

## Syllabus of B. Tech. in Mechanical Engineering

### Semester VI

#### HS1601 PROJECT MANAGEMENT & BUSINESS MANAGEMENT (2-1-0)

##### I. PROJECT MANAGEMENT

Concept of Project, Types of project, Project life cycle

Project identification and formulation, Need analysis, Resource surveys marketing research

Project feasibility analysis, Technical feasibility, Choice of technology, financial feasibility, Project budgeting, Geographic feasibility, Location and site selection.

Investment analysis, Project appraisal, NPV, IRR, ROI, Payback period, Consideration of risk and uncertainty in the project.

Project finance, Sources of finance, Internal and external finance, World bank, etc. role of financial institutions.

Project organization: Role and importance of project manager, Project team structure Task force, selection and training of project manager.

Project planning, Implementation and control, Routing and scheduling of project, CPM, PERT and GERT, Project Programming Budgeting System (PPBS).

Project maintaining tool and techniques, Project management information system (PMIS), Project documentation and audit, Computer application in project management.

##### II. BUSINESS MANAGEMENT

Concept, System approach for business management, Social and political aspects on business, Forms of business single proprietorship, Partnership, Joint ventures. Components of business management Business organization: Kinds of organization, Organization structure, Line, Functional, Staff, Line and staff etc .

##### Financial management

Need of finance; Kinds and sources of capital, Shares & debentures, Fixed and working capital, Assets, Financial statements and their importance in business, Financial ratio, current ratio, liquidity ratio, equity ratio, inventory ratio, etc., Relation with other departments .

##### Cost and cost control

Elements of cost, Types of cost - direct and indirect, variable and fixed, labor cost, material cost, over head cost, Cost control techniques, Budgets- meaning, kinds, Budgetary control.

break even analysis.

### **Interest and depreciation**

Meaning, Compound interest, Annuity - types - capital recovery annuity, present worth annuity, etc., Nominal and effective rate of interest, Depreciation - meaning, kinds and causes, methods of calculating depreciation- straight line, sinking funds method, declining balance method, etc.

### **Human Resource Management**

Need & importance for business, acquisition of human resource, personnel management, difference / relationship between HRM & personnel management, strategic human resource management; Relationship with other departments, Labor relation, Trade union, Employees union, Disputes and methods of settling disputes - collective bargaining, conciliation, arbitration, etc.

### **Sales & Marketing**

Importance for growth for business; idea or overview of sales & marketing; effect of consumer behavior on business; relationship of marketing with other departments.

### **Purchase Management**

Importance and objectives, Functions and duties, Purchasing procedure, Kinds of purchasing, Relationship with other departments.

### **Managerial Economics**

Economic background to management, Economic system and its functions, Managerial economics - nature and scope, its relationship with other disciplines; Determinants, elasticity and kinds of demand; Pricing decisions, Monopoly and Oligopoly, Perfect and monopolistic competition, Capital budgeting.

### **Economic Environment**

Need and importance of regulation of business, Capitalism, Socialism, Delnocratic socialism and mixed economy, Directive principles of state policy (DPSP), government policies- Economic, commercial, banking, fiscal, monetary, industrial and technological policies; theory of national income, determination, economic fluctuation, stabilization.

Fuel air cycles real cycles; volumetric efficiency and thermal efficiency, effect of variable specific heats and dissociation on indicator diagram (3 lectures)

#### S.I. Engines

Principles of carburetion, effect of nozzle tip and compressibility, jet size and depression at venturi-choke and compensation. (4 lectures)

#### Combustion in S.I. Engines

Flame development and its propagation, ignition lag, effects of engine parameters, Preignition, Combustion chambers. (3 lectures)

#### Ignition system

Battery and coil ignition system, Magneto system, spark advancing. (3 lectures)

#### Combustion in I.C. Engines

P.O. indicator diagram and their study for various stages of combustion, delay period, combustion chambers. (4 lectures)

