



InSem Examination-II Summer 2024		
Exam Seat No.:		
Academic Year: 2023-2024	Semester: IV	
Name of Programme: B.Tech	Pattern: 2022	
Name of Course: Electric and Hybrid Vehicles	Course Code: MEC222014	
Max. Marks: 30	Duration: 1 hour	

<p><b>Instructions:</b> Candidates should read carefully the instructions printed on the Question Paper and on the cover page of the Answer Book, which is provided for their use.</p> <ol style="list-style-type: none"><li>1. This question paper contains 02 page(s).</li><li>2. Answer to each new question is to be started on a new page.</li><li>3. Assume suitable data wherever required, but justify it.</li><li>4. Draw the neat labelled diagrams, wherever necessary.</li><li>5. The last columns indicates the Course Outcome of the Question/sub-question.</li></ol>
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**Question No. 1 Attempt following Question**

- a) Explain the working of four stroke SI engines with proper sketch. (5) CO1

**OR**

- b) Compare petrol engine with diesel engine. (5) CO1

- c) What are the merits and demerits of Electric vehicles over Internal Combustion engine vehicles? (5) CO1

**OR**

- d) Classify engines on the basis of: 1. Thermodynamic cycle used, 2. Cylinder arrangement, 3. Fuel used, 4. Cooling method used, 5. No. of strokes per cycle (5) CO1

- e) Write a note on Hybrid vehicle technology. (5) CO1

**OR**

- f) Describe in details various components used in electric vehicles. (5) CO1

**Question No. 2 Attempt following Question**

- a) Derive an expression for efficiency of air standard Otto cycle. State the assumptions used in analysis. (5) CO4

**OR**

- b) In air standard diesel cycle, compression begins at 1 bar and 300 K. The compression ratio is 14. Heat added per kg of air is 2000 kJ/kg. Calculate pressure and temperature of each state point. Make suitable assumptions if required. (5) CO4

- c) Describe in detail working of Pump assisted cooling system. (5) CO4

**OR**

- d) Write a note on pressurised lubrication system. (5) CO4
- e) During Trial on single cylinder diesel engine following observation were obtained. Load on engine =4.8 kg, Speed= 1500 rpm, Dynamometer arm length (L) = 0.185 m, Fuel consumption = 0.8 kg/hr, Calorific value of fuel = 42000 KJ/ Kg, Calculate Brake thermal efficiency and Brake specific fuel consumption. (5) CO4

**OR**

- f) During a Trial on engine following observation were obtained. Torque = 407 Nm, Speed = 250 rpm, Fuel consumption = 4 kg/hr, Mass flow rate of air =135 kg/hr, Calorific value of fuel = 43000 kJ/kg, coolant flow rate = 4.5 kg/min, Rise in temperature of coolant = 45 degree Celsius, Specific heat of exhaust gas = 1 kJ/kgK, Specific heat of Cooling water = 4.187 kJ/kgK, Temperature of exhaust gases = 420 degree Celsius, Room temperature = 20 degree Celsius . Draw heat balance sheet in kJ/min. (5) CO4

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