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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, $\eta_{\text{compressor}} = 85\%$, $\eta_{\text{turbine}} = 80\%$, $\eta_{\text{combustion}} = 85\%$, $\gamma = 1.4$ and $c_p = 1.024 \text{ kJ/kg K}$ 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.