

Code No: 117GP

R13

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech IV Year I Semester Examinations, March - 2017

POWER PLANT ENGINEERING

(Mechanical Engineering)

Time: 3 Hours

Max. Marks: 75

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

Part- A (25 Marks)

- 1.a) What are different components of pulverized fuel burning system? [2]
- b) Differentiate between underfeed and overfeed fuel bed systems. [3]
- c) Explain the starting equipment used for the internal combustion engine power plant. [2]
- d) Explain the principle of operation of fuel cell used for power generation. [3]
- e) Explain different non conventional sources for power generation. [2]
- f) Differentiate between dams and spillways used in hydro electric power plants. [3]
- g) What are the major sources for the radiation hazards in nuclear power plants? [2]
- h) Explain the breeding materials used for the chemical reaction in the nuclear power plants. [3]
- i) Define the terms demand factor, diversity factor and load factor. [2]
- j) Explain the effects of effluents on the environment and human health. [3]

Part-B (50 Marks)

- 2.a) What are different methods used for collection of the dust before sending the flue gas through chimney? Explain them with suitable diagrams.
- b) Explain ash handling cycle layout for the thermal power plant and discuss the salient features. [5+5]

OR

- 3.a) Discuss the constructional and operational features of retort stokers used in thermal power plants.
- b) What are different types of hoppers used for coal in steam power plants? Explain them. [5+5]

- 4.a) Draw the schematic diagram of magneto hydrodynamic direct energy conversion power generation unit along with their auxiliary components and discuss the principle.
- b) What type of fuel injection system is used in internal combustion engine power plants? Explain the merits and demerits. [5+5]

OR

- 5.a) Compare the principle of operation of combined cycle power plant with the cogeneration unit along with their limitations.
- b) Differentiate between closed cycle and open cycle power plants along with their advantages. [5+5]

- 6.a) What is Hydrological cycle? Explain its significance in locating the site and design of hydro electric power plants.
- b) How to make use of the tides for power generation based on their capacities? Explain the principle of operation. [5+5]

OR

- 7.a) Explain the characteristics of hydrographs with respect to the power generation along with the suitable curves.
- b) Differentiate between the constructional and working of horizontal axis wind turbine and vertical axis wind turbines. [5+5]

- 8.a) What are the byproducts formed during nuclear fission and fusion reactions in the nuclear power plants? Explain their applicability.
- b) Explain the principle of operation of boiling water reactor used for power generation along with a neat sketch. [5+5]

OR

- 9.a) How the Graphite can be used in the nuclear power plant reactors? Explain the special requirement of Graphite in the reactions.
- b) How to make use of the gas for the cooling of a chemical reactor in the nuclear thermal power plants? Explain with a suitable diagram. [5+5]

- 10.a) Draw the load curve for the power requirement in India and discuss the methods to fulfill the part load conditions.
- b) A power station has the installed capacity of 150 MW. Calculate the cost of generation. Capital cost = Rs. 140×10^6 . Rate of interest and depreciation = 20 %; Annual cost of fuel oil, salaries and taxation = Rs. 30×10^6 ; Load factor = 42 %. [5+5]

OR

- 11.a) What are different pollutants evolved from the thermal and nuclear power plants? Explain the methods to control them.
- b) The following data is given for a steam power plant: Maximum Demand 25,000 kW; Load factor 40%; Coal consumption 0.86 kg/kWh; Boiler efficiency 85%; Turbine efficiency 90%; Price of coal Rs. 55 per Ton; Determine: i) Thermal efficiency of the station ii) Coal bill of the station for one year. [5+5]

---ooOoo---

Code No: 117GP**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech IV Year I Semester Examinations, November/December - 2016****POWER PLANT ENGINEERING
(Mechanical Engineering)****Time: 3 Hours****Max. Marks: 75**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART- A**(25 Marks)**

- 1.a) List out the fuel and handling equipments. [2]
- b) Classify cooling Towers used in power plants. [3]
- c) What is meant by super charging? [2]
- d) Differentiate the open and closed cycle of GT. [3]
- e) What is the need of spill ways? [2]
- f) What is VAWT? [3]
- g) What is meant by Fertile materials in nuclear fuels? [2]
- h) What are the types of nuclear reactors? [3]
- i) What is the need of load curves? Explain. [2]
- j) How to control the pollution? [3]

