Name: **Enrolment No:**	

UPES

End Semester Examination, May 2024

Course: Internal Combustion Engines **Semester : IV**

Program: B. Tech-Automotive Design Engineering **Time : 03 hrs.**

Course Code: MEAD2007 **Max. Marks: 100**

Instructions: Use standard notations for explanation. Assume suitable data.

SECTION A
(5Qx4M=20Marks)

S. No.		Marks	CO
Q 1	Discuss the phenomenon of Knocking in spark ignition engines. List down the parameters affecting ignition lag.	**4**	**CO1**
Q 2	Draw a combustion pressure v/s Crank Angle (P-θ) diagram for an internal combustion engine. Show the different phases of combustion processes.	**4**	**CO1**
Q 3	Discuss different techniques of lubricating an engine.	**4**	**CO2**
Q 4	Explain the working principle of an elementary Carburetor.	**4**	**CO1**
Q 5	Discuss a method used in a Diesel engine to increase turbulence for enhancing the performance of engine and lowering the emissions.	**4**	**CO4**

SECTION B
(4Qx10M= 40 Marks)

Q 6	In a trial of a single cylinder oil engine, the following observations were made: Oil consumption = 15 kg/h Calorific value of fuel =43 MJ/kg Speed =2000 rpm Torque on brake drum =200 N-m Quantity of cooling water used =15 kg/min Temperature rise of cooling water =40 °C Exhaust gas temperature =400 °C Room temperature =25 °C Cp of exhaust gases =1.17 kJ/kg K		**10**	**CO3**

	Specific heat of water =4.18 kJ/kg K Mechanical efficiency =90 % Draw the heat balance sheet on minute basis.		
Q 7	Write short note on: i. Supercharging of engines. ii. Multi Point Fuel Injection.	**10**	**CO4**
Q 8	Explain the procedure to determine the indicated power of an engine by MORSE test.	**10**	**CO4**
Q 9	A 4 cylinder, 4 stroke petrol engine of bore 80 mm and 110 mm stroke runs at 2500 rpm with volumetric efficiency of 85%. The pressure head causing the flow is 110 mm of Hg. Determine: (a) The size of venture. (b) Also find the fuel nozzle diameter if the A:F ratio of mixture supplied is 14:1. Take the following data. C_{da} =0.84, C_{df} =0.7, ρ_a =1.29 kg/m^3, ρ_f =700 kg/m^3.	**10**	**CO3**
SECTION-C (2Qx20M=40 Marks)			
Q 10	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**
Q 11	Derive an expression to determine the air fuel ratio of an engine using an elementary carburetor, neglecting the compressibility of air. Discuss the use of Lip of nozzle for various operating modes. **OR** Derive an expression for thermal efficiency of an air standard Diesel cycle. List the assumptions made for Diesel cycle. Discuss the factors affecting knocking in Diesel engine.	**20**	**CO2**