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B.TECH.
(SEM VII) THEORY EXAMINATION 2022-23
POWER PLANT ENGINEERING

Time: 3 Hours ***Total Marks: 100***

Note: Attempt all Sections. If you require any missing data, then choose suitably.

SECTION A

1. Attempt *all* questions in brief. 2x10 = 20

(a) Differentiate between conventional and non-conventional power plants.
(b) Explain the function of Cooling tower in brief.
(c) Define specific speed of hydraulic turbine.
(d) Explain the function of Reheater in gas turbine power plant.
(e) Differentiate between fission reaction and fusion reaction with suitable examples.
(f) Explain the function of Solar thermal collector.
(g) Differentiate between Tidal energy and Ocean thermal energy.
(h) Explain the principle of fuel cell in brief.
(i) Define the term 'Depreciation'.
(j) Explain the function of bus bar in power plant.

SECTION B

2. Attempt any *three* of the following: 10x3 = 30

(a) Explain Modified Rankine cycle with the help of neat sketch and T-s diagram.
(b) In a constant pressure open cycle gas turbine, air enters at 1 bar and 20°C and leaves the compressor at 5 bar. Using the following data : Temperature of gases entering the turbine = 680°C, pressure loss in the combustion chamber = 0.1 bar, $\eta_{compressor}$ = 85%, $\eta_{turbine}$ = 80%, $\eta_{combustion}$ = 85%, γ = 1.4 and cp = 1.024 kJ/kg K for air and gas, find :
  (i) The quantity of air circulation if the plant develops 1065 kW.
  (ii) Heat supplied per kg of air circulation.
  (iii) The thermal efficiency of the cycle.
  Mass of the fuel may be neglected.
(c) Explain the working of BWR with neat sketch. Also compare BWR with PWR.
(d) Explain the function of all the components of wind turbine.
(e) A generating station has a maximum demand of 25MW, a load factor of 60%, a plant capacity factor of 50% and a plant use factor of 72%. Find
  (i) the reserve capacity of the plant
  (ii) the daily energy produced and
  (iii) maximum energy that could be produced daily if the plant while running as per schedule, were fully loaded.

SECTION C

3. Attempt any *one* part of the following: 10x1 = 10

(a) Explain all the energy sources on which different power plant are based.

(b) Explain the function of Velox boiler. Also detail the working of Fludized bed combustion.

4. Attempt any *one* part of the following: 10 x1 = 10

(a) With the help of neat sketch explain the general arrangement of all the major components of Hydro electric power plant.

(b) Draw the layout of modern Gas Power Plant and explain function of its each component in brief.

5. Attempt any *one* part of the following: 10x1 = 10

(a) With the help of neat sketch explain the function of CANDU. Also compare thermal neutron with un-moderated neutron.

(b) Explain construction of solar cell. Also explain PV based power system with neat sketch showing all its components.

6. Attempt any *one* part of the following: 10x1 = 10

(a) How the geothermal energy is converted in electrical energy? Explain advantages and drawbacks of geothermal power plant.

(b) What are different methods to convert bio energy into useful energy? Explain biogas plant with neat sketch.

7. Attempt any *one* part of the following: 10x1 = 10

(a) Explain the factors affecting economics of power generation and distribution.

(b) Write an essay on power plant pollution and measures to control it.