Syllabus of B. Tech. in Mechanical Engineering

Semester VIII

ME1801 POWER PLANT ENGINEERING (3-1-0)

**Introduction**

Power and energy, sources of energy, review of thermodynamic cycles related to power plants, fuels and combustion, steam generators and steam prime movers, steam condensers, water turbines.

**Variable load problem**

Industrial production and power generation compared, ideal and realised load curves, terms and factors. Effect of variable load on power plant operation, methods of meeting the variable load problem. Power plant economics and other considerations in plant selection.

**Steam power plant**

Power plant boilers including critical and super critical boilers. fluidized bed boilers, boilers mountings and accessories. general layout of a team power plant. different systems such as fluid handling system, combustion system, draft, ash handling system, feed water treatment and condenser and cooling system, turbine auxiliary systems such as governing feed heating, turbine mountings, lubrication, flange heating and gland leakage. operation and maintenance of steam power plant ,heat balance and efficiency. trouble shooting and remedies.

**Diesel power plant**

General layout ,performance of diesel engine, fuel system, lubrication system, air intake and admission system, supercharging system, exhaust system, cooling system, diesel plant operation and efficiency, heat balance, trouble shooting and remedies.

**Gas turbine power plant**

Elements of gas turbine power plants, regeneration and reheating, cogeneration, Auxiliary systems such as fuel ,controls and lubrication, operation and maintenance performance and trouble shooting and remedies.

**Nuclear power plant**

Principles of nuclear energy, basic components of nuclear reactions, nuclear power station, trouble shooting and remedies.

**Hydro electric station**

principles of working, applications, site selection classification and arrangement of -hydro-electric plants, run off size of plant and choice of units, operation and maintenance, hydro systems ,interconnected systems, trouble shooting and remedies.

**ME1802 MECHANICAL SYSTEMATIC DESIGN (3-1-0)**

Design of Engineering System with it sub-systems including consideration of alternatives.

Specifications of the components of engineering system

Designing various components of the system from manufacturing point of view.

Systems will be selected out of the following:

* Material handling and transportation systems
* A system power plant

(i) Boiler (ii) Condenser

(iii) Turbine (steam)

* Refrigeration and Air-conditioning

(i) Compressor (ii) Condenser (iii) Evaporator

* Pneumatic an Hydraulic Systems

(i)Single and double acting cylinders (ii) Control valves

(iii) Hydraulic cylinder

* A pressure vessel

(i) Vessel (ii) Ends

(iii) Supports (iv) Nozzles and manholes

**HS2832 HUMAN VALUES Credit: 4**

1. The value crisis in the contemporary Indian society.
2. The nature of values: The spectrum for good life.
3. Human values – Introduction, a snspshot.

Human values: Humanities, Humanism, Human Resources, Human right, Human Kind, Human Nature, Human values on aspects of society & own range of personal characteristics. Human values as freedom, moral obligations, creativity, love and wisdom.

1. The Indian system of values: Knowing philosophy, wholesome philosophy of life and service, Meaningful life, Character, Knowing Goal, Influence of though, Pillars of prosperity, Responsibility, Love, Wisdom, Mind and its control, Will power, True education, Ethics, Determination, Knowledge – Man – the maker of his destiny.
2. An Approach to Human Development: Personality, Personality development, The divine core of our personality – physical, mental, intellectual & spiritual dimension, qualities for personality development, effective communication.
3. Psychological Values: Integrated Personality & Mental Health

Our mind, the four folds of the mind, strong and weak mind, mind control, medically unexplained symptoms, power of mind – concentration, psychological management (stress management)

1. Social Values: The modern search for a good society. Maintaining values of democracy, Values of Indian Constitution, Values of justice.
2. Material Development and its Values: The challenge of Science & Technology.
3. Ethics: Evolution of ethics, Rational ethics and spirituality, what is ethics? Doing good to the world – The hallmark of ethics, Religion & Ethics, virtue, Religion, Faith & Strength, Be Brave, Heroism, Self Confidence, Self confidence Vs Ego, The march of freedom, The goal of life, Practice of Vedanta, Love , Creativity, Moral & Ethical values, Ethics of values, Ethics of duty, Ethics of responsibility, Works ethics and Professional ethics.
4. Management of values: Professional excellence, Inter-personal relationship at work place, Leadership& Learn building, Stress Management.