#### Detonation in I.C. Engines

Various parameters effecting detonation, knock rating of fuel, Octane and centane numbers, H.U.C.R. action of dopes; Valve timing and firing order (3 lectures)

#### Fuel injection system

Air and solid injection; fuel pump and injectors; petrol injection. (3 lectures)

#### Supercharging in I.C. Engines

Effect of altitude on power output; types of supercharger (3 lectures)

#### Two Stroke Engine

Constructional detail, scavenging system, valve diagrams, Supercharging. (3 lectures)

#### Cooling system

Piston and cylinder temperature distribution; air and water cooling. Lubrication system: Principles, various methods (3 lectures)

#### Testing of Engines

Engine indicator, measure of air and fuel supply, Friction losses, Mechanical and thermal efficiencies, engines losses and heat balance. (4 lectures)

#### Compressors

Centrifugal and axial type, Performance (3 lectures)

#### Gas Turbine

Introduction, ideal cycles, regeneration, reheating and intercooling, closed and open cycles, operating variables.

Jet propulsion, Principles, turbojet and turboprop Engines (5 lectures)

**Fatigue consideration in design**

Variable load, Loading pattern. Endurance stresses, influence of size, surface finish notch sensitivity & stress concentration. Goodmann line, Soderberg line; Design of machine members, subjected to combined steady & alternating stresses. Design of finite life

**Design of gear tooth**

Lewis and Buckingham equations; wear and dynamic load consideration. Design & force analysis of spur, helical, bevel & worm gears. Bearing reactions due to gear tooth forces. Detailed design of the fixed ratio gear boxes.

**Design of sliding & journal bearing**, method of lubrication, hydrodynamic, hydrostatic, boundary etc. Minimum films thickness & thermal equilibrium.

**Design of fly wheels**, plate clutches, brakes, crank shafts, cam shaft & connecting rod. Design of helical springs. Design of crane hook, C-clamp, machine frame etc.

**Introduction**

Classification- energy transfer between fluid and rotor - Flow through machines ideal and actual slip (6 lectures)

**Hydraulic Turbines**

Impulse type - Pelton wheel - Reaction type - Francis, Kaplan and Propeller Principle of operation- regulation and performance - Draft tube (12 lectures)

**Hydraulic Pumps**

Radial Flow, axial flow and mixed flow type - reciprocating and centrifugal pumps - performance studies - fluid coupling and torque converter (12 lectures)

**Compressors and Blowers**

Radial Flow an axial flow type - reciprocating and centrifugal compressors applications characteristics (12 lectures)

**Introduction:**

✓ Meaning and need of automation, Types of automation: fixed, programmable, flexible, and integrated automation.

**Components of automation**

ECE  
 ✓ Actuators, controllers, sensors. Actuators: Solenoids and torque motors. Hydraulic and pneumatic actuators, valves and circuits. Sensors; characteristics, contact and non-contact type, Pressure switches, proximity and position sensors. Encoders, resolvers, synchros. Vision systems; Components of vision systems, image, camera, image capturing systems, processing systems Bar coding and other identification systems. Controllers; Digital and analog control, open and closed loop control, servo systems, servo system analysis and response, control configuration.

**Logic control and PLCs**

EEB  
 ✓ Logic control, logic control elements, Programmable logic controllers: Applications, architecture, operation, and programming of PLCs. Typical applications.

**Automated material handling systems**

ME  
 ✓ Automated flow lines, transfer mechanisms, conveyors, robots. Automated guided vehicles; categories, guidance technologies and control. Automated Storage and Retrieval Systems, categories and components.

**Automated inspection systems**

✓ In process gauging systems, Co-ordinate measuring machines: Construction, operational modes and different probes.

Automated assembly systems:

**Factory communication**

CE  
 ✓ Interface standards, communication networks, LAN, WAN, Protocols: OSI and MAP.

