Power Plant Engineering VTU Question Paper Set

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10ME833

Eighth Semester B.E. Degree Examination, Dec.2015/Jan.2016

Power Plant Engineering

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions, selecting at least TWO questions from each part.***

PART – A

1 a. Draw the general layout of steam power plant and explain the component of it. **(08 Marks)**

b. With a neat sketch and combustion equations explain overfeed and underfeed mechanism of burning coal. **(06 Marks)**

c. List the advantages and disadvantages of pulverized fuel. **(06 Marks)**

2 a. Sketch and explain Loeffler coiler and also justify why forced circulation is necessary for high feature boiler. **(10 Marks)**

b. List and explain in brief the feature and advantages of high process boiler. **(07 Marks)**

c. List the steps in coal handling. **(03 Marks)**

3 a. With a neat diagram explain indirect dry cooling lower with conventional surface condenses and also draw temperature path lengths. **(08 Marks)**

b. With a simple sketch explain brick type regenerative air preheater. **(08 Marks)**

c. List and explain the different method of controlling the temperature of superheated steam. **(04 Marks)**

4 a. List advantages disadvantages and applications of direct engine power plant. **(12 Marks)**

b. Sketch and explain open cycle gas turbine with T – S diagram. **(08 Marks)**

PART – B

5 a. Explain the terms hydrograph, Mass curve water hammer, surge tank and Penstocks. **(10 Marks)**

b. The run off data of a river at a particulars site is tabulated below.

Month	Mean discharge in millions of m^3/ month	Month	Mean discharge in millions of m^3/ month
Jan	40	July	70
Feb	25	Aug	100
Mar	20	Sep	105
Apr	10	Oct	60
May	0	Nov	50
June	50	Dec	40

i) Draw a 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 100 m and overall efficiency of generation is 80%. **(10 Marks)**

6 a. Sketch and explain liquid metal reactor. **(03 Marks)**

b. Define the terms Mass deflect, fission reaction and nuclear fuels. **(07 Marks)**

c. Define multiplication Ratio and explain the conditions to be satisfied for self sustained chained reaction to calenture. **(10 Marks)**

7 a. Define load factor, diversity factor, plant capacity factor demand factors and plant use factor. **(10 Marks)**

b. The peak load for a power station is 35MW the loads having maximum demands of 20MW, 10MW, 5MW and 7MW are connected to the power station. The are connected to the power elation. The capacity of power elation is 40MW and annual load factors is 55%

Find :

i) Average load on power elation

ii) Annual energy supplied

iii) Demand factor

iv) Diversity factor **(10 Marks)**

8 a. Explain briefly straight line meter, step meter and block meter tariff. **(09 Marks)**

b. List the requirement of tariffs. **(05 Marks)**

c. Explain the performance and operating characteristics of power plant. **(06 Marks)**

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10ME833

Eighth Semester B.E. Degree Examination, June/July 2016
Power Plant Engineering

Time: 3 hrs. Max. Marks:100

Note: 1. ***Answer FIVE full questions, selecting at least TWO questions from each part.***
2. Use of steam tables/cost analysis charts/ TD handbook is permitted.

PART – A

1 a. Explain the working of a spreader stoker with the help of a neat diagram and state its limitations. **(10 Marks)**

b. Sketch and explain the following pulverized fuel handling systems:
i) Unit system ii) Central or bin system **(10 Marks)**

2 a. Mention the important properties of coal used in power plant applications. **(05 Marks)**

b. What are the principal advantages of forced circulation boilers? **(05 Marks)**

c. What are the factors to be considered in selection of a boiler? Explain with a neat diagram, a Velox boiler. **(10 Marks)**

3 a. Explain Draught and give its classification. **(06 Marks)**

b. Explain the function of a superheater and mention its advantages. **(04 Marks)**

c. A chimney of 28 m high and the temperature of hot gases inside the chimney is 320°C. The temperature of outside air is 23°C and furnace is supplied with 15 kg of air per kg of coal burnt. Calculate:
i) Draught in mm of water
ii) Draught head in meters of hot gases. **(10 Marks)**

4 a. State the applications of diesel engines in power field. **(05 Marks)**

b. What are the advantages and disadvantages of diesel power plant and gas turbine power plant? **(05 Marks)**

c. Explain air intake and admission system of diesel power plant with a neat sketch and mention the precautions should be taken care while constructing it. **(10 Marks)**

PART – B

5 a. Hydro projects are developed for what purpose? List the advantages and disadvantages of hydro electric power plants. **(10 Marks)**

b. The mean monthly discharge at a particular site is given in table below. Draw the hydrograph and the flow duration curve.

