Total No. of Questions : 10] **SEAT No. :**

P3053 **[Total No. of Pages : 3**

[5354]-542
B.E. (Mechanical Engg.) (Semester - II)
POWER PLANT ENGINEERING
(2012 Pattern)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Draw a neat diagram wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of calculator, steam tables is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) Write a short note on: **[4]**

i) Load Shedding

ii) Carbon credit

b) What is a load curve? What is its use in distribution of electrical energy? **[6]**

OR

Q2) a) Explain in details load curve and load distribution curve with sketch. **[4]**

b) The peak load on a power plant is 60 MW. The loads having maximum demand of 30MW, 20 MW, 10 MW and 14 MW are connected to the power plant. The capacity of the power plant is 80 MW and the annual load factor is 0.50 estimate: **[6]**

i) average load on the power plant

ii) the energy supplied per year

iii) demand factor

iv) the diversity factor

Q3) a) Describe the four major circuits in a thermal power plant. **[4]**

b) Define condenser efficiency and vacuum efficiency. **[6]**

OR

Q4) a) With neat sketch explain different types of wet dust collectors. **[4]**

b) What are the functions of moderators. control rods and coolant in a nuclear power plant. **[6]**

P.T.O.

Q5) a) Derive the equation of thermal efficiency of Brayton Cycle. **[8]**

b) An open cycle gas turbine plant works on Brayton cycle. The maximum pressure and temperature of the cycle are limited to 5 bar. 900K. The pressure and temperature at the inlet to the compressor are 1 bar and 300K. Reheating is used at the pressure of 2.5 bar where the temperature of the gases is increased to its original turbine inlet temperature. Mass flow rate of the air in the plant is 10 kg/s. Determine: **[10]**

i) Thermal efficiency and capacity of the plant in MW.

ii) Exhaust pressure of the gases leaving the plant is 1 bar. Assume compression and expansion is isentropic. Take $\gamma = 1.4$ (air and gas), $C_p = 1$ kJ/kgK (air and gas), CV of the fuel 40000 kJ/kg. Neglect pressure losses in the system. Do not neglect the mass of the fuel.

OR

Q6) a) Draw the schematic diagram for complete diesel power plant showing all the systems used and explain the working. **[8]**

b) A gas turbine takes in air at 101 KN/m^2 and 150° C. The air is compressed to a pressure of 606 kN/m^2 and then passed through a regenerative heat exchanger of effectiveness 0.65. The air is then passed through the combustion chamber where its temperature is increased to 8700° C by the combustion of fuel. The gases enter a turbine and are expanded to 101 KN/m^2 pressure. Assuming a compressor efficiency of 85% and a turbine efficiency of 80%, determine the following for air flow rate of 4 kg/s: **[10]**

i) The power output of the plant.

ii) Exhaust temperature from heat exchanger.

iii) The thermal efficiency of the plant and

iv) The thermal efficiency without the heat exchanger.

Q7) a) Describe the basic principle of photovoltaic power. List out its merits over the other system. What are the main hurdles in the development of' this mode of power generation? **[8]**

b) What are the basic requirements for locating a wind power plant? Which factor affect the size of wind power plant? **[8]**

OR

Q8) a) What is OTEC? What is the minimum requirement to operate the OTEC? Explain Close cycle OTEC with typical layout. **[8]**

b) How is electricity generated from geothermal energy what are advantages and disadvantages. **[8]**

Q9) a) Enlist the protective equipment and explain the working of circuit breaker in power plant. **[8]**

b) Explain the cause and effect of various pollutants from a thermal power plant. **[8]**

OR

Q10) a) Write a short note on: **[8]**

i) Switch Gear

ii) Power Transformer

b) What do you understand by noise pollution? Explain the methods adopted to reduce the noise pollution. **[8]**