

B.Tech IV Year II Semester (R15) Advanced Supplementary Examinations July 2019

POWER PLANT ENGINEERING

(Mechanical Engineering)

Time: 3 hours

Max. Marks: 70

PART – A

(Compulsory Question)

- 1 Answer the following: (10 X 02 = 20 Marks)
- Explain the principle of harnessing nuclear energy.
 - How important is cost analysis of a power plant? Explain.
 - Explain the necessity of a proper draught system.
 - What is enthalpy of steam? Write an expression for enthalpy of a superheated steam.
 - Draw neat sketch of an IC engine and label its parts.
 - List the different methods to improve efficiency of a gas turbine plant.
 - List the different types of gates used in dams.
 - Explain the function of surge tank.
 - List the advantages of non-conventional sources over conventional sources.
 - Give a note of usage of graphite in nuclear reactors.

PART – B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT – I

- 2 Give a note on the scenario of power generation from renewable sources in India.

OR

- 3 Define load factor. A power station supplies the following loads to the consumers.

Time in hrs	0-6	6-10	10-12	12-16	16-20	20-22	22-24
Load in MW	30	70	90	60	100	80	60

- Draw the load curve and estimate the load factor of the plant.
- What is the load factor of a standby equipment of 30 MW capacity if it takes up all the loads above 70 MW. What is the use factor?

UNIT – II

- Explain with neat sketch the working principle of out plant handing of coal.
- Explain how waste heat recovery is achieved in modern boilers.

OR

- Explain with neat sketch the working principle of overfeed stoker.
- Explain the neat diagram the working principle of cyclone furnace.

UNIT – III

- 6 Explain with suitable diagram the working of diesel power plant.

OR

- 7 An open cycle constant pressure gas turbine plant consists of two turbines with perfect intercooling and a two stage turbine with a reheater. Air enters at 1 bar, 15°C. The maximum pressure ratio and the maximum temperature of the cycle are limited to 5 and 800°C respectively. The reheating takes place at 2.3 bar to 800°C. The isentropic efficiencies of each compressor and each turbine are 0.8 and 0.9 respectively. The calorific value of fuel is 42 MJ/kg. Taking $C_p = 1.005$ kJ/kgK and $\gamma = 1.33$ for gases and neglecting pressure and heat losses and if the flow rate of air is 25 kg/s, estimate: (i) The overall thermal efficiency of the plant. (ii) The air fuel ratio. (iii) The specific fuel consumption. (iv) Power output of the plant.

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UNIT – IV

- 8 Give a note on hydroelectric power plant generation in India and its future with neat diagram.

OR

- 9 (a) A Pelton wheel driven by two similar jets transmits 4000 kW to the shaft while running at 400 rpm. The head from the reservoir level to the nozzle is 200 m and the efficiency of power transmission through the pipelines and nozzles is 90%. The jets are tangential to a 1.50 m diameter circle. The relative velocity decreases by 10% as the water traverses the buckets, which are so shaped that they would, if stationary, deflect the jet by 165° . Neglecting the windage losses, estimate:
(i) The efficiency of the runner. (ii) The diameter of each jet.
- (b) Explain classification of dams and spillways.

UNIT – V

- 10 Differentiate between solar thermal and solar photovoltaic. List the different types of solar collectors and explain any one of them with a neat sketch.

OR

- 11 (a) Differentiate between heavy water reactors and gas cooled reactors.
(b) With a neat sketch, explain the working of a pressurized water reactor.

