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Roll No

ME-6002-CBGS

B.E. VI Semester

Examination, June 2020

Choice Based Grading System (CBGS) Thermal Engineering and Gas Dynamics

Time : Three Hours

Maximum Marks : 70

- Note:** i) Attempt any five questions.
ii) All questions carry equal marks.

1. a) Explain with neat sketches the construction and working of Benson boiler. 7
b) What do you understand by the term chimney efficiency? Derive the expression for chimney height. 7
2. a) Discuss the limitations of Carnot vapour cycle. Also draw the P-V and H-S diagram for ideal Rankine cycle. 7
b) In a Rankine cycle, the steam at inlet to turbine is saturated at a pressure of 35 bar and the exhaust pressure is 0.2 bar. Determine: 7
 - i) The pump work
 - ii) The Turbine work
 - iii) The Rankine efficiency
 - iv) The condenser heat flow
 - v) The dryness at the end of expansion.Assume flow rate of 9.5 kg/s.
3. a) Define mach number write the significance of mach number. 7
b) Define Mach cone, stagnation and critical pressure ratio. 7
4. a) What is the effect of atmospheric condition on the output of a compressor? 7

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- b) A multi-stage air compressor is to be designed to elevate the pressure from 1 bar to 125 bar such that stage pressure ratio will not exceed 4. Determine: 7
- i) Number of stages
 - ii) Exact stage-pressure ratio
 - iii) Intermediate pressures
5. a) What do you mean by a supersaturated flow? Explain with the help of h-s diagram. 7
- b) Steam initially dry and saturated is expanded in a nozzle from 15 bar at 300°C to 1.0 bar. If the frictional loss in nozzle is 12% of the total heat drop. Calculate the mass of steam discharged when exit diameter of the nozzle is 15mm. 7
6. a) Classify the surface condensers and explain with neat sketch the working of evaporative condenser. 7
- b) Define cooling towers. Write the various types of cooling towers used in power plants. 7
7. a) The following data were taken during the test on a boiler for a period of one hour: 7
Steam generated = 5000 kg; coal burnt = 700 kg; calorific value of coal = 31402 kJ/kg, quality of steam = 0.92. If the boiler pressure is 1.2 MPa and the feed water temperature is 45 °C, find the boiler equivalent evaporation and the efficiency.
- b) Explain with neat diagram the working of a Binary vapour cycle. 7
8. Write short notes on any three: 14
- i) Ash handling of thermal power plant
 - ii) Advantages of multi staging
 - iii) Normal shock
 - iv) Velocity coefficient
 - v) Condition for minimum work done in compressor.

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