Code No: 125ER/115ER

R15/R13

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech III Year I Semester Examinations, March - 2021
THERMAL ENGINEERING - II
(R15-Common to ME, AME; R13-Mechanical Engineering)

Time: 3 Hours **Max. Marks: 75**

Answer any five questions
All questions carry equal marks
- - -

1.a) What are the different thermodynamic variables affecting efficiency and output of Rankine cycle. Explain their influence on Rankine cycle.
b) What do you mean by stoichiometric air fuel ratio? Explain the method to estimate the air fuel ratio. [8+7]

2. Mention any three boiler mountings and three Accessories with neat sketches. [15]

3.a) What is the condition for maximum discharge through the chimney in terms of flow gas temperature and boiler house temperature.
b) In surface condenser the vacuum maintained is 700 mm of Hg. The barometer reads 754mm. If the temperature of condensate is 18 ^{0}C, Determine (i) mass of air per kg of steam (ii) Vacuum Efficiency. [7+8]

4. Steam leaves the nozzle of a single-stage impulse turbine at 840 m/s. The nozzle angle is 18^0 and the blade angles are 29^0 at the inlet and outlet. The friction coefficient is 0.9. Calculate (a) blade velocity (b) steam mass flow rate in kg/h to develop 300 kW power. [7+8]

5.a) Explain the operating principle of Brayton cycle with a schematic diagram p-v and T-s diagrams.
b) A simple gas turbine cycle works with a pressure ratio of 8. The compressor and turbine inlet temperatures are 300 K and 800 K respectively. If the volume flow rate of air is 250 m^3/s, compute the power output and thermal efficiency. [7+8]

6.a) Dry saturated steam expands through a nozzle from a pressure of 13.7 bar down to 9.6 bar. Assuming the flow to be frictionless and adiabatic, estimate velocity of steam jet.
b) What is degree of reaction for steam turbine? Derive its equation for reaction turbine. [7+8]

7.a) Explain working of turbo prop engine with a neat sketch.
b) Explain the advantages and disadvantages of bipropellants used in rocket engines over monopropellants. [8+7]

8.a) Differentiate between jet condensers and surface condensers.
b) Draw the schematic diagram of solid propellant rockets and discuss its working principle. [7+8]

---ooOoo---