

Roll No.....

Total No. of page(s): 1

BT-4/M-20: 34116
ME-204N: Steam Generation & Power

Time: 3 hrs]

[Max. Marks: 75

Q.N.	Note: - Attempt <i>only five</i> questions, selecting <i>one</i> question from each unit. Students can use steam table to solve numerical problems. Assume missing data, if any.	MM
UNIT -I		
I	(a) Discuss the chief advantages of water tube boilers over fire tube boilers.	7
	(b) Explain why the superheater tubes are flooded with water at the starting of the boilers?	8
II	(a) What do you understand by steam jet draught? Where it is generally used?	7
	(b) Derive the expression for height of a chimney.	8
UNIT -II		
III	The steam at 20 bar and 360°C expands in a turbine to a pressure of 0.08 bar. The steam coming out of turbine is condensed in a condenser to saturated liquid water. Then the pump feeds back to water (condensate) to the boiler. Assuming ideal processes, find out the cycle efficiency and power developed if the steam flow rate is 25 kg/sec.	15
IV	Steam at 50 bar and having an enthalpy of 3100 kJ/kg is supplied to a turbine and comes out at 0.10bar and enthalpy of 2100 kJ/kg. A feed heating is done by extracting the steam at 3.2 bar with an enthalpy of 2500 kJ/kg. The condensate from the condenser with an enthalpy of 125 kJ/kg is fed into the feed heater of direct mixing type. The quantity of bled steam of 11200 kg/hr. find the power developed by the turbine. Neglect pump work.	15
UNIT -III		
V	Steam at 15 bar and 0.97 dry is discharged through a convergent-divergent nozzle to a back pressure of 0.2 bar. The flow rate is 9 kg/kWh. If the power developed is 220 W, determine: (a) throat pressure, (b) no. of nozzles required if the nozzle throat is 32mm ² . (c) If 12% of overall isentropic enthalpy drop is lost in friction in divergent part only then find out the cross sectional area at the exit.	15
VI	Show that the maximum discharge of steam through a nozzle takes place when the ratio of steam pressure at the throat to the inlet pressure is $\left(\frac{2}{n+1}\right)^{\frac{n}{n-1}}$ where n is the index of adiabatic expansion.	15
UNIT -IV		
VII	The following particular refers to a single stage impulse turbine, the nozzle angle is 20° and blade angles are equal. The velocity coefficient of blade is 0.85. Find the maximum blade efficiency possible. If the actual blade efficiency is 92% of maximum, find the possible ration of blade speed to steam speed.	15
VIII	i. Discuss the condition of maximum efficiency of an impulse turbine?	7
	ii. Derive the expression for degree of reaction for reaction turbine.	8