

Total No. of Questions : 10]

SEAT No. :

**P3676**

**[4959]-1042**

[Total No. of Pages : 3

**B.E.(Mechanical)**

**POWER PLANT ENGINEERING**

**(2012Pattern) (402047)(Semester-II)(End Semester)**

*Time : 2½Hours]*

*[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) Neat diagram must be drawn wherever necessary.
- 3) Figure to the right side indicate full marks.
- 4) Use of calculator, steam tables is allowed.
- 5) Assume suitable data, if necessary.

**SECTION-I**

- Q1)** a) Explain with neat sketch load curve and load duration curve. [4]  
b) Discuss the role and participation of private sector in development of power sector in India. [6]

OR

- Q2)** a) Explain with neat sketches mechanical dust collectors. [6]  
b) Draw a neat diagram of fluidized bed boiler. Discuss its merits and demerits. [4]  
**Q3)** a) Explain in details various plants used based on the availability of quality of water. [6]  
b) Write a short note on: Nuclear waste disposal. [4]

OR

- Q4)** a) The following common load data is available in share for a base load power station and stand by power station. [6]

Base load station annual output =  $150 \times 10^6$  KWh

Stand by station annual output =  $15 \times 10^6$  KWh

Base load station capacity = 50MW

Standby station capacity = 22MW

Maximum demand on base load station = 35MW

Maximum demand on standby station = 20MW

Determine the following for both power stations:

- i) Load Factor
- ii) Capacity factor

- b) What is the necessity of condenser in a steam power plant? [4]

**P.T.O.**

- Q5)** a) Derive the equation of thermal efficiency of Brayton Cycle. [6]
- b) The pressure ratio used in an open cycle gas turbine power plant is 6.5. The pressure and temperature of air entering in the compressor are 1 bar, 300K. Intercooling arrangement is used to reduce the work of compression. The maximum temperature of the cycle is limited to 850K. If the power plant capacity is 10MW, find the thermal efficiency of the plant and air consumption per hour if calorific value is 45000kJ/kg. Assume compression in both the stages and expansion in turbine are isentropic. Take  $\gamma = 1.4$  (air and gas),  $C_p = 1 \text{ kJ/kgK}$  (air and gas). Assume perfect intercooling. [10]

OR

- Q6)** a) Write a short note on combined cycle plants. [6]
- 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 10kg/s. Determine the thermal efficiency and capacity of the plant in MW. The exhaust pressure of the gases leaving the plant is 1 bar. Assume compression and expansion are isentropic. Take  $\gamma = 1.4$  (air and gas),  $C_p = 1 \text{ kJ/kgK}$  (air and gas), CV of the fuel 40000kJ/kg. Neglect pressure losses in the system. Do not neglect the mass of the fuel. [10]

- Q7)** a) Discuss the parameters to be considered for site selection of wind power plant. [8]
- b) Explain with neat sketch the construction and working of photovoltaic power system and fuel cell. [10]

OR

- Q8)** a) Discuss any two type of the horizontal axis wind mills with suitable sketches. [8]
- b) Explain flat plate and parabolic solar collectors with neat diagrams. [10]

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

- b) What are different pollutants due to thermal power plants and explain their effects on human health. [8]

OR

- Q10)**a) Write a short on exciters used in the power plants. [8]  
b) Explain the noise pollution caused by thermal power plant and its control. [8]

