Name:

Enrolment No:

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

Course: Internal Combustion Engines **Semester : IV**
Program: Automotive Design Engineering **Time : 03 hrs.**
Course Code: MEAD2007 **Max. Marks: 100**

Instructions:

SECTION A
(5Qx4M=20Marks)

S. No.		Marks	CO
Q 1	Differentiate between ideal and actual Otto cycle with a suitable diagram.	**4**	**CO1**
Q 2	What is the requirement of an ideal IC engine fuel? What do you understand by "DOPES"?	**4**	**CO1**
Q 3	Draw a combustion pressure v/s Crank Angle (P-θ) diagram for an internal combustion engine. Show the different phases of combustion processes.	**4**	**CO2**
Q 4	Explain the working principle of an elementary Carburetor.	**4**	**CO1**
Q 5	Discuss the working principle of an EGR system.	**4**	**CO2**

SECTION B
(4Qx10M= 40 Marks)

Q 6	In a trial of a single cylinder oil engine, the following observations were made:		**10**	**CO3**
	Oil consumption	=10.2 kg/h		
	Calorific value of fuel	=43890 kJ/kg		
	Speed	=1900 rpm		
	Torque on brake drum	=186 N-m		
	Quantity of cooling water used	=15.5 kg/min		
	Temperature rise of cooling water	=36°C		
	Exhaust gas temperature	=410°C		
	Room temperature	=20°C		
	Cp of exhaust gases	=1.17 kJ/kg K		
	Mechanical efficiency	=85%		

	Draw the heat balance sheet on minute basis.		
Q 7	Write short note on: i. Multi Point Fuel Injection. ii. Idling system in carburetor.	**10**	**CO1**
Q 8	Discuss the methods of providing Swirl and Turbulence in diesel engine with the help of neat sketch of the combustion chamber.	**10**	**CO4**
Q 9	Explain the procedure to determine the indicated power of an engine by MORSE test.	**10**	**CO2**
SECTION-C (2Qx20M=40 Marks)			
Q 10	Discuss the modification required in an engine while converting it to turbocharged engine from conventional naturally aspirated engine. Explain the turbocharging process with a suitable diagram.	**20**	**CO4**
Q 11	An engine working on Otto cycle has a volume of 0.45 m3, pressure 1 bar and temperature 30°C at the beginning of compression stroke. At the end of compression stroke, the pressure is 11 bar. 210 kJ of heat is added at constant volume. Determine : (i) Pressures, temperatures and volumes at salient points in the cycle. (ii) Efficiency. (iii) Net work per cycle. (iv) Mean effective pressure. (v Ideal power developed by the engine if the number of working cycles per minute is 210. **OR** An engine with 200 mm cylinder diameter and 300 mm stroke works on theoretical Diesel cycle. The initial pressure and temperature of air used are 1 bar and 27°C. The cut-off is 8% of the stroke. Determine : (i) Pressures and temperatures at all salient points. (ii) Theoretical air standard efficiency. (iii) Mean effective pressure. (iv) Power of the engine if the working cycles per minute are 380. Assume that compression ratio is 15 and working fluid is air.	**20**	**CO3**