B.E. / B.Tech. Mechanical Engineering (Model Curriculum) Semester-VI

PECMEL321 / POWPLA1 - Power Plant Engineering

P. Pages : 2 **GUG/S/25/14077**

Time : Three Hours * 2 3 9 4 * Max. Marks : 80

Notes :
1. All questions carry equal marks.
2. Assume suitable data wherever necessary.
3. Diagrams and Chemical equation should be given wherever necessary.
4. Illustrate your answers wherever necessary with the help of neat sketches.
5. Use of slide rule, Logarithmic tables, Steam tables, Mollier's chart, Drawing instruments, Thermodynamic tables for moist air, Psychrometric charts and Refrigeration charts is permitted.
6. Solve 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.

1. a) Discuss the layout of modern steam power plant. Discuss its circuits. **8**

b) Enlist types and role of pulverizing mills. Discuss any pulverizing mill with neat sketch. **8**

OR

2. a) Explain unit system of pulverized fuel handling. **8**

b) What are the advantages of quenching of ash while it's handling? Explain mechanical system of ash handling. **8**

3. a) Draw a neat diagram of CANDU type of nuclear reactor & explain its operation. Give its advantages & disadvantages over other types. **8**

b) Draw a neat diagram of PWR & explain its working. **8**

OR

4. a) Discuss briefly with neat sketch the working of liquid metal cooled reactor .Also state its major advantages and disadvantages. **8**

b) Discuss in brief the different methods of nuclear waste disposal. Also discuss about the importance of nuclear waste disposal. **8**

5. a) Explain the construction and operation of different components of hydro - electric power plants. **8**

b) Discuss briefly with neat sketch the working of Governing of pelton turbine. **8**

OR

6. At a particular site of a river, the mean monthly discharge for 12 month is tabulated below: **16**

Month	April	May	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Discharge (millions of m3/month)	250	100	750	1250	1500	1200	1000	750	750	500	400	300

a) Draw hydrograph for the given discharges and find the average monthly flow.
b) Also draw the flow duration curve.
c) The power available at mean flow of water if available head is 90 m at the site and overall efficiency of the generation is 82 %Take 30 days in a month.

7. a) Discuss closed cycle gas turbine plant in details. **8**

b) Derive the expression for efficiency of constant pressure open cycle gas turbine. **8**

OR

8. Explain the following with neat sketch in details **16**
a) Geothermal power generation
b) Wind power

9. a) What do you mean by load curve? Differentiate between load curve and load duration curve. **8**

b) Explain the following with neat sketch in details. **8**
i) Tariff for electrical energy.
ii) Cost of electrical energy.

OR

10 The following data relate to a 2000 kw diesel power station : The peak load on the plant =1500kw, load factor = 0.4, capital cost per kw installed = Rs1200, **16**
Annual costs = 15 per cent of capital, Annual operating coasts = Rs 50,000, Annual maintenance costs : (a) fixed = Rs 9000 (b) variable = Rs 18,000 cost of fuel = Rs 0.45 per kg, cost of lubricating oil =Rs 1.3 per kg, C.V of fuel = 41,800 kJ/kg, consumption of fuel = 0.45 KJ/kWh, consumption of lubricating oil = 0.002 kg/kWh
Determine the following:
a) The annual energy generated.
b) The cost of generation per kWh

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