Enrollı	nent No:		Exa	m Seat No:		
		C.U.SHAF		ERSITY		
		Summer E				
G 1 .	4 <b>N</b> 1					
Subject	t Name: Tu	rbomachines				
Subject Code: 4TE07TMA1			<b>Branch: B.Tech (Mechanical)</b>			
Semest	er: 7	Date: 23/03/2017	Time	e: 02:30 To 05:30	Marks: 70	
(2) (3)	Use of Prog Instruction Draw neat	grammable calculator s written on main anso diagrams and figures itable data if needed.	wer book are stri	ctly to be obeyed.	prohibited.	
	Attempt tl	he following questior	ns:			
a)	(A) Incre	of friction in the nozz ease exit velocity ease exit velocity and	(B)	decrease exit velocit	.y	
<b>b</b> )	During iser (A) Subsor (C) Sonic	ntropic flow the mach nic	(B)	ed at the throat is ) Supersonic ) Hypersonic		
c)	Nozzles ar	re more efficient than ovake formation	diffusers because (B			
d)	In impulse (A) Energ	reaction turbine whic gy transfer in fixed bla gy transfer in both blac	th one is true?  ade (B	B) Energy transfer in r D) None of above.	•	
e)	In impulse (A) Energ	steam turbine which gy transfer in Nozzle	one is true? (E	3) Energy transformat	tion in nozzle	
f)	The optimic (A)Cosα1	* *	city to steam vel (C) Cosα	• •		
g) h)	(A) 0	turbine the degree of (B) 0.5 ency of modern gas tur	(C) 1	(D) None	of above.	
h)	(A) 25-30%	% (B) 30-35%	(C) 35-45	•	%	
i) j) k)	List the dif	application of gas turb fferent types of combu principle jet propulsio	stion chamber	king?		

Q-1

l)

n)



(C) 6-8

(C) 0.2-0.4

The specific fuel consumption in kg/Nh for turbojet engine range from

(B) High Thrust

(D) All of above.

(D) 8-10

(D) 0.4-0.6

Turbofan engine is preferred over turbojet due to

(B) 4-6

(B) 0.1-0.2

m) The fan pressure ratio in turbofan engine is in the range of

(A) High propulsive efficiency

(C) Reducing noise

(A) 2-4

(A) 0.05-0.1

**(14)** 

## Attempt any four questions from Q-2 to Q-8

Q-2	a)	Attempt all questions Dry saturated steam is supplied to an impulse reaction turbine at 4 bar and expands with an efficiency of 0.75. The blade velocity is 50 m/s and the axial velocity varies from 0.58 to 0.78 blade velocity. Determine final pressure and useful heat drop if the final dryness fraction is 0.985.	(14) 7
	<b>b</b> )	Assuming exit angles of 20, determine work done per kg of steam for a pair of blades in the middle and estimate the total no of pairs.  Derive Steady flow energy equation foe nozzle.	7
Q-3	a)	Attempt all questions Calculate the throat and exit diameters of a convergent-divergent nozzle which will discharge 820kg of steam per hour from a pressure of 8 bar superheated to 220C in to chamber having a pressure of 1.5 bar. Friction loss in diverging part of the nozzle	(14 <sub>7</sub>
	<b>b</b> )	may be taken as 0.15 of the total enthalpy drop.  With neat sketch explain in detail pressure compounding of impulse turbine.	7
Q-4	a) b)	Attempt all questions With neat sketch explain detail about nozzle control governing of turbine. Explain about different methods of efficiency improvement of gas turbine.	(14) 7 7
Q-5	a) b)	Attempt all questions With neat sketch explain in detail about turbine blade attachment. The following data refers to a gas turbine using intercooling, regeneration and reheating arrangement.	(14 7 7
		Pressure ratio 64, compressor inlet temperature 3000k, turbine inlet temperature 1500k, compressor efficiency 0.88, regeneration effectiveness 0.8, inlet pressure to compressor 1 bar.  Determine 1. Cycle thermal efficiency 2. Cycle work ratio 3. Cycle air rate.	
Q-6	a)	Attempt all questions A jet propelled unit travels at 180 m/s in air at 0.65 bar and 6°c. air first enter diffuser in which it is brought to rest relative to the unit and it is then compressed in compressor through a pressure ratio of 5.8 and fed to a turbine at 925°C. The gas expands through the turbine and then through the nozzle to atmospheric pressure (0.65 bar). The efficiency of diffuser and nozzle are 0.9 each. The compressor And turbine efficiency are 0.8 pressure drop in the combustion chamber is 0.14 bar. Find the fuel-air ratio and the specific thrust of the unit. If the inlet cross section of the diffuser is 0.1m², calculate the total thrust. Assume calorific value of fuel is 44141 kj/kg.	(14)
	<b>b</b> )	State merits and demerits of closed cycle gas turbine over open cycle.	7
Q-7	a) b)	Attempt all questions With neat sketch explain in detail about combustion chamber. Derive equation for propulsive power and propulsive efficiency.	(14) 7 7
Q-8	a) b)	Attempt all questions Writhe advantage and disadvantage of jet propulsion over other system. Derive equation of optimum pressure ratio for maximum cycle thermal efficiency.	(14) 7 7

