

KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY

Department of Mechanical Engineering

B. Sc. Engineering 3rd Year Backlog Examination, 2021

ME 3223

(Power Plant Engineering)

Time: 3 Hours

Total Marks: 210

N.B.: i) Answer any THREE questions from each section in separate scripts.

ii) Figures in the right margin indicate full marks.

iii) Assume reasonable data if any missing.

SECTION-A

- 1(a) Describe the present power generation situation of Bangladesh. 12
- 1(b) Classify power plants in detail. 07
- 1(c) Distinguish between base load and peak load power plants. What types of power plant is suitable for peak load power plant? 08
- 1(d) A power station is said to have a use factor of 47% and capacity factor of 40%. For how many hours in a year was the power station not in service? 08
- 2(a) What factors should be considered while selecting a site for power plant? 09
- 2(b) Explain the various fixed and operating cost of electricity generation. 08
- 2(c) Explain the diminishing value method of calculating depreciation. 06
- 2(d) Calculate the energy cost per kWhr for a power station having the following data: 12
Installed capacity of the plant = 120 MW, Capital cost = Tk. 35 crores, rate of interest = 8.5%, rate of depreciation = 7%, annual cost of fuel = Tk. 28 lacs, salaries and taxation = Tk. 10 lacs, annual load factor = 60%.
Also calculate the increase of cost per kWhr if the annual load factor decreases to 45%.
- 3(a) Discuss the classification of hydro-electric power station with neat sketch. 10
- 3(b) What are the function of surge tank and dam of a hydro power plant? 06
- 3(c) State the advantages and disadvantages of hydro-electric power plant. 07
- 3(d) Determine the HP developed from a hydro-electric power plant with the following data: 12
Catchment area of reservoir = 3×10^8 m², mean head = 42 m, annual average rainfall = 110 cm, overall efficiency of power station = 65%, load factor = 45% and run off = 75%.
- 4(a) Discuss the advantages and disadvantages of nuclear power plant. 10
- 4(b) Draw a neat sketch of a nuclear reactor. Explain the function of its various components. 12
- 4(c) What is meant by enrichment? Explain the fuel fabrication procedure in the nuclear power plant. 08
- 4(d) What are the advantages of CANDU reactor? 05

SECTION-B

- 5(a) What are the essential equipments of steam power plant? Discuss the pipe network of the plant. 10
- 5(b) Briefly describe the various steps involved in coal handling of a steam power plant. 10
- 5(c) Describe a ball and race mill for pulverize coal with neat sketch. 07
- 5(d) What is fluidized bed combustion (FBC)? State the advantages of FBC system. 08

6(a)	What are the types of dust collector? Describe the ESP with necessary sketch.	10
6(b)	Briefly explain 'overfeed' and 'under-feed' principles of firing with necessary diagram.	10
6(c)	Why treatment of water is necessary before using it as feed water? Classify water treatment processes.	10
6(d)	What is the cause of smoke?	05
7(a)	Sketch a diesel engine power plant with all major auxiliary equipment.	09
7(b)	What are the methods of starting a diesel power plant? Describe the starting procedure of Gopalganj 100 MW peaking power plant.	10
7(c)	State the functions of lubricant in diesel engine.	05
7(d)	What are the different ways for improving the performance of a gas turbine power plant? Explain with neat sketch.	11
8(a)	Describe the combined working of gas turbine and steam power plant.	11
8(b)	What are the purposes of chimney? Derive an expression for the height of a chimney.	12
8(c)	What is the function of cooling tower in a power plant? Describe the working procedure of a dry type cooling tower.	12