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Total No. of Pages : 02

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M.Tech.(Mechanical Engineering) PT (Sem.–5) ADVANCED INTERNAL COMBUSTION ENGINES Subject Code : MME-559 M.Code : 38222

Time : 3 Hrs. INSTRUCTION TO CANDIDATES : Max. Marks : 100

- 1. Attempt any FIVE questions out of EIGHT questions.
- 2. Each question carries TWENTY marks.
- 3. Assume any data missing.
- A Diesel engine working on a dual combustion cycle has a stroke volume of 0.0085 m3 and a compression ratio 15:1. The fuel has a calorific value of 43890 kJ/kg. At the end of suction, the air is at 1 bar and 100°C. The maximum pressure in the cycle is 65 bar and air fuel ratio is 21:1. Find for ideal cycle the thermal efficiency. Assume cp = 1.0 kJ/kg K and cv = 0.71 kJ/kg K.
- 2. a) Discuss the effects of the following engine variable on flame propagation :
 - i) Engine speed
 - ii) Compression ratio

b) Discuss the influence of ignition delay on combustion process in S.I and C.I engines. Explain how the presence of a knock inhibitor in fuel oil helps to change the ignition delay in C.I engines.

- 3. What are turbochargers? Explain with a neat sketch Hyper bar turbo charging. State the advantages and disadvantages also.
- 4. Fuel injection in a single cylinder, 4-stroke cycle engine running at 650 r.p.m. takes place through a single orifice nozzle and occupies 28° of crank travel. The fuel consumption of the engine is 2.2 kg/hour and the fuel used has a specific gravity of 0.875. If injection pressure is 150 bar and the combustion chamber pressure is 32 bar estimate the volume of fuel injected per cycle and the diameter of the orifice. Take coefficient of discharge of orifice = 0.88.

- 5. a) What is the significance of Octane number and Cetane number in rating of fuels for S.I and C.I engines? Discuss.
 - b) What are the desirable properties of S.I and C.I engine fuels? Discuss.
- 6. a) Explain the scavenging process in two stroke engine.
 - b) Discuss different scavenging arrangements based on charge flow with the help of suitable sketch.
- 7. a) Discuss combustion process in the C.I engine. Describe stages of combustion with the help of pressure crank rotation diagram.
 - b) Discuss compressibility effect in fuel injection system.
- 8. Write notes on the following :
 - a) Pump characteristics
 - b) Mechanism of atomization and spray formation.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.