Code No: 125ER

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech III Year I Semester Examinations, August - 2022
THERMAL ENGINEERING - II
(Mechanical Engineering)

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

Answer any five questions
All questions carry equal marks
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1.a) Show that the thermal efficiency of a regenerative cycle is always greater than that of a simple Rankine cycle regardless of where steam is tapped off?
b) Discuss the advantages of reheating the steam in high-pressure steam plants. [8+7]

2.a) Enumerate the characteristics of good fuel. What is meant by dry and wet analysis of the products of combustion?
b) Write a short note on adiabatic flame temperature. [8+7]

3.a) Classify the boilers based on the temperature and pressure limits.
b) Draw the line diagram of the Volex boiler and mention its pressure limits. [7+8]

4.a) Derive the equation for maximum discharge in nozzles.
b) In a nozzle steam expands from 12 bar and 300 ^{0}C to 6 bar with a flow rate of 5 kg/s. Determine throat and exit area if exit velocity is 500 m/s and velocity at the inlet to the nozzle is negligible. Also, find the coefficient of velocity at exit. The coefficient of velocity is the ratio of the actual velocity of the fluid at nozzle exit to the velocity at exit considering isentropic flow through the nozzle. [5+10]

5.a) Why compounding is necessary for steam turbines? What are the types and explain any one type of compounding with a neat sketch?
b) Sketch the velocity diagram of a single-stage impulse turbine and determine the expression for the force, work done, diagram efficiency and axial thrust. [8+7]

6. What is a condenser? How are they classified? Sketch and describe the operation of any one Jet condenser used in power plants. [15]

7. Explain the working of a gas turbine with Inter cooling and Reheating and derive its thermal efficiency with the help of P-V and T-S diagram. [15]

8.a) State the fundamental differences between jet propulsion and rocket propulsion.
b) List out the requirements of ideal rocket propellant and give the applications of rockets. [7+8]

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