

Total No. of Questions : 8]

SEAT No. :

PB2374

[6263]-224

[Total No. of Pages : 3

B.E. (Mechanical)
ENERGY ENGINEERING
(2019 Pattern) (Semester - VIII) (402049)

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

- Q1)** a) What are main functions of Spillways? Enlist the different types of spillways. Explain anyone type with simple diagram. [6]
- b) Describe with simple diagram Plant Layout of Low Capacity Diesel Engine Power Plant. [6]
- c) Discuss working of Gas Cooled Reactor with its diagram and advantages. [6]

OR

- Q2)** a) The run off data of one river at a particular site is as below. [6]

Sr. No.	Month	Discharge in millions of Cu m per month
1	J	80
2	F	40
3	M	50
4	A	0
5	M	20
6	J	100
7	J	150
8	A	250
9	S	200
10	O	120
11	N	80
12	D	100

From above data

- i) Determine Mean Flow
 - ii) Draw Flow Duration Curve
- 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]

P.T.O.

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 exhausts. 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]

- i) The thermal efficiency of cycle
 - ii) Heat carried away by exhaust gases on per minute basis
- b)** How Kalina (Cheng) Cycle works? Describe with cycle arrangement, advantages and disadvantages. [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)** Define Tri-generation. Describe Tri-generation cycle with block diagram, advantages and applications. [8]

Q5) a) A power generation station with maximum demand as 30 MW having following annual data. Capacity factor = 0.4, Load factor = 0.5 and use factor = 0.5. Determine [6]

- Determine-
- i) Annual energy produced
 - ii) Reserve capacity over and above peak load
 - iii) Number of hours during which plant is not working.
- b)** Why relays are used in power stations? Discuss working of any one relay with diagram. [6]
- c)** List out various methods of thermal energy storage. Describe anyone method with simple diagram. [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 60 MW.
- b) State main functions of switch gear system. Describe working of anyone switch gear system with diagram. [6]
- c) Describe methods of estimation of Energy demand. [5]
- Q7) a)** Explain the working principle of Solar Photovoltaic System. What are advantages and applications of the same? [6]
- b) Discuss the working of flash steam geothermal energy system with diagram and advantages. [6]
- c) Write note on:-Close type (Inert gas) MHD system. [6]

OR

- Q8) a)** Elaborate dolphin type wave machines with diagram and advantages.[6]
- b) Discuss the working of Anderson's Ocean Thermal Energy system with simple diagram and advantages. [6]
- c) Write note on:- Biomass gasifier. [6]

