

[Total No. of Printed Pages:1]

**CODE NO:- Z-8054**

**FACULTY OF ENGINEERING & TECHNOLOGY**

**M.E (Mechanical)Year Examination - June – 2015**

**Advanced Internal Combustion Engines**

**(Revised )**

[Time: Three Hours]

[Max. Marks:80]

“Please check whether you have got the right question paper.”

- i) Attempt any three questions from each section.
- ii) Use of data/ property tables , non-programmable calculator is allowed
- iii) Neat diagrams must be drawn wherever necessary.
- iv) Figure to the right indicating full marks
- v) Assume suitable data, if necessary.

**SECTION-A**

- Q.1 a) Explain the normal and abnormal combustion phenomenon and its effect on knocking in SI engine 06  
b) A simple jet carburetor has to supply 5 kg/min of air. The air is at a pressure of 1.013 bar ad at a temperature of 27 °C .Calculate the throat diameter of the choke for air flow velocity of 90 m/s. Take velocity coefficient to be 0.8 .Assume isentropic flows and to be compressible. 07
- Q.2 a) Discuss the stages of combustion in CI using pressure crank angle diagram and heat release rate diagram. 08  
b) Explain in detail the injection characteristics of a compression ignition engine . 05
- Q.3 a) Discuss the suitability of biogas and CNG as fuel for SI engines . 08  
b) Calculate the air- fuel ratio diesel ( $C_{16}H_{34}$ ) using basic combustion reaction . 05
- Q.4 Write explanatory notes on any two 14  
a) Combustion chambers in SI engine  
b) Spray characteristics  
c) Vegetable oil as a fuel for CI engine

**SECTION-B**

- Q.5 a) Explain the different methods of turbocharging . 05  
b) A 4 -stroke diesel engine of 3000 cc capacity develops 14 kW/m<sup>3</sup> of free air induced per minute. When running at 3500 rpm it has a volumetric efficiency of 80% referred to free air conditions of 1.013 bar and 27°C. It is proposed to boost the power of the engine by supercharging by a blower (mechanically driven by engine) of pressure ratio. 1.7 and isentropic efficiency of 75% .Assuming that at the end of induction the cylinders contain a volume of charge equal to the swept volume, at the pressure and temperature of the delivery from the blower, estimate the increase in brake power to be expected from the engine . Take overall mechanical efficiency as 80%. 08
- Q.6 a) Explain thermal ,prompt and fuel bound  $NO_x$  formation . 08  
b) Explain and compare EURO and Bharat Stage (bs) emission norms . 05
- Q.7 a) Explain the working principle , merits and demerits of homogenous charge compression ignition (HCCI) engine . 08  
b) Discuss the general characteristics of stratified charge engines. 05
- Q.8 Write explanatory notes on any two 14  
a) Supercharging  
b) GHGs emissions  
c) Lean burn engine