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C. U. SHAH UNIVERSITY

Winter Examination-2021

Subject Name: Turbomachines

Subject Code: 4TE07TMA1 Branch: B.Tech (Mechanical)

Semester: 7 Date: 14/12/2021 Time: 02:30 To 05:30 Marks: 70

Instructions:

- (1) Use of Programmable calculator & any other electronic instrument is prohibited.
- (2) Instructions written on main answer book are strictly to be obeyed.
- (3) Draw neat diagrams and figures (if necessary) at right places.
- (4) Assume suitable data if needed.

	Attempt the following questions:	(14
1.	Nozzle efficiency is described as	01
	A.Isentropic heat drop/useful heat drop	
	B.useful heat drop/isentropic heat drop	
	C.saturation temperature/supersaturation temperature	
	D.supersaturation temperature/saturation temperature	
2.	The flow of steam in a nozzle is subsonic at	01
	A.Throat B.Entrance C.Convergent portion	
	D.Divergent portion	
3.	Under thermal equilibrium, flow of steam is	01
	A.Isentropic B.Adiabatic C.Hyperbolic D.Polytropic	
4.	The critical pressure ratio for initially superheated steam isas	01
	compared to initially dry saturated steam	
	A. More B.Less C.Same D.None of the above	
5.	The person's reaction turbine has	01
	A.Only moving blades	
	B.Only fixed blades	
	C.Identical moving and fixed blades	
_	D.Fixed and moving blades of different shape	0.1
6.	There is enthalpy drop only inblades in case of an impulse steam	01
	turbine CM : DAIL CALL	
_	A.Fixed B.Rotating C.Moving D.All of the above	01
7.	The blade friction in the impulse turbine reduces the velocity of steam	01
	bywhile it passes over the blades A.10% to 15% B.15% to 20%	
	C.20% to 30% D.30% to 40%	
Q		01
8.	Maximum combustion pressure in a gas turbine isas compared to	01
	diesel engine A.Same B.Less C.More D.None of the above	
9.	In a gas turbine, high thermal efficiency is obtained in	01
7.	A.Closed cycle B.Open cycle	01
	A.Ciosca cycle B.Opeli cycle	



		C.In both the cycles D.All the above cycles	
		10. For a gas turbine the pressure ratio in the range of	01
		A.2 to 3 B.3 to 5 C.16 to 18 D.18 to 22	
		11. In a two stage gas turbine plant, reheating after first stage	01
		A.Increases work ratio B.Decreases work ratio	
		C.Does not effect work ratio D.None of the above	
		12. A jet engine has	01
		(a) no propeller (b) propeller in front	
		(c) propeller at back (d) propeller on the top	
		13. In a jet propulsion	01
		(a) the propulsive matter is ejected from within the propelled body	
		(b) the propulsive matter is caused to flow around the propelled body	
		(c) its functioning does not depend upon the presence of air	
		(d) none of these	0.1
		14. In a jet propulsion unit, the products of combustion after passing through	01
		the gas turbine are discharged into	
		(a) atmosphere (b) vacuum	
A ttor	nnt	(c) discharge nozzle (d) back to the compressor any four questions from Q-2 to Q-8	
Allei	прі	any four questions from Q-2 to Q-6	
Q-2		Attempt all questions	(14)
Q- <u>2</u>	a)	Derive equation for discharge of mass through nozzle	07
	b)	Estimate the mass flow rate of steam in a nozzle with the following data:	07
	ω)	Inlet pressure and temperature = 12 bar and 200° C	0.
		Back pressure = 1 bar	
		Throat diameter = 10 mm	
Q-3		Attempt all questions	(14)
	a)	With neat sketch explain in detail pressure-velocity compounding of	07
		impulse turbine.	
	b)	The following data refer to a particular stage of a parson's reaction	07
		turbine. Speed of the turbine = 2000 rpm, mean diameter of the rotor =	
		1.2m, stage efficiency = 83%, blade outlet angle = 20° , speed ratio =	
		0.72.	
		Determine the available isentropic enthalpy drop in the stage.	(4.A)
Q-4	`	Attempt all questions	(14)
	a)	With neat sketch explain in detail about combustion chamber	07
	b)	Explain ideal Brayton cycle with p-v and t-s diagram and derive its	07
0.5		equation.	(1.1)
Q-5	٥)	Attempt all questions Explain throttle governing of steam turbing with figure	(14) 07
	a)b)	Explain throttle governing of steam turbine with figure. Write difference between impulse and reaction turbine.	07
Q-6	D)	Attempt all questions	(14)
Q-U	a)	With neat sketch explain about working of ram jet engine also draw the	07
	u)	TS diagram	07
	b)	Explain open cycle gas turbine with intercooling with p-v and t-s	07
	~ <i>)</i>	diagram and derive its efficiency equation.	0,
Q-7		Attempt all questions	(14)
	a)	State merits and demerits of closed cycle gas turbine over open cycle.	07



	b)	A turbojet engine having two jets takes air at velocity 200 m/s when	07
		flying at an altitude of 10000 m. The resistance or drag of the plane is	
		6500 N. the air fuel ratio is 5:1. The propulsive efficiency of jet is 50%.	
		Calculate 1) absolute velocity of jet 2) mass flow rate of air enters 3)	
		propulsive power	
Q-8		Attempt all questions	(14)
	a)	Derive equation for thrust power, propulsive power and propulsive	07
		efficiency.	
	b)	With neat sketch explain in detail about turbine blade attachment	07