ME2838 PROJECT ENGINEERING Credit: 4

Project Feasibility Analysis

Marketing, technical and financial feasibility.

Project Management

Nature, Scope, PERT, CPM techniques, principles, applications.

Interest and Time Value of Money

Simple interest, Compound interest, present worth uniform series payments, use of interest tables, nominal and effective interest rates, continuous compounding payment, uniform gradient.

Depreciation

Reasons for depreciation, causes of reclaiming values, depreciation methods, comparison with accounting of time value of money and without it.

Methods of Tangible Evaluation of Alternatives

Equivalent annual worth comparisons, present worth comparisons, rate of return comparisons.

Methods for Forecasting

Need for forecast – statistical method, time series analysis, method of least squares, moving average method, curvilinear trend.

Replacement Policy

Item deteriorating with time and items that fail completely (not accounting for time value of money), accounting for time value of money, replacement policy for new and old machines with infinite horizon.

Risk Analysis

Risk in economic analysis, measuring risk investment, risk profiles, decision trees, formulation of discounted decision tree.

Suggested test books and references

* James, L. Riggs, “Engineering Economics”, McGraw Hill Book Co., 1982.
* James, L. Pappas and Eugene, F. Brigham, “Managerial Economics”, Holt Rinehaut and Winston Ltd., 1983.
* Norman, N. Barish, “Economic analysis for engineering” McGraw Hill Book Co., 1978.
* Chandra, Prasanna, “Projects”, Tata McGraw Hill, 1996.

**ME2842 SPECIAL CASTING TECHNIQUES Credit: 4**

**Introduction to Special Casting Techniques**

**Shell Moulding**

Shell moulding, process, shell moulding machines, pattern equipment, sand, resins, and other materials used in shell moulding, application of shell moulding, advantages of shell moulding over other method.

**Centrifugal Casting**

Principle of centrifugal casting, types of centrifugal casting processes, calculation of mould rotary speed, techniques, equipment used and production processes, advantages and limitations of centrifugal casting methods.

**Investment Casting**

Introduction, pattern and mould materials used, techniques and production of investment moulds and casting, applications, advantages and limitations of die casting.

**Die Casting**

Die casting processes, die casting machines, operations and details, die materials, metal cast by die casting methods, advantages and limitations of die casting.

**Recent Development**

Low pressure die casting, squeeze casting, Rheocasting, Vaccum casting processes, high pressure moulding, and continuous casting, application and advantages of continuous casting.

Suggested test books and references

* Heine, R.W., Loper, C.R., and Rosenthal, P.C., “Principles of metal casting”, 2nd edition, Tata McGraw Hill Publishers Co. Ltd., New Delhi, 1996.
* Jain, P.L., “Principles of Foundry Technology”, 3rd edition, TataMcGraw Hill Publishers Co. Ltd., New Delhi, 1997.
* Beeley, P.R., “Foundry Technology”, Butterworths, London, 1972.
* Doehler, E.H., “Die Casting”, 1st edition, McGraw Hill Book Co. New York, 1951.
* Barton, H.K., “Die Casting Processes”, Odhams Press Ltd., 1957
* Wood, R.L., and Davidlee Von Lodwig, “Investment casting for Engineers”, Reinhold Publishers Corporation Inc., 1952
* Dumond, T.C., “Sheel Mouldinnd & Sheel Moulded Casting”, Reinhold Publishers Corporation Inc., 1954.

**HS1808-P GENERAL PROFICIENCY VIII (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).