GUJARAT TECHNOLOGICAL UNIVERSITY ME – SEMESTER II– EXAMINATION – WINTER – 2016

Subject Code: 2722107Date: 18/11/2016Subject Name: ADVANCED INTERNAL COMBUSTION ENGINETime: 2:30 pm to 5:00 pmTotal Marks: 70

Instructions:

- 1. Attempt all questions.
- 2. Make suitable assumptions wherever necessary.
- 3. Figures to the right indicate full marks.
- Q.1 (a) Explain following terms with suitable formula: 1) brake torque 2) power 3) 07 mechanical efficiency 4) mean effective pressure 5) specific fuel consumption 6) air/fuel and 7) volumetric efficiency
 - (b) A hydrocarbon fuel of composition 84 % by mass C and 16% by mass H has a molecular weight of 115. Determine the number of moles of air required for stoichiometric combustion and the number of moles of products produced per mole of fuel. Calculate (A/F)s and the molecular weights of the reactants.
- Q.2 (a) Explain enthalpy of formation, adiabatic combustion process and dissociation in 07 brief.
 - (b) Give various engine operating parameters for constant volume cycle and constant 07 pressure cycle using equations.

OR

- (b) Describe with p-V diagram, cycle comparison of constant volume and constant 07 pressure cycle using different operating parameters.
- Q.3 (a) Compare fuel-air cycle with actual cycle of SI engine with respect to following characteristic: 1) Heat transfer 2) Finite combustion time 3) Exhaust blowdown loss 4) Incomplete Combustion
 - (b) Explain types of scavenging in two-stroke cycle engines with line diagram. 07

OR

- Q.3 (a) Explain any one method of power boosting using sketch.
 (b) What do you understand by partial burning, misfire and abnormal combustion for SI engine?
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- **Q.4** (a) MPFI explain its working and list the advantages.
 - (b) For CI engine combustion, give brief idea about fuel spray structure, spray 07 penetration and evaporation.

OR

- Q.4 (a) Describe mechanism of formation of nitrogen oxides, carbon monoxide and hydrocarbon 07 emission in SI engine.
 - (b) What is catalytic convertor? Explain any one for SI engine emission control. 07
- Q.5 (a) Which are the substitute alternate fuels for SI and CI engines? List pros and cons 07 of alternate fuels.
 - (b) What is the importance of lubricant in an IC Engine? How it affects heat transfer 07 and friction in engine.

OR

Q.5 (a) A four cylinder, four stroke gasoline engine working at 3500 rpm develops a brake power of 20 kW. A Morse Test was conducted on this engine and the brake power obtained when each cylinder was made inoperative by short circuiting the spark plug are 15, 14.7, 14.5 and 14.2 kW respectively. The Morse test was conducted at constant speed. Find the indicator power, mechanical efficiency and

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bmep when all the cylinders are firing. The bore and stroke of the engine are 9 cm and 10 cm.

(b) What do you mean by hybrid engines and vehicles?

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