UPES Dehradun
End Semester Examination, May 2023

Course: Advanced Propulsion Systems and Fuels | Semester: II
Program: M.Tech (Advanced Vehicles) | Time : 03 hrs.
Course Code: MEAV7008 | Max. Marks: 100

Instructions:
All values required to solve the problems need to be assumed by the students.

SECTION A
(5Qx4M=20Marks)

S. No.	Statement of question	Marks	CO
Q 1	Explain the working principle of ramjet engine.	4	CO1
Q 2	Explain the difference between turbojet and turboprop aircraft.	4	CO1
Q 3	Explain the working of DMFC	4	CO3
Q 4	Explain different emissions by combustion chamber of a jet aircraft.	4	CO1
Q 5	Explain the layout of hydrogen four-wheeler vehicle. What are the different methods for hydrogen production.	4	CO4

SECTION B
(4Qx10M= 40 Marks)

Q 6	Define the jet propulsion system. Explain air breathing and non-airbreathing jet propulsion system with example	10	CO1
Q 7	Explain BS-6 system and its norms. Also briefly explain the norms of BS-6 phase 2.	10	CO4
Q8	Explain in detail the Pollution created by Exhaust gas emission of diesel vehicle in atmosphere.	10	CO4
Q9	Design the schematic diagram of a simple Joule cycle with a heat exchanger and explain briefly the working principle. Also draw the PV and TS diagram of the cycle. **OR** Solve the indicated mean effective pressure and efficiency of a Joule cycle if the temperature at the end of the combustion is 2000K and the temperature and pressure before compression is 350K and 1bar. The pressure ratio is 1.3. Assume Cp=1.005KJ/kgK.	10	CO2

	SECTION-C **(2Qx20M=40 Marks)**		

Q10	Solve a problem of oil gas turbine installation which consists of a compressor, a combustion chamber and turbine. The air taken in at a pressure of 1 bar and temperature 30C is compressed to 6 bar, with an isentropic efficiency of 87%. Heat is added by the combustion of fuel in combustion chamber to raise the temperature to 700C. the efficiency of the turbine is 85%. The calorific value of the oil is 43.1MJ/kg. Calculate for an air flow of 80kg/min. Neglect the effect of fuel in the mass flow rate. Calculate
	
	    i. The air/fuel ratio of the turbine gases,
	    ii. The final temperature of exhaust gases,
	    iii. The net power of installation, and
	    iv. The overall thermal efficiency of the installation.
		20	**CO2**

Q11	Define different components of electric propulsion systems of tesla electric vehicle with completer bed design. **OR** Explain the process of electrolysis for electric power generation and compare the same with thermal power plants.	**20**	**CO3**