Sanjay Ghodawat University, Kolhapur 2019-20

Established as State Private University under Govt. of Maharashtra. Act No XL, 2017 EXM/P/09/01

Year and Program: 2019-20 & S.Y.B.Tech | **School of Technology** | **Department of Aeronautical Engineering**

Course Code: AET206 | **Course Title: Propulsion** | **Semester – IV**

Day and Date: Wednesday 1/1/20 | **End Semester Examination (ESE)** | **Time:** 3hr **Max Marks: 100** 10.30am-1.30pm

Instructions:
1) All questions are compulsory.
2) Assume suitable data wherever necessary.
3) Figures to the right indicate full marks.

			Marks	Bloom's Level	CO
Q.1		**Attempt the Following**			
	a)	The effective jet exit velocity from a jet engine is 2700 m/s.The forward flight velocity is 1350 m/s and the airflow rate is 78.6 kg/s. fuel air ratio is 0.018. Determine: Thrust, Thrust power and propulsive efficiency.	07	L_3	CO1
		OR			
	a)	List down the different factor affecting the thrust	07	L_2	CO1
	b)	Illustrate the different types of Starting problem occur in supersonic inlets with neat sketches.	08	L_3	CO2
		OR			
	b)	Derive the relation between minimum area ratio and external deceleration ratio neat sketch.	08	L_3	CO2
Q.2		**Attempt the Following**			
	a)	Explain with neat sketch about use of flame holders	07	L_2	CO2
		OR			
	a)	Discuss in detail about combustion chamber performance	07	L_2	CO2
	b)	Describe in detail about convergent nozzles and convergent divergent nozzle in engine with neat sketch.	08	L_2	CO2
		OR			
	b)	Sketch and Explain the thrust reversal in aircraft engine?	08	L_2	CO2
Q.3		**Solve any Two**			
	a)	Estimate the Specific Thrust and Specific Fuel Consumption of a jet Propulsion unit whose data are as	08	L_3	CO1

follows:Isentropic Efficiency of Compressor = 80%, Isentropic Efficiency of Turbine = 85%, Efficiency of Combustor = 98%, Total Pressure Ratio=4:1, Mechanical Efficiency =99%, Nozzle efficiency = 90%, Maximum cycle temperature= 1000 k, Fuel air ratio= 0.02, Ambient Temperature and Pressure are 15^0C and 1 bar, Air flow= 200 N/S

For Air: $C_p = 1005\ ^J/_{kg-k}, \gamma = 1.4$

For Gas: $C_p = 1153\ ^J/_{kg-k}, \gamma = 1.3$

(Assume combustion take place at constant pressure, Nozzle exit Pressure is equal to ambient Pressure)

b)	Describe in detail about internal flow and stall in subsonic inlets.	08	L_2	CO2
c)	Discuss the following: 1)Annular Combustion Chamber 2) Can-Annular Combustion Chamber	08	L_2	CO2
d)	Explain the following: 1) Nozzle efficiency 2) Over expanded and under expanded nozzle	08	L_2	CO2
Q.4	**Solve any Two**			
a)	Discuss in detail about theory of axial flow compressor with neat sketch.	09	L_2	CO3
b)	Describe in detail about Centrifugal flow compressor velocity diagram and procedure.	09	L_3	CO3
c)	Discuss in detail about operation of centrifugal compressor and with neat sketch?	09	L_2	CO3
Q.5	**Solve any Two**			
a)	Explain with neat sketch about LACE.	09	L_2	CO4
b)	With neat Sketch Discuss in detail about turbo rocket engines	09	L_2	CO4
c)	Describe in detail about ram jet engine	09	L_3	CO4
Q.6	**Solve any Three**			
a)	In a centrifugal compressor the atmospheric air enters at 28 degree Celsius and leaves at 110 degree Celsius and 2 bar. Calculate the	06	L_3	CO3

	isentropic efficiency and power required by the compressor. If40 kg of air is compressed per minute .Take Cp= kg/kg K & Cv=0.716 k g/kg K			
b)	Derive the Isentropic efficiency of centrifugal flow compressor	06	L_2	CO3
c)	Sketch and Explain in detail about scram jet engine	06	L_2	CO4
d)	Explain in detail about turbo ramjet..	06	L_2	CO4

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