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B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

January / February 2025 Semester End Main Examinations

Programme: B.E. **Semester : V**

Branch: Mechanical Engineering **Duration: 3 hrs.**

Course Code: 20ME5DEICE **Max Marks: 100**

Course: Internal Combustion Engines

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

		UNIT - I	CO	PO	Marks
1	a)	List out the various simplified assumptions used in fuel-air cycle analysis.	CO1	PO1	**06**
	b)	Explain with the help of a p-V diagram the loss due to variation of specific heats and effect of dissociation in an Otto cycle.	CO1	PO2	**08**
	c)	What will be the effect on the efficiency of an Otto cycle having a compression ratio of 8, if Cv increases by 1.6%?	CO1	PO3	**06**
		OR			
2	a)	Explain the effect of compression ratio and fuel air ratio on engine performance better understood by fuel-air cycle analysis.	CO1	PO2	**10**
	b)	A petrol engine having a compression ratio of 6 uses a fuel with calorific value of 42 MJ/kg. The air-fuel ratio is 15:1. Pressure and temperature at the start of the suction stroke is 1 bar and 57 ◦C respectively. Determine the maximum pressure in the cylinder if the index of compression is 1.3 and the specific heat at constant volume is given by Cv = 0.678 + 0.00013 T, where T is in Kelvin.	CO1	PO3	**10**
		UNIT - II			
3	a)	Explain different air-fuel mixture on which an engine can be operated and their effect on the engine performance.	CO2	PO1	**06**
	b)	Explain various component of electronic fuel injection system	CO2	PO1	**08**
	c)	Draw a schematic diagram of fuel feed pump and explain its working principle.	CO2	PO2	**06**
		OR			
4	a)	Explain the factors that affect the process of carburetion.	CO3	PO1	**08**
	b)	Automotive Engine requires rich Air–Fuel mixture for the following cases: (i) idling (ii) maximum power and (iii) sudden	CO3	PO2	**08**

			acceleration. Justify			
		c)	Draw a neat sketch of CRDI system.	*CO3*	*PO1*	**04**
			UNIT - III			
	5	a)	Bring out clearly the process of ignition delay illustrating Pressure-time diagram for CI engine	*CO3*	*PO2*	**08**
		b)	Explain the phenomenon of knock in CI engines and compare it with SI engine knock	*CO3*	*PO1*	**08**
		c)	Briefly explain how smooth Engine Operation of SI engines is ensured.	*CO3*	*PO1*	**04**
			OR			
	6	a)	Briefly explain the stages of combustion in SI engines with neat sketch	*CO3*	*PO1*	**08**
		b)	Explain the various factors that influence the flame speed	*CO3*	*PO1*	**08**
		c)	Explain the importance of HUCR	*CO3*	*PO1*	**04**
			UNIT - IV			
	7	a)	List out and draw various types of combustion chambers used in SI engines. Explain working principle of any two.	*CO4*	*PO1*	**06**
		b)	Explain with figures the various types of combustion chambers used in CI engines.	*CO4*	*PO1*	**08**
		c)	Explain with a figure the variation of gas temperature during a cycle.	*CO4*	*PO2*	**06**
			OR			
	8	a)	Give the general chemical formula of the following fuels: (i) Paraffin (ii) Olefin (iii) Naphthene (iv) Aromatic and their molecular arrangement. Also mention whether they are saturated or unsaturated.	*CO4*	*PO1*	**10**
		b)	Explain alcohols as alternate fuels for IC engines bringing out their merits and demerits.	*CO4*	*PO1*	**10**
			UNIT - V			
	9	a)	Draw the graph of quantity of engine emissions as a function of equivalence ratio and explain.	*CO5*	*PO1*	**10**
		b)	Compare Bharat stage 4 and Bharat stage VI emission norms of IC engine.	*CO5*	*PO2*	**10**
			OR			
	10	a)	Discuss suitability and the salient characteristics of multi fuel engine	*CO5*	*PO1*	**08**
		b)	Discuss briefly the principle of following engines with sketches i) Rotary piston engines, ii) Stratified engine and iii) Multiple injection system.	*CO5*	*PO2*	**12**

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