Q.P. Code: 16ME8803 **R16**

Reg. No. | | | | | | | | | | |

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
M.Tech I Year I Semester Regular & Supplementary Examinations February 2018
TURBO MACHINES
(THERMAL ENGINEERING)

Time: 3 hours Max. Marks:60

(Answer all Five Units 5 X 12 =60 Marks)

UNIT-I

1	a.	Define Turbo Machine and classify the turbo machines.	6M
	b	Explain the significance of First and Second law of thermodynamics applied to Turbo Machines.	6M

OR

2	a.	Explain about static and stagnation conditions in turbo machines	6M
	b.	Discuss the following: i) Applications of Turbo Machines ii)Stage efficiency and overall efficiency of Turbo Machines	6M

UNIT-II

3	a.	Discuss about the different types of Nozzles	3M
	b.	A convergent divergent nozzle receives steam at 7bar and 200oc and it expands isentropically into a space of 3bar neglecting the inlet velocity calculate the exit area required for a mass flow of 0.1Kg/sec . when the flow is in equilibrium through all and super saturated with $PV^{1.3}=C$.	9M

OR

4	a.	With neat sketches explain the working of Steam Turbines.	6M
	b.	The rotor of an impulse turbine is 60 cm diameter and runs at 15000 rpm. The nozzles are at 20^0 to the plane of the wheel and the steam leaves them at 500 m/s. The blade outlet angle is 30^0 and the friction factor is 0.6. Calculate the power developed/kg of steam/second and the diagram efficiency	6M

UNIT-III

5	a.	Define Mach Number and State the importance of Mach Number	4M
	b.	A jet of air at300 K and 0.6 bar has an initial Mach number of 2.0. If it passes through a normal shock wave, determine: i) Mach number ii) Pressure iii) Temperature iv) Jet velocity, downstream of the shock	8M

OR

6	a.	With suitable sketches explain the area-velocity relation?	4M
	b.	Air (c_p=1.05 kJ/kg K, γ= 1.38) at P_1=3 bar & T_1=500K flows with a velocity of 250 m/sec in a 30 cm diameter duct. Calculate the following: i) Mass flow rate ii) Mach number.	6M

UNIT-IV

7	a	Explain the working principle of a centrifugal compressor.	6M
	b	A centrifugal compressor runs at a speed of 15000 rpm and delivers 30 kg of air per second. Exit radius is 0.35m, relative velocity at exit is 100 m/s at an exit angle of 75^0 . Assume axial inlet and T01=300 K and p01= 1 bar. Calculate (a) the torque (b) the power required to drive the compressor	6M

OR

8		Derive an expression for Degree of Reaction for an axial flow compressor	12M

UNIT-V

9	a.	What is the function of blades in a turbo machine	4M
	b.	Classify the aero- foil sections	4M
	c.	Define the term Lift and Drag	4M

OR

10	a.	Derive the expression for energy transfer in terms of blade lift and drag coefficients.	6M
	b.	What are the forces the blades of gas turbine subjected to? Explain	6M

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