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

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

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

M.Tech I Year I Semester (R16) Regular Examinations January 2017

TURBO MACHINES

(Thermal Engineering)

(For Students admitted in 2016 only)

Time: **3 hours** Max. Marks: **60**

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

UNIT-I

Q.1	a.	Classify the turbo machines.	3M
	b.	List out the applications of turbo machines	3M
	c.	Show the following processes between two finite states: i) Flow process: ii) Non flow process:	6M

OR

Q.2	a.	Explain about static and stagnation conditions in turbo machines	6M
	b.	Prove that for an adiabatic turbo machine the work transfer equals the change in stagnation enthalpy	6M

UNIT-II

Q.3	a.	With neat sketches explain the working of Steam Turbines	6M
	b.	The throat diameter of round sectioned nozzle is 0.6 cm, steam with and initial pressure of 10 bar dry and saturated is expanded to 1.5 bar. What is the mass flow rate and exit velocity?	6M

OR

Q.4	a.	Explain the effect of variation of back pressure with suitable sketches	6M
	b.	The rotor of an impulse turbine is 60 cm diameter and runs at 14000 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 0.65. Calculate the power developed/kg of steam/second and the diagram efficiency	6M

UNIT-III

Q.5	a.	Define Mach Number and State the importance of Mach Number	5M
	b.	Derive the energy equation for flow through an oblique shock	7M

OR

Q.6		A jet of air at 275 K and 0.69 bar has an initial Mach number of 2.0. If it passes through a normal shock wave, determine: (a) Mach number. (b) Pressure. (c) Temperature. (d) Jet velocity, downstream of the shock.	12M

UNIT-IV

Q 7		Derive an expression for Degree of Reaction for an axial flow compressor	12M

OR

Q.8		A centrifugal compressor compresses air from 1 bar and 200C to 1.5 bars. The index of compression as 1.5. The flow velocity at inlets & outlets of the machine is same and equal to 65 m/sec. The inlet 7 outlet impeller diameter is 0.32 m 7 0.62 m blowers rotates at 8000 rpm. Calculate i. The blade angle at inlet & outlet of impeller ii. The absolute angle at tip of the impeller.	12M

UNIT-V

Q.9		Explain about the following: i. Effiencies of an axial flow gas turbine. ii. Degree of reaction iii. Aero-foil sections	12M

OR

Q.10	a.	Derive the expression for energy transfer in terms of blade lift and drag coefficients.	6M
	b.	How the losses are estimated in axial flow gas turbine? Explain.	6M

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