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Question Paper Code : 41417

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2018

Fifth/Seventh Semester

Mechanical Engineering

ME 6701 – POWER PLANT ENGINEERING

(Common to Mechanical Engineering (Sandwich)/Electrical and Electronics Engineering)

(Regulations 2013)

Time : Three Hours

Maximum : 100 Marks

Answer ALL questions.

PART – A

(10×2=20 Marks)

1. What is a super critical boiler ?
2. What are binary cycles ? Give examples.
3. Draw the P-V diagram of dual cycle.
4. What are the applications of gas turbine power plants ?
5. List out the important components of a nuclear reactor.
6. What are breeder reactors ?
7. How are winds formed ?
8. What is a fuel cell ?
9. Define utility factor.
10. What are chronological load curves ?

PART – B

(5×13=65 Marks)

11. a) i) Discuss the various steps involved in coal handling systems. (5)
ii) Briefly discuss the commonly used ash handling systems. (8)
(OR)
b) Explain the working and advantages of a fluidized bed combustion system. (13)
12. a) Describe the functions and types of fuel injection systems. (13)
(OR)
b) i) Write a brief note on starting systems of gas turbine. (5)
ii) With the help of neat diagram, explain the working of combined gas turbine and steam turbine plant. (8)



13. a) i) Write a note on nuclear fuels. (5)
ii) Write the points to be considered for selecting sites for nuclear power plant. (8)

(OR)

- b) Explain the working of a pressurized water reactor with a schematic diagram. (13)

14. a) i) Explain briefly the essential features of hydroelectric power plant. (8)
ii) State the advantages of inward flow reaction turbine over outward flow reaction turbine. (5)

(OR)

- b) i) Explain the operation of a fixed dome type digester biogas plant. (6)
ii) Describe the working of hydrogen-oxygen fuel cell. (7)

15. a) i) What are the basic requirements of energy tariffs? (5)
ii) Explain the elements of operating expenditure of a power plant. (8)

(OR)

- b) Determine the thermal efficiency of a steam power plant and its coal bill per annum using the following data :
Maximum demand = 24000 kW, Load factor = 40%, Boiler efficiency = 90%
Turbine efficiency = 92 %, Coal consumption = 0.87 kg/Unit
Price of coal = Rs. 280 per tonne. (13)

PART - C

(1×15=15 Marks)

16. a) A 2-cylinder C.I. engine with a compression ratio 13:1 and cylinder dimensions of 200 mm × 250 mm works on two stroke cycle and consumes 14 kg/h of fuel while running at 300 rpm. The relative and mechanical efficiencies of engine are 65% and 76% respectively. The fuel injection is effected upto 5% of stroke. If the calorific value of the fuel used is given as 41800 kJ/kg, calculate the mean effective pressure developed. (15)

(OR)

- b) A four-stroke diesel engine has a piston diameter of 16.5 cm and a stroke of 27 cm. The compression ratio is 14.3, the cut-off a 4.23% of the stroke and the mean effective pressure 4.12 bar. The engine speed is 264 rpm and the fuel consumption is 1.076 kg of oil per hour, having a calorific value of 39150 kJ/kg. Calculate the relative efficiency of the engine. (15)