

Total No. of Questions : 8]

SEAT No. :

P-6677

[Total No. of Pages : 3

[6181]-245

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 indicate full marks.
- 4) Assume suitable data, if necessary.
- 5) Use of steam tables, Mollier chart and calculator is allowed.

- Q1) a) What do you mean by Flow Duration Curve? Discuss main functions of the same. [6]
- b) Describe with simple diagram general layout of diesel power plant indicating all systems used. [6]
- c) Discuss working of Boiling Water Reactor with its diagram and limitations. [6]

OR

- Q2) a) What do you mean by Hydrograph? Discuss main functions of the same. [6]
- b) Describe with simple diagram Plant Layout of Low Capacity Diesel Engine Power Plant. [6]
- c) Discuss working of Pressurized Water Reactor with its diagram and advantages. [6]

- Q3) a) The air enters the compressor of gas-turbine power plant at 1 bar, 27 degrees Celsius. The pressure ratio is 6:1. The air after compression is passed through heat exchanger with effectiveness 0.65. Then air is passed to combustion chamber and heated to 870 degrees Celsius Then gases are expanded up to 1 bar in turbine then to heat exchanger and finally to the exhaust. The isentropic efficiency of compressor, gas turbine is 80%, 85% respectively. Take adiabatic index for air gas as 1.4. Take specific heat for air, gas as 1 KJ/Kg-K. Neglect mass flow rate of fuel and air mass as 5 kg/sec. Draw cycle arrangement and T-s diagram and determine.

[9]

P.T.O.

- i) The thermal efficiency of cycle
 - ii) Heat carried away by exhaust gases on per minute basis.
- b) Define Tri-generation. Describe Tri-generation cycle with block diagram, advantages and applications. [8]

OR

Q4) a) The air enters the compressor of 5 MW capacity gas-turbine power plant at 1 bar, 30 degrees Celsius. The maximum cycle temperature, pressure is 550 degrees Celsius, 5 bar respectively. The two stage expansion with reheating pressure of 2.24 bar is used in the plant. In the reheater gas is heated up to maximum cycle temperature. The gases are expanded up to 1 bar in second turbine. The isentropic efficiency of compressor, both turbines is 80%, 85% respectively. Take adiabatic index for air gas as 1.4, 1.33 respectively. Take specific heat for air, gas as 1 KJ/Kg-K, 1.15 KJ/Kg-K respectively. Neglect mass flow rate of fuel. Draw cycle arrangement and T-s diagram and determine. [9]

- i) The thermal efficiency of cycle
 - ii) Mass flow rate of air
- b) How Kalina (Cheng) Cycle works? Describe with cycle arrangement, advantages and disadvantages. [8]

Q5) a) A power generation station with maximum demand as 30 MW having following annual data. [6]

Capacity factor = 0.4, Load factor = 0.5 and use factor = 0.5.

Determine

- i) Annual energy produced
 - ii) Reserve capacity over and above peak load
 - iii) Number of hours during which plant is not working
- b) State main functions of circuit breaker. Describe working of anyone circuit breaker with diagram. [6]
- c) Describe methods of estimation of Energy demand. [5]

OR

Q6) a) Refer data for power supplied to consumer [6]

Time (hr)	0-6	6-10	10-12	12-16	16-20	20-22	22-24
Load (MW)	20	50	60	40	80	70	40

Determine

- i) Plant load factor
 - ii) Load factor for stand by equipment of 20 MW capacity if it takes up all load above 60MW
- b) List out various methods of thermal energy storage. Describe anyone method with simple diagram. [6]
- c) Why relays are used in power stations? Discuss working of any one relay with diagram [5]
- Q7) a)** Elaborate dolphin type wave machines with diagram and advantages. [6]
- b) Discuss the working of Claude's Ocean Thermal Energy system with simple diagram and advantages. [6]
- c) Discuss the working of superheated steam geothermal energy system with diagram and advantages. [6]

OR

- Q8) a)** Explain the working principle of Solar Photovoltaic System. What are advantages and applications of the same? [6]
- b) Write note on:- Fuel Cells [6]
- c) Write note on:- Open type (Inert gas) MHD system. [6]

