

GUJARAT TECHNOLOGICAL UNIVERSITY
BE – SEMESTER – VI (NEW).EXAMINATION – WINTER 2016

Subject Code: 2161902

Date: 24/10/2016

Subject Name: Internal Combustion Engines

Time: 10:30 AM to 01:00 PM

Total Marks: 70

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) What is I.C Engine? Explain