**Flexible Manufacturing systems**

✓ Types, components, architecture and control.  
 ✓ Computer integrated manufacturing.

**Refrigeration and heating systems** Air Refrigeration systems; Bell Coleman air refrigeration cycle. Aircraft air conditioning systems and its performance; steam and air heating systems; piping and accessories.

**Vapor compression refrigeration** Simple cycle, T-S and p-h charts, analysis of vapor compression cycle; factors effecting performance of vapor compression cycle, actual vapor compression cycle; use of multistage compression, heat exchangers, flash chambers, properties of refrigerants and their suitability.

**Vapor absorption and other refrigeration systems:** Description of system components, generator, rectifier, condenser, absorber, heat exchanger and water pump; Aqua ammonia and water Lithium bromide systems.

**Refrigeration equipment:** Constructional details, capacity control and performance of compressors, condensers, evaporators, Expansion devices: Purpose.

**Psychometrics:** Psychometric and Psychrometric properties, Psychrometric relations, Psychrometric chart and its use, Psychrometric processes. Humidification and dehumidification; evaporative cooling; Jet water-cooling; air washers and air cleaners. Human comfort: Factors affecting comfort; comfort charts.

**Estimating Requirements:** Heating, cooling, humidifying and dehumidifying requirements. Loads: Building transmission, infiltration and air charges. Heat gain from people, light, power and duct. Winter and summer design conditions, air quantity and temperature requirements.

**Automotive Air Conditioning:** System location and layout, components. Automotive heaters, air routing and temperature control-Objectives, evaporator care air blow, through the dash circulating unit duct system, system maintenance.

**ME1607-P IC ENGINE LAB**

**(0-0-3)**

**List of Experiments**

1. Determine BHP, Fuel consumption, Nth, air consumption for 2 stroke petrol engine.
2. Determine Fuel consumption, BHP, Nth, air consumption 4 stroke petrol engine.
3. Determine Fuel consumption, BHP, Nth, air consumption 4 stroke diesel engine.
4. To determine the various types of efficiencies of a reciprocating air compressor.
5. To determine the thermal efficiency & heat balance of 2 stroke S.I. Engine.
6. To determine the thermal efficiency & heat balance of 4 stroke S.I. Engine.

**ME1608-P MACHINE DESIGN LAB**

**(0-0-3)**

**List of Experiments**

1. Design & draw an open type spur gearing.
2. Design & draw fixed ratio, helical gear box.
3. Design & draw worm & worm wheel gear box.
4. Design & draw journal bearing.
5. Design & draw plate clutch.
6. Design & draw machine frame.
7. Design shaft design.

**ME1609-P FLUID MACHINERY LAB**

**(0-0-3)**

**List of Experiments**

1. Verification of momentum theory by impact of Jet.
2. Determine operating characteristics of an impulse turbine.
3. Determine the operating characteristic of a reaction turbine.
4. Determine the operating characteristic of a reciprocating pump.
5. Determine the operating characteristic of an air blower.
6. Determine various types of efficiencies of air compressor.

**ME1610-P REFRIGERATION & AIR CONDITIONING LAB**

(0-0-3)

**List of Experiments**

- 1 Refrigeration testing : Determination of COP & cooling capacity of refrigeration testing machine.
- 2 Preparation of vapour compression – cycles of refrigeration testing machine.
- 3 Determination of efficiencies of refrigeration testing machine.
- 4 Preparation of :
  - # Vapour compression cycle &
  - # Heat factor of air conditioner
- 5 Determination of :
  - # H.P.
  - # COP &
  - # refrigeration capacity of the air conditioner.

**HS1606-P GENERAL PROFICIENCY VI**

(0-0-0)

Debate, Elocution, Extempore, Group Discussion, Panel Discussion, Presentation – Paper & oral, Allegation & clarification, Quiz / Brain Teaser, Survey Report / Project Report / Case Study, Dissertation, Mock Interview, Expository / Argumentative Report & National Service Scheme (NSS).