

JK Lakshmipat University Jaipur
INSTITUTE OF ENGINEERING AND TECHNOLOGY
End Term Examination, December, 2021

IC Engine
B. Tech. in Mechanical Engineering, Semester VII

Roll No.....

Course Code : ME1201

Time: 1.5 hours

Max. Marks: 30

Instructions to students:

Do not write anything other than your roll number on question paper.

Assume suitable data wherever required and mention it clearly.

Writing appropriate units, nomenclature, and drawing neat sketches/schematics/flow chart wherever, required are an integral part of the answer.

1. A dual combustion cycle operates with a compression ratio of 12 and with a cut off ratio of 1.615. The maximum pressure is 52.17 bar. The temperature and pressure before compression are 1 bar and 62°C respectively. Assuming the indices of compression and expansion of 1.35, calculate a) The temperature at cardinal points, b) the cycle efficiency, and C) the mean effective pressure of the cycle.

4M
2. A four-cylinder, 2.5 liter, SI automobile engine operates at WOT on a four stroke air standard Otto cycle at 3000 RPM. The engine has a compression ratio of 8.6:1, a mechanical efficiency of 86%, and a stroke to bore ratio of $S/B = 1.025$. Fuel is iso-octane with $AF=15$, a heating value of 44,300 kJ/kg, and combustion efficiency $\eta_c = 100\%$, at the start of the compression stroke, condition in the cylinder combustion chamber are 100 kPa and 60°C. It can be assumed that there is a 4% exhaust residual left over from the previous cycle. Do a complete thermodynamic analysis of the engine.

6M
3. A four stroke gasoline engine has four cylinders of 8.5 cm bore and 9.5 cm stroke. The engine is coupled to a brake having a torque radius of 35 cm. At 3000 rpm all cylinders firing the net brake load is 430 N. When each cylinder is in turn is cutoff the average net brake load produced at the same speed by the remaining 3 cylinders is 350N. Estimate the indicated mep of the engine. With all cylinders firing the fuel consumption is 0.24 kg/min, and the calorific value of fuel is 44,000 kJ/kg. The cooling water flow rate is 65 kg/min and the temperature rise is 12°C. The air-fuel ratio is 15, the temperature of the exhaust gas is 450°C, the temperature of the test room is 17°C, the barometric pressure is 76 cm of Hg, the proportion by mass in the fuel is 15.5%, the mean specific heat of dry exhaust gas is 1 kJ/kgK, the specific heat of the super-heated steam is 2 kJ/kgK. Determine the Imep, the indicated thermal efficiency, the bsfc and the volumetric efficiency based on the atmospheric conditions.

10M
4. As a lubricant specialist what benefits that I get when I go from a mineral to synthetic blend, to a fully synthetic base oil. What is the function of an additive in the oil explain some of the benefits of using additives in the oil. What should anyone look for when selecting an engine oil

10M