Sanjay Ghodawat University, Kolhapur

2020-21

Established as State Private University under Govt. of Maharashtra. Act No XL, 2017

EXM/P/09/00

Year and Program: SY BTech	**School of Technology**	**Department: Aeronautical Engineering**
Course Code: AET206	**Course Title: Propulsion**	**Semester : IV**
Day and Date: Wednesday and 23-06-2021	**End Semester Examination**	**Time : 2 Hrs.** **Max Marks : 50**

Instructions: 1) All questions are compulsory
2) Use appropriate values wherever necessary

Q.1		**Answer/Solve the following (any two)**	**Marks**	Bloom's Level	CO
	a)	Explain the characteristics of turboprop engine with a neat sketch.	8	2	1
	b)	Consider a turbojet flying at an altitude where ambient temperature is 248 K and ambient pressure is 0.458 bar. The speed of the aircraft is 805 km/hr. Consider $\gamma = 1.4$ and $R = 287$ J/kg-K. Calculate: i. Stagnation temperature at the end of the inlet ii. Stagnation pressure at the end of the inlet iii. Diffuser efficiency iv. Stagnation pressure at end of inlet if the ambient pressure is changed to 1.5 bar.	8	3	2
	c)	Explain the major feature of external flow near subsonic inlet with diagram.	8	3	3
Q.2		**Answer/Solve the following (any two)**			
	a)	Consider a situation where you are working on the flame stabilization for a combustion chamber. Examine, explain and sketch the methods that you will use to stabilize the flame that incorporates pilot flames and bluff body techniques.	8	5	4
	b)	Explain over-expanded and under-expanded nozzles with sketches.	8	3	4
	c)	Consider a convergent nozzle with inlet velocity of 200 m/s. The actual enthalpy at inlet is 4750 kJ/kg. The actual enthalpy at exit is 4612 kJ/kg and the isentropic enthalpy at exit is 4435 kJ/kg. Find the following: i. Exit velocity ii. Exit velocity for isentropic case iii. Nozzle efficiency iv. Velocity coefficient	8	4	4

Q.3		Answer/Solve the following (any two)			
	a)	Compare centrifugal and axial flow compressor.	9	3	4
	b)	A centrifugal compressor runs at 8000 rpm and handles 20 m^3/s of air from 1 bar and 20^0C to 63^0C. The flow velocity is 65 m/s which is same at the inlet and outlet of compressor. The inlet and outlet impeller diameters are 320 mm and 620 mm respectively. Consider Cp = 1.005 kJ/kg-K. Apply combined velocity triangle concept and calculate: β, Φ, θ and B_1.	9	3	4
	c)	Explain over/under turboramjet engine including the 3 modes with neat sketch.	9	4	5

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