

Renewable Energy Sources (DME-602)

Open Elective (OE): Credit 3(3-0-0)

Objective: 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.

COURSE OUTLINE:

UNIT-I

Energy resources and their utilization:

Indian and global energy sources, Energy exploited, Energy planning, Energyparameters (energy intensity, energy-GDP elasticity)

Solar radiations:

Solar radiation on earth, Extra terrestrial radiation, Spectral distribution, Solar constant, clarity index, Measurement of solar radiations, Solar radiation geometry, Latitude, Declination angle, Surface azimuth angle, Hour angle, Zenith angle, Solaraltitude angle, Local apparent time, Apparent motion of sun, Day length, computation of average daily solar radiation, and angle of incidence, simple numerical problems

UNIT-II

Solar energy:

Introduction, Solar Thermal collectors, Flat plate collector, Parabolic Trough collector, Parabolic Dish collector, Heliostats, Solar Central receiver, limitationof solar energy, Applications of solar energy Solar still (single and double slope, Water heater, Cookers, Dryers.

Solar photovoltaic system:

Introduction to Photo-Voltaic system, merits & demerits of P-V system,Principle of P-V cell,V-I characteristics of a solar cell, Efficiency of solar cells, PV hybrid system.

UNIT-III

Biomass:

Introduction, Raw materials, Biomass conversion techniques, Biomass resource development in India.

Biogas:

Introduction to biogas generation, Classification of Biogas digesters, KVIC digester, Bio gas applications

Wind energy:

Introduction, Properties of wind, Availability of wind energy in India, Merits and limitations of wind energy, Wind machine fundamentals, Three blade Horizontal axis wind turbine, and Vertical axis Darrieus rotor wind turbine, Selection of a wind mill

UNIT-IV

Magneto-hydrodynamics (MHD) Energy:

Introduction, Basic Principles of MHD generation, advantages of MHD generation

Fuel cells power plants:

Introduction, Principle and operation of fuel cell,acidic and alkaline electrolyte fuel cells, Advantages and disadvantages of fuel cell

Hydrogen Energy:

Properties of hydrogen in respect of it's use as source of renewable energy, Sources ofhydrogen, Production of hydrogen, Storage and transportation, Problems with hydrogenas fuel

UNIT-V

Geothermal energy:

Introduction, Geothermal resources, Principal of working, Types of geothermalstation with schematic representation.

Tidal power:

Introduction, Tides and waves as sources of energy, Fundamentals of tidal power, Use of tidal energy, Limitations of tidal energy conversion systems

Ocean energy;

Introduction, Principle of ocean thermal energy conversion, open cycle OTEC, closed cycle OTEC

RECOMMENDED BOOKS

1.S. Rao, B. B. Parulekar, “Energy Technology” KhannaPublishers New Delhi2.BansalKeemann, Meliss," Renewable energy sources and conversion technology", Tata Mc Graw Hill.3.Rai G.D, "Non-Conventional energy Sources", Khanna Publishers New Delhi.4.Ashok V. Desai, "Nonconventional Energy", New Age International Publishers Ltd

POWER PLANT ENGINEERING (DME-602)
Open Elective (OE): Credit 4(3-0-2)

Objective: A diploma holder in mechanical engineering is supposed to manage the power generating plant. In Uttranchal state, hydropower potential in supossed 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.

COURSE OUTLINE:

1. Introduction

Sources of energy fuels, flowing stream of water, solar rays, wind, terrestial 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

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, vaccum 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

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 rent reactor, candu type reactor-system
components, advantages and dis advantages Comparison of nuclear power station with a steam power station Health hazards, safety precautions

4. Diesel Engine Power Plant

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

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 point. Fuel for gas turbines

6. Hydro Power

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

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

ADVANCED MACHINE DESIGN (DME-602)
Open Elective (OE): Credit 3(3-0-0)

Objective: 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.

COURSE OUTLINE:

1. Introduction
- Review of the design principle under static, impact and cyclic loading
2. Design of power transmission systems
(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
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
Sliding contact bearing, terms used in journal bearing, Explain the use of Design chats
5. Design of brakes
Different types of braking systems Braking materials Design of simple shoe and band brake
6. Design of flywheels
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

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

AUTOMOBILE ENGINEERING (DME-603)
Discipline core (DC): Credit 4(3-0-2)

Objective: 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.

COURSE OUTLINE:

1. INTRODUCTION

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

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

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

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

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

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

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

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 OFMPFI 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

MECHATRONICS (DME-604)
Discipline core (DC): Credit 4(3-0-2)

Objective: 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.

COURSE OUTLINE:

1- Introduction

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

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

3- Signal Recording and Display

3.1 Recording Requirements
3.2 Analog Recorders
3.3 Graphics Recorders
3.4 Strip Chart Recorders
3.5 Types of Strip Chart Recorders
3.6 Galvanometer Type Recorders

3.7 Null Type Recorders
3.8 Potentiometric Recorders
3.9 Segmental Displays
3.10 Dot Matrices

4- Mechanical Actuation Systems

Mechanical systems Types of motion Kinematic chains Cams Gear trains Ratchet and Belt and chain drives Bearing Mechanical aspects of motor selection Simple problems

5- Electrical Actuation System

Electrical systems Mechanical switches Solid- state switches Solenoids D.C. motors A.C. motors Stepper motors simple Problems

6- Basic System Models

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

7.1 Brief Idea and Introduction of following control techniques
7.2 ON-OFF Control
7.3 Proportional
7.4 Integral
7.5 Derivative
7.6 PI
7.7 PD
7.8 PID

Controller

i) Block Diagram & Circuits of pneumatic & hydraulic PI,PD & PID controller, Controller
ii) Electronic Controller/Automatic Controller

8- Programmable Logic Controller (PLC)

Introduction of PLC, Block Diagram of PLC, Characteristics function of PLC ,Use of PLC in Mechanical Industry

9- Robotix

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.

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.

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.

PROJECT WORK (DME-605)

Discipline core (DC): Credit 4(0-0-8)

Objective: 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.

a) Projects related to repair and maintenance of automobiles

b) Projects related to increasing productivity

c) Projects related to quality assurance

d) Projects related to estimation and economics of production

e) Projects connected with repair and maintenance of plant and equipment

f) Projects related to identification of raw material thereby reducing the wastage

g) Any other related problems of interest of host industry

Employable skills (DME-606)
Discipline core (DC): Credit 2(0-0-4)

Objective: 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 workplace. This subject is included to develop employability skills amongst the students

DETAILED CONTENTS

1.Industrial Scenario Engineering Education and expectations ofcompetences from an engineer by employer

2.Personality types, characteristic and features for a successful engineer

3.Professional Engineer desirable values and ethics and their development. Relation between engineering profession, society and environment

4.Managing project

·Leadership·Motivation

·Time management

·Resource management

·Computer Software

·Interpersonal relationship

·Engineer economics and fundamentals

5.Effective Communication

·Listening

Speaking

·Writing

·Presentation Technique/Seminar

·Group discussion

6.Preparing for Employment

·Searching for job/job hunting

·Resume Writing

·Interview technique in personal interview telephonic interview, panel interview, group interview, video conference

7.Managing Self

·Managers body, mind, emotion and spirit

·Stress Management

·Conflict resolution

8. Continuing professional development

·Organizing learning and knowledge

·Use of computer for organizing knowledge resource

9.Creativity, Innovation and Intellectual property right

·Concept and need in present time for an engineer

10. Basic rules, laws and norms to be adhered by engineers during their working