



Third Semester M.Tech. Degree Examination, Dec.2014/Jan.2015
Engine Flow and Combustion

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions.

1. a. Define volumetric efficiency of IC engine. Discuss different factors which affect the volumetric efficiency of an engine. (10 Marks)
- b. Define scavenging and explain: i) Scavenging efficiency; ii) Tapping efficiency; iii) Delivery ratio. (10 Marks)
2. a. Explain charge motion characteristics within the engine cylinder: i) Swirl, Squish and Tumble flow; ii) Piston cylinder wall interaction. (10 Marks)
- b. Explain briefly the crevice flows and blowby. (10 Marks)
3. a. Discuss the effect of engine variables on ignition lag. (10 Marks)
- b. Define the following terms in connection with surface ignition: i) Pre ignition; ii) Post ignition; iii) Run away; iv) Wild ping; v) Rumble. (10 Marks)
4. a. Describe the essential features of the combustion process in a CI engine. (10 Marks)
- b. What are the functional requirements of an injection? (10 Marks)
5. a. What is the cause of diesel smoke? Describe the factor affecting odour production. (10 Marks)
- b. Describe the exhaust gas recirculation for the control of oxides of nitrogen. (10 Marks)
6. Explain the following engine variables which affect the engine heat transfer:
 - i) Spark timing
 - ii) Speed and load
 - iii) Swirl and squish
 - iv) Coolant temperature and composition
 - v) Compression ratio. (20 Marks)
7. a. What is the effect of supercharging on the following parameters: i) Power out put; ii) Mechanical efficiency; iii) Fuel consumption. (10 Marks)
- b. Derive an expression for the power required for an IC engine super chargers. (10 Marks)
8. a. Mention various methods for finding frictional power of an IC engine. Explain briefly the motoring test method. (10 Marks)
- b. A gas engine working on the constant volume cycle gave the following results during a one hour test run. Cylinder diameters 24cm, stroke 48cm, torque 770 N-m, average speed 220rpm, average explosion per minute is 77, mean effective pressure 7.5 bar, volume of gas used 12m^3 at 17°C and 770mm of mercury pressure, lower calorific volume of gas 21MJ/m^3 at NTP, inlet and out temperature of cooling water are 25°C and 60°C respectively, cooling water used 600kg. Determine: i) The mechanical efficiency; ii) The indicate specific gas consumption in m^3/kWh ; iii) The indicate thermal efficiency. Draw up a heat balance for the engine on minute basis explaining why frictional power has been included in or omitted from your heat balance. NTP are 760mm of Hg and 0°C . (10 Marks)