Month	Discharge, m^3/s	Month	Discharge, m^3/s
January	200	July	2000
February	450	August	2400
March	600	September	1800
April	1200	October	1200
May	1500	November	800
June	1600	December	400

(10 Marks)

6 a. Explain Pressurized Water Reactor (PWR) power plant with a neat schematic diagram. **(08 Marks)**

b. Write short notes on disposal of radioactive wastes. **(04 Marks)**

c. Explain with a neat sketch the elements of the nuclear reactor. **(08 Marks)**

7 a. Define the following:

i) Load factor
ii) Utility factor
iii) Capacity factor
iv) Demand factor
v) Diversity factor **(10 Marks)**

b. A power station has to supply load as follows:

Time (hrs)	0-6	6-12	12-14	14-18	18-24
Load (MW)	45	135	90	150	75

i) Draw the load curve.
ii) Draw load duration curve.
iii) Choose suitable generating units to supply the load.
iv) Calculate the load factor.
v) Calculate the plant capacity factor. **(10 Marks)**

8 a. Name some important remedies to reduce the cost of power generation. **(05 Marks)**

b. For what purpose the expenses are made in a construction cost of a power plant? **(05 Marks)**

c. The capital cost of a power generating equipment in a steam power plant is RS 80×10^6. The useful life of the plant in 30 years and its salvage value is 5% of the capital cost. Determine by the sinking fund method the amount of money to be saved annually for replacement if yearly rate of compound interest is 6%. **(10 Marks)**

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10ME833

Eighth Semester B.E. Degree Examination, Dec.2014/Jan.2015

Power Plant Engineering

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions, selecting at least TWO questions from each part.***

PART – A

1 a. Explain with a neat sketch the principle of "overfeed stoker". **(06 Marks)**

b. Sketch and explain the following pulverized fuel handling system:
i) unit system
ii) bin system. **(10 Marks)**

c. List the advantages of stoker firing over pulverized system of firing. **(04 Marks)**

2 a. Classify the ash handling system. Explain pneumatic or vacuum extraction ash handling system with a neat sketch. **(10 Marks)**

b. Explain with a neat sketch the working of a Benson boiler. Mention its advantages. **(10 Marks)**

3 a. Define draught. Sketch and explain induced draught. **(06 Marks)**

b. What is a cooling tower? Explain the working of natural draught hyperbolic cooling tower with a neat sketch. **(07 Marks)**

c. Explain the functions of economizer and air preheater. Also, differentiate between regenerative and recuperative air preheater. **(07 Marks)**

4 a. With a neat sketch, explain diesel engine exhaust system. **(05 Marks)**

b. With a neat sketch, explain thermostat cooling method employed in diesel engines. **(05 Marks)**

c. List the advantages of a gas turbine power plant. With a neat sketch, explain closed cycle gas turbine plant. **(10 Marks)**

PART – B

5 a. With a neat sketch, explain the pumped storage plant. Mention its advantages. **(07 Marks)**

b. What is a surge tank? Why is it important in a hydro-plant? **(03 Marks)**

c. The run off data of a river at a particular site is tabulated below:

Month	Mean discharge in millions of Cu m per month	Month	Mean discharge in millions of Cu m per month
Jan	80	July	150
Feb	50	Aug	200
Mar	40	Sep	250
Apr	20	Oct	120
May	0	Nov	100
June	100	Dec	80

i) Draw a 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 100 m and overall efficiency of generation is 80%. **(10 Marks)**

6 a. With the help of a neat sketch, show the important parts of a nuclear reactor describing briefly the function of each part. **(08 Marks)**

b. Sketch and explain Sodium-Graphite reactor. Mention its advantages. **(08 Marks)**

c. Write a short note on radiation hazards. **(04 Marks)**

7 a. What are the considerations to be made while selecting the suitable site for a power plant? **(04 Marks)**

b. What is a load curve? Give the graphical representation of a load curve. What is its significance in power generation? **(06 Marks)**

c. Explain the following terms:
i) Load factor
ii) Capacity factor
iii) Demand factor
iv) Diversity factor
v) Plant use factor **(10 Marks)**

8 a. Discuss in detail the performance and operating characteristics of power plants. **(10 Marks)**

b. What do you understand by the term "tariff"? List various types of tariffs and explain any two of them with graphical representation. **(10 Marks)**

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10ME833

Eighth Semester B.E. Degree Examination, June/July 2015
Power Plant Engineering

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting atleast TWO questions from each part.***

PART – A

1 a. What are the advantages of stoker firing? Explain the working of traveling grate stoker with a simple sketch. State its outstanding features. **(10 Marks)**

b. What is pulverized coal? Explain the BIN system of handling pulverized coal with a neat diagram. List the advantages and disadvantages of using pulverized coal. **(10 Marks)**

2 a. Draw a neat diagram of velox boiler and explain its working and advantages. **(10 Marks)**

b. Classify the ash handling system. Explain the working principle of mechanical handling system with neat sketch. **(10 Marks)**

