Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 90374

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2019
Third Semester
Electrical and Electronics Engineering
ME 8792 – POWER PLANT ENGINEERING
(Regulations 2017)

Time : Three Hours | Maximum : 100 Marks

State clearly any assumption made with justification
Use of approved steam table is permitted
Answer ALL questions

PART – A **(10×2=20 Marks)**

1. List any 4 advantages of cleaning of coal.
2. State the principle of Rankine cycle cogeneration.
3. Compare the compression ratio of gasoline engine and diesel engine.
4. Claim any 4 merits of gas turbine over steam turbine.
5. What is the purpose of control rods ?
6. What do you mean by moderating ratio and what is the significance of high value of moderating ratio ?
7. Which kind of solar collectors preferred for solar thermal power plant ? Why ?
8. How wind mill is classified ?
9. What is the need of depreciation cost ?
10. What is plant capacity factor ?

PART – B (5×13=65 Marks)

11. a) What is binary cycle ? Sketch the schematic of mercury-water based power plant and the corresponding plant T-s diagram. Also explain the working of the plant.

(OR)

b) i) Discuss the merits and demerits of water tube boilers over fire tube boilers. (8)

ii) List the qualities that are required for a good boiler. (5)

12. a) What is dual cycle ? Explain the dual cycle process using PV and TS diagram. Also obtain the efficiency expression for dual cycle.

(OR)

b) i) Draw a schematic of closed gas turbine plant and discuss its function. Also suggest fuels that are especially required for closed cycle gas turbine plant. (8)

ii) Draw a schematic of reheat based gas turbine plant and briefly discuss its function. (5)

13. a) i) Write any 4 merits and demerits each for nuclear power plant. (8)

ii) Write short notes on : (5)

- Reflector and
- Biological shielding.

(OR)

b) Name the different components of nuclear reactor and discuss the working of Boiling Water Reactor (BWR).

14. a) i) List the essential elements of hydro-electric power plant. (4)

ii) Highlight the merits of "pumped storage plant". (4)

iii) With relevant sketch explain the function of Pelton turbine. (5)

(OR)

b) What is Fuel cell ? Why Fuel cells for power generation ? Also discuss the working principle of fuel cell.

15. a) Discuss the reason and effects of air pollution and water pollution due to thermal power plants.

(OR)

b) A new power plant is desired to install and for which discuss the detailed cost analysis.

PART – C (1×15=15 Marks)

16. a) The minimum pressure and temperature in an Otto cycle are 100 kPa and 27°C. The amount of heat added to the air per cycle is 1500 kJ/kg. (i) Determine the pressure and temperatures at all points of the Otto cycle. (ii) Also calculate the specific work and thermal efficiency of the cycle for a compression ratio of 8 : 1. Take for air C_v = 0.72 kJ/(kg-K) and specific heat ratio is 1.4.

(OR)

b) i) A hydro power plant is to be used as peak load plant at an annual load factor of 30%. The electrical energy obtained during the year is 750×10^5 kWh. Determine the maximum demand. If the plant capacity factor is 24% find reserve capacity of the plant. (7)

ii) A steam power station has an installed capacity of 120 MW and a maximum demand of 100 MW. The coal consumption is 0.4 kg per kWh and cost of coal is Rs. 80 per tonne. The annual expenses on salary bill of staff and other overhead charges excluding cost of coal are Rs. 50×10^5. The power station works at a load factor of 0.5 and the capital cost of the power station is Rs. 4×10^5. If the rate of interest and depreciation is 10% determine the cost of generating per kWh. (8)
