Total No. of Questions : 8]

SEAT No. :

PF5365

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B.E. (Mechanical)

ENERGY ENGINEERING

(2019 Pattern) (Semester - VIII) (402049)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8***
2) ***Neat diagrams must be drawn wherever necessary***
3) ***Figures to the right of each question indicate full marks***
4) ***Assume suitable data wherever necessary and mention the same clearly***
5) ***Use of steam tables, Mollier chart and calculator is allowed***

Q1) a) Describe with neat labelled diagram of general layout of diesel power plant representing all system used. **[8]**

b) Discuss the following with simple diagram and applications. **[9]**

i) Power Duration Curve

ii) Mass Curve

iii) Unit hydrograph

OR

Q2) a) Write note on following. **[8]**

i) Difference between PWR and BWR

ii) Nuclear waste disposal

b) The run off data of a river at a particular site is tabulated below as shown in the Table: **[9]**

Month	Discharge in millions of cu. m/month
January	40
February	25
March	20
April	10
May	0
June	50
July	75
August	100
September	110
October	60
November	50
December	40
Total	580

P.T.O.

i) Draw the hydrograph and find the mean flow

ii) Draw the flow duration curve.

iii) Find the power in MW available at mean flow if the head available is 80m and overall efficiency of generation is 85%. Take each month of 30 Days.

Q3) a) Discuss concept of thermal efficiency and work ratio of Gas Turbine cycle. How Regeneration technique helps to improve thermal efficiency of Gas Turbine cycle? Elaborate with neat schematic and T-s diagram. **[9]**

b) Air enters the compressor of a gas-turbine power plant having capacity 12 MW at 1 bar and 27 degrees Celsius. The maximum cycle temperature, pressure is 577 degrees Celsius, 6.5 bar respectively. The two stage compression with perfect inter cooling arrangement is incorporated in the plant. The compression in both stages and expansion in turbine are isentropic. Take adiabatic index, specific heat for both air and gas as 1.4, 1 KJ/Kg-K respectively. Assume calorific value of fuel as 45.5 MJ/Kg. Draw cycle arrangement and T-s diagram and determine. **[9]**

i) Maximum work saved per kg of air compressed due to use of inter cooling

ii) Fuel consumption in Tph (with inter cooling arrangement)

iii) The thermal efficiency of cycle with considering effect mass flow rate of fuel on air.

OR

Q4) a) Describe concept of Cogeneration. Explain Cogeneration cycle in Gas Power cycle with block diagram. What are advantage and applications of the same? **[9]**

b) Elaborate the Kalina (Cheng) Cycle with cycle arrangement, T-s diagram. What are advantages and disadvantages of it? **[9]**

Q5) a) State the main functions of the Circuit Breaker. What are different types of the same? Discuss working of any one Circuit Breaker with a neat sketch. **[9]**

b) Write short notes on following. **[8]**

i) Thermal Energy Storage

ii) Energy pricing

OR

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Q6) a) A hydro-electric plant costs Rs. 3000 per kW of installed capacity. The total annual charges consist of 5% as interest; depreciation at 2%, operation and maintenance at 2% and insurance, rent etc. 15%. Determine a suitable two-part tariff if the losses in transmission and distribution are 12.5% and diversity of load is 1.25. Assume installed capacity of the station be 100 kW & maximum demand on the station is 80% of the capacity and annual load factor is 40%. What is the overall cost of generation per kWh? **[9]**

b) Define and write the equation for the following: **[8]**

i) Load Curve

ii) Load Duration Curve

iii) Diversity Factor

iv) Plant capacity factor

Q7) a) How wind solar hybrid power plants? Explain working with diagram, advantages, and disadvantages. **[9]**

b) Elaborate binary cycle type geothermal energy based system with following points. **[9]**

i) Labelled Diagram

ii) Construction and working

iii) Advantages

iv) Limitations

OR

Q8) a) Discuss Open type MHD based power generation system with following points. **[9]**

i) Labelled Diagram

ii) Construction and working

iii) Advantages

iv) Limitations

b) Elaborate working principle of following with simple diagram. **[9]**

i) Dolphin type wave machines

ii) Fuel cell

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