

Code No: RT42033D

R13

Set No. 1

IV B.Tech II Semester Regular Examinations, April/May - 2017

POWER PLANT ENGINEERING

(Mechanical Engineering)

Time: 3 hours

Max. Marks: 70

Question paper consists of Part-A and Part-B

Answer ALL sub questions from Part-A

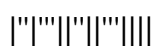
Answer any THREE questions from Part-B

PART-A (22 Marks)

1. a) What is the function of cooling tower? [4]
- b) Draw the layout of diesel power plant? [4]
- c) List out the drainage area characteristics? [4]
- d) State the advantages of fast breeder reactors? [3]
- e) List out the advantages and disadvantages of nuclear plants over conventional thermal plants. [4]
- f) What are fixed and operating costs? [3]

PART-B (3x16 = 48 Marks)

2. a) Enumerate and explain the steps involved in coal handling. [8]
- b) Explain the general layout of ash handling and dust collection systems. [8]
3. a) Draw and explain the layout of modern diesel power plant showing the following systems. [8]
 - (i) Fuel supply system
 - (ii) Lubrication system
- b) Discuss the advantages of combined cycle power generation. Explain the working of GT-ST combined cycle plant. [8]
4. a) What is a spillway? Why are spillways required? What are the different types of spillways? [8]
- b) Explain with a neat sketch a pumped storage hydro plant, state its advantages [8]
5. a) Enumerate and explain the essential components of a nuclear reactor. [8]
- b) Explain about sodium-graphite reactor with a neat sketch [8]
6. a) Explain the working principle of hydroelectric and gas turbine station. [8]
- b) With a neat sketch explain the working of photo cell type smoke meter. [8]
7. a) Define peak load, demand factor, load factor and plant use factor. [8]
- b) Explain briefly various methods of pollution. [8]



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PART-A (22 Marks)

1. a) What are the methods used for handling of coal? [3]
- b) What are the components of gas turbine power plants? [4]
- c) Explain about hydrograph. [4]
- d) Explain the function of nuclear reactor? [4]
- e) State the advantages of combined power plants. [3]
- f) What is the significance of load curves? [4]

PART-B (3x16 = 48 Marks)

2. a) How does a cooling tower operate? Mention its merits and demerits. [8]
- b) Explain the various draught systems with a neat sketch [8]
3. a) Draw a neat line diagram of a diesel power plant showing all the systems and explain the working [8]
- b) Mention the advantages and disadvantages of diesel power plant over a gas turbine power plant? [8]
4. a) State the functions of a dam. How are dams classified? Briefly describe a few important types of dams. How would you select the site and the type of the dam? [10]
- b) How hydro electric power plants are classified? [6]
5. a) Explain with a line diagram, the working of homogeneous reactor. [6]
- b) Sketch and explain gas cooled reactor and also its advantages [10]
6. a) Explain the working of run-of-river plant in combination with steam plant. [8]
- b) Explain with a neat line diagram the circuit to analyse the gas for nuclear radiation. [8]
7. A power station has to supply load as follows:

| Time(hrs) | 0-6 | 6-12 | 12-14 | 14-18 | 18-24 |
|-----------|-----|------|-------|-------|-------|
| Load(MW) | 30 | 90 | 60 | 100 | 50 |

 - (i) Draw the load curve
 - (ii) Draw the load-duration curve
 - (iii) Give a scheme of suitable generating units to supply the level
 - (iv) Calculate load factor, capacity of the plant and plant capacity factor [16]



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PART-A (22 Marks)

1. a) What are the uses of ash? [3]
- b) What are the components of diesel power plants? [3]
- c) Classify different types of dams. [4]
- d) Mention the various types of fast breeders. [4]
- e) List out the techniques for measuring water purity. [4]
- f) How the load duration curve is is constructed. [4]

PART-B (3x16 = 48 Marks)

2. a) Explain the working of spreader stoker with neat sketch. [8]
- b) What are the different types of cooling towers ?Explain with a neat sketch [8]
3. a) Give the classification of gas turbine power plant? [8]
- b) Supercharging-explain with advantages and disadvantages [8]
4. The turn off data of a river at a particular site is tabulated below.

| Month | Mean discharge (millions of cu.m.) | Month | Mean discharge (millions of cu.m.) |
|----------|---------------------------------------|-----------|---------------------------------------|
| January | 30 | July | 80 |
| February | 25 | August | 100 |
| March | 20 | September | 110 |
| April | 0 | October | 65 |
| May | 10 | November | 45 |
| June | 50 | December | 30 |

- (i) Draw the hydrograph and find the mean flow.
- (ii) Draw the flow duration curve.
- (iii) Find the power developed if the head available is 90m and the overall efficiency of generation is 86 percent. Assume each month of 30 days. [16]



5. a) Explain the construction and working of nuclear power plant with a layout [8]
b) Describe with the help of a neat sketch the construction working of a pressurized water reactor. What are the advantages and disadvantages? [8]
6. a) Draw the electric line diagram to measure CO₂ in the flue gases and explain the working [8]
b) Explain the working of pump storage type plant in combination with steam plant. [8]
7. a) What do you understand by load factor and capacity factor? When are they numerically equal? [8]
b) What are the various costs involved in power plant? Discuss briefly. [8]



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Set No. 4

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Answer ALL sub questions from Part-A

Answer any THREE questions from Part-B

PART-A (22 Marks)

1. a) What is the function of a coal crusher [4]
- b) What are the different types of engines used in diesel power plants? [3]
- c) Define Spill way? Classify different types of spill ways. [4]
- d) How the nuclear reactors are classified? [4]
- e) Explain the importance of measurement in power plant [4]
- f) What do you mean by diversity factor? [3]

PART-B (3x16 = 48 Marks)

2. a) Explain the working principle of cyclone furnace with neat diagram. [8]
- b) Classify the pulverised fuel burners and list the requirements of them. [8]
3. a) List the essential components of gas turbine power plant and explain them briefly [8]
- b) Explain how engines are selected for diesel power plants [8]
4. a) What you mean by storage and pondage. Why are they required? [8]
- b) What do you understand by pumped storage plant? [8]
5. a) Explain the working of a typical fast breeder nuclear power plant with neat diagram. [8]
- b) Explain briefly about radiation hazards and scheduling? [8]
6. a) Explain the magnetic wind method for the measurement of O₂ in the flue gases. [8]
- b) Explain the working of run-off-river plant in combination with steam plant. [8]
7. a) Define pollution and pollutants. [8]
- b) Estimate the generating cost per unit supplied from a power plant having the following data [8]
Plant capacity = 120 MW.
Capital cost = Rs.600 × 10⁶
Annual load factor = 40 %
Annual cost of fuel, taxation, oil and salaries = Rs.500000
Interest and depreciation = 12 %