3 a. Explain with sketch: i) Super heater; ii) Desuperheater. **(08 Marks)**

b. Describe the working principle of natural draught cooling tower with neat sketch. **(04 Marks)**

c. Explain the importance of cooling tower in a steam power plant. **(02 Marks)**

d. Calculate the mass of flue gases flowing through the chimney when the draught produced is equal to 2.0cm of water. Temperature of flue gases is 290°C and ambient temperature is 27°C. The flue gases formed per kg of fuel burnt are 23kg. Neglect the losses and take the diameter of the chimney as 1.9m. **(06 Marks)**

4 a. Explain the necessity of cooling systems in diesel engine. What are the methods of cooling the engine? Explain. **(06 Marks)**

b. Explain the importance of lubrication system in diesel power plant. **(04 Marks)**

c. List at least six advantages and four disadvantages of diesel engine power plant. **(05 Marks)**

d. Explain the working principle of closed cycle gas turbine with neat sketch. **(05 Marks)**

PART – B

5 a. What are the advantages and disadvantages of hydro electric plants? **(08 Marks)**

b. Explain the following:
i) Hydrographs ii) Storage and pondage iii) Water hammer. **(12 Marks)**

6 a. With the help of sketch show all the important parts of nuclear reactor describing briefly the function of each part. **(08 Marks)**

b. Explain the characteristic feature of a boiling water reactor. What do you mean by internal and external circulation? **(08 Marks)**

c. Write short notes on disposal of radioactive wastes. **(04 Marks)**

7 a. Define the following terms:
i) Peak load ii) Demand factor iii) Load factor iv) Diversity factor. **(08 Marks)**

b. What are considerations to be made while selecting the suitable site for a thermal and a nuclear power plants? **(06 Marks)**

c. A base load power station and stand by power station share a common load as follows:

Base load station annual output	$= 180 \times 10^6$ kWh
Base load capacity	= 42 MW
Maximum demand on base load station	= 36 MW
Standby station capacity	= 22 MW
Standby station annual output	$= 17 \times 10^6$ kWh
Maximum demand (peak load) on standby station	= 18 MW

Determine the following for both power stations i) Load factor ii) Capacity factor. **(06 Marks)**

8 a. Enumerate various type of tariff and explain any two of them. **(08 Marks)**

b. What are the objectives and requirements of tariff? **(04 Marks)**

c. Explain the performance and operating characteristics of power plant. **(08 Marks)**

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10ME833

Eighth Semester B.E. Degree Examination, June/July 2014

Power Plant Engineering

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions, selecting at least TWO questions from each part.***

PART – A

1 a. Draw a general layout of a steam power plant, showing the different circuits and system and explain them. **(10 Marks)**

b. Explain with a neat sketch of chain grate stoker. **(06 Marks)**

c. Write the merits and demerits of pulverized coal. **(04 Marks)**

2 a. What are the requirements of good coal handling plant? **(04 Marks)**

b. Explain with neat sketch: i) Benson boiler, ii) Loeffler boiler **(12 Marks)**

c. What are characteristics of a good ash handling plant? **(04 Marks)**

3 a. Explain the forced, induced, balanced draught chimneys. **(06 Marks)**

b. Explain with sketch: i) Air preheater, ii) Superheater. **(08 Marks)**

c. Calculate the mass of flue gases flowing through the chimney when the draught produced is equal to 1.9 cm of water. Temperature of flue gases is 290°C and ambient temperature is 20°C. The flue gases formed per kg of fuel burnt are 23 kg. Neglect the losses and take the diameter of the chimney as 1.8 m. **(06 Marks)**

4 a. Explain with neat sketch the air intake system and exhaust system of diesel power plant. **(12 Marks)**

b. Sketch and explain the layout of a diesel engine power plant. **(08 Marks)**

PART – B

5 a. Explain the following:
i) Water hammer ii) Pumped storage plant iii) Surge tank on ground level **(12 Marks)**

b. What are the advantages and disadvantages of hydro-electric plants? **(08 Marks)**

6 a. Give the classification of nuclear reactors. **(06 Marks)**

b. Sketch and explain gas cooled reactor and also list its advantages. **(10 Marks)**

c. What are safety measures for nuclear power plants? **(04 Marks)**

7 a. Define: i) Demand factor, ii) Load factor, iii) Diversity factor
iv) Utilization factor v) Capacity factor vi) Use factor **(12 Marks)**

b. A base load power station and standby power station share a common load as follows:
Base load station annual output = 180×10^6 KWh; Base load station capacity = 42 Mw; Maximum demand on base load station = 36 MW; Standby station capacity = 22 MW; Standby station annual output = 17×10^6 KWh; Maximum demand (peak load) on standby station = 18 MW.
Determine the following for both power stations:
i) Load factor ii) Capacity (or plant) factor. **(08 Marks)**

8 a. Explain the performance and operating characteristics of power plant. **(08 Marks)**

b. Give the requirements of Tariff. **(04 Marks)**

c. What are different types of tariffs? Explain any two of them. **(08 Marks)**

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