UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2022

Course: M.Tech Advance Vehicle   Semester: I
Program: Vehicle thermal management   Time   : 03 hrs.
Course Code: MEAV7002   Max. Marks: 100

Instructions:

SECTION A
(5Qx4M=20Marks)

S. No.		Marks	CO
	Statement of question		CO1
Q 1	Ambient air at dbt of 35 °C and wbt of 24 °C is passed through an adiabatic humidifier having efficiency of 90%. Find the dbt and specific humidity of resultant air.	4	CO3
Q 2	With the help of diagram explain about the thermal management of transmission system,	4	CO2
Q 3	Explain in brief thermal management of inverters.	4	CO2
Q 4	With the help of energy flow diagram enumerate various factors involved in thermal management of engine.	4	CO1
Q 5	Discuss in brief about the energy flow in an engine.	4	CO1

SECTION B
(4Qx10M= 40 Marks)

Q	Statement of question		
Q 6	Discuss the various factors affecting the thermal comfort inside the cabin space.	10	
Q 7	The Engine oil at 150°C is cooled at 80°C in a parallel flow heat exchanger by water entering at 25°C and leaving at 60°C. Estimate the exchanger effectiveness and the number of transfer units. If the fluid flow rates and the inlet conditions remain unchanged, work out the lowest temperature to which the oil may be cooled by increasing length of the exchanger.	10	CO2
Q 8	A four – cylinder petrol engine has a bore of 57mm and a stroke of 90mm. its rated speed is 2800 rpm and it is tested at this speed against a brake which has a torque arm of 0.356m. The net brake load is 155N and the fuel consumption is 6.74 l/h. The specific gravity of the petrol used is 0.735 and it has a lower calorific value of;44200 kJ/kg. A Morse test is carried out and the cylinders are cut out in the order 1,2,3,4, with corresponding brake load of 111,106.5, 104.2 and 111 N, respectively. Calculate for this speed, the engine torque, the	10	CO2

	bmep, the brake thermal efficiency, the specific fuel consumption, the mechanical efficiency and the imep.		
Q 9	Explain how air conditioning load affect the performance of the engine.	**10**	**C03**
	SECTION-C **(2Qx20M=40 Marks)**		
Q	Statement of question		
Q10	A simple air cooled system is used for an aero plane having a load of 10 tones. The atmospheric pressure and temperature are 0.9 bar and 10°C respectively. The pressure increases to 1.013 bar due to ramming. The temperature of the air is reduced by 50°C in the heat exchanger. The pressure in the cabin is 1.01 bar and the temperature of air leaving the cabin is 25°C.Determine: 1 Power required to take the load of cooling in the cabin; and 2.C.O.P. of the system. Assume that all the expansions and compressions are isentropic. The pressure of the compressed air is 3.5 bar.	**20**	**CO3**
Q11	Discuss in detail about the thermal management of electric vehicles and explain them at individual component level. Or Discuss the impact of thermal management on comfort and performance of the vehicle .	**20**	**CO5**