PART –B**(50 Marks)**

- 2.a) Explain the basic FBC system with line diagram.
- b) Draw line diagram and explain the working of hydraulic cooling tower. [5+5]

OR

- 3.a) With the help of line diagram, explain the central pulverized fuel handling system.
- b) What draught system is used and explain its significance. [5+5]

- 4.a) Which types of I.C Engines are used in diesel power plant and explain them in detail.
- b) Explain the working details with line diagram of MHD generation. [5+5]

OR

- 5.a) Explain the working details of gas turbine power plant indicating all auxiliaries.
- b) Draw the schematic representation of Fuel cell and explain its working (Hydrogen and oxygen). [5+5]

- 6.a) Compare and contrast between storage and pondage.
- b) Draw line diagram and explain how the low temperature solar power plant. [5+5]

OR

- 7.a) Draw the line diagram and explain the working details of hydro power plant giving salient points.
b) Draw the general layout of tidal power plant and what are the limitations of that plant. [5+5]
- 8.a) What are the principal parts of a nuclear reactor? Explain the working of each part.
b) Draw the line diagram and explain the working of Gas cooled reactor. [5+5]
- OR**
- 9.a) What are the radiation hazards and also explain the effect of shielding.
b) Draw the line diagram and explain the pressurized water reactor and its limitations. [5+5]
- 10.a) Enumerate briefly various methods used to calculate the depreciation cost.
b) A generation station supplies the following loads 15MW, 12MW, 8MW and 0.5MW. The station has a maximum demand of 20MW and the annual load factor is 0.5. Find
i) Number units supplied annually ii) Diversity factor [5+5]
- OR**
- 11.a) Enumerate the latest pollution laws in existence.
b) The yearly duration curve of a certain plant can be considered as a straight line from 150 MW to 40 MW. The power is supplied with one generating unit of 100 MW and two units of 40MW each. Calculate installed capacity, load factor, Plant factor, utilization factor and Maximum demand. [5+5]

---ooOoo---

R13

Code No: 117GP

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech IV Year I Semester Examinations, November/December - 2017

POWER PLANT ENGINEERING

(Mechanical Engineering)

Time: 3 Hours

Max. Marks: 75

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A.

Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART- A

(25 Marks)

- 1.a) What are the different coal handling and transfer equipments? [2]
- b) What is pulverization? Why is it done? [3]
- c) What are the various systems that form part of a diesel power plant? [2]
- d) What is meant by a gas turbine with reheating arrangement? [3]
- e) What is tidal energy? How tidal power can be generated? [2]
- f) What is catchment area? [3]
- g) What are fertile materials and fissile materials? [2]
- h) What is meant by critical mass (of fuel) in a reactor? [3]
- i) Define connected load and demand factor. [2]
- j) Define diversity factors and load factor. [3]

PART-B

(50 Marks)

- 2.a) Draw the line diagram and explain the different components used in steam power plant.
 - b) Describe different types of coal conveyors. [5+5]
- OR**
3. Draw a neat diagram of cyclone burner and explain its outstanding features. [10]
 4. What is meant by super charging diesel engines? Why it is used? Indicate the features of mechanical supercharging and turbo charging? [10]
- OR**
- 5.a) What are the various factors to be considered while selecting the site for diesel engine power plant?
 - b) What are the methods by which solar energy can be converted into electricity? [5+5]
6. Explain the layout (showing the various components) and operation of a hydroelectric power plant. [10]
- OR**
7. What are the different types of hydroelectric power plants? Explain in brief. [10]

AG AG AG AG AG AG AG A

8. Explain briefly the construction and operation of a nuclear reactor. [10]

OR

9.a) Explain briefly the terms neutron flux, reaction rate and multiplication factor.

b) How are nuclear reactors classified? What is a fast breeder reactor? [5+5]

AG AG AG AG AG AG AG A

10.a) Write a note on "Pollution from atomic power station".
b) Discuss in detail the environmental hazards in respect of thermal power plants. [5+5]

OR

11.a) What are the different methods used to control SO₂ in the flue gases.

b) What you understand by thermal shielding? [5+5]

AG AG AG AG AG AG AG A

---ooOoo---

AG AG AG AG AG AG AG A

AG AG AG AG AG AG AG A

AG AG AG AG AG AG AG A

AG AG AG AG AG AG AG A

AG AG AG AG AG AG AG A