(Following Paper ID and Roll No. to be filled in your Answer Books)	
Paper ID : 140801	Roll No.

B.TECH.

Theory Examination (Semester-VIII) 2015-16

POWER PLANT ENGINEERING

Time : 3 Hours   *Max. Marks : 100*

Section-A

1.   Attempt all parts.   (2×10=20)

(a)   Mention any two drawbacks of a stationary gas turbine power plant for generation of electricity.

(b)   What are the applications of diesel engine power plant?

(c)   Why is the maximum cycle temperature of gas turbine plant much lower than that of diesel power plant?

(d)   What are the methods used in ash handling system?

(e)   What is the mechanism of pulverized fuel firing system?

(f)   What are the advantages of nuclear power plant?

(g)   What do you understand by moderation?

(1)   P.T.O.

(h) What are the components present in the diesel electric power plants ?

(i) What is the components used in fuel injection system of a diesel power station?

(j) Mention the various processes of the Brayton cycle.

Section-B

2. **Attempt any five parts of the following.** **(10×5=50)**

(a) A steam boiler generates steam at 30bar, 300°C at the rate of 2kg/s. This steam is expanded isentropically in a turbine to a consider pressure of 0.05bar, condensed at constant pressure and pumped back to boiler.

  i. Draw the schematic arrangement of the above plant and T-s diagram of Rankine Cycle.

  ii. Find heat supplied in the boiler per hour

  iii. Determine the quality of steam after expansion.

  iv. What is the power generated by the turbine?

  v. Estimate the Ranking efficiency considering pump work.

(b) Explain the principle involved in preparation of coal and what are the methods of preparation?

(c) A power station has two 60MW units each running for 1500hours a year. The energy produced per year is 700×10^6 kW-hr. Calculate the plant load factor and plant use factor.

(d) A petrol engine uses a fuel of CV 43963 kJ/kg the compression and expansion curves follow the law $PV^{1.35}$=Const. at 25% and 75% of compression stroke the pressure are 1.96 bar and 5.54 bar the relative efficiency and mechanical efficiency of the engine may be taken as 48% and 78% find the specific fuel consumption based on Brake Power.

e) A reversible engine receives heat from two constant temperature source at 1000K And 600 K. It rejects 3500KJ/Min to a sink at 340K. The Engine develops 85KW.Determine heat supplied by each source and the efficiency.

(f) Enlist various method to control the nuclear pollution? Explain any one?

g) What is pre-ignition? What are the disadvantages of pre ignition?

h) Sketch the Brayton cycle. Air enters the compressor of the cycle at 1 bar and 25° C. Pressure after compression is 3 bar. Temperature at turbine inlet is 650° C. Determine per kg of air the

  i. cycle efficiency

ii.   heat supplied to air

iii.   work available

iv.   heat rejected in the cooler

v.   Temperature of air leaving the turbine.

Section-C

Note: Attempt any two parts of the following.   (15×2=30)

3.   What are the elements which contribute to the cost of the electricity? And how can the cost of power generation be reduced?

4.   Explain the term unit power, unit speed and unit discharge with reference to a turbine. What is the Function of draft tube in turbines and the various types of draft tubes?

5.   Consider a stationary power plant operating on an ideal Brayton cycle. The pressure ratio of the cycle is 8 and the gas temperature at the compressor inlet and turbine inlet are 27^0 C & 1027^0 C respectively. Determine the following:

i.   Gas temperature at the compressor and turbine exit

ii.   Back work ratio

iii.   Thermal efficiency.

Assume $p_{r1} = 1.386$ and $p_{r3} = 330.9$. Where, p_r is the relative pressure.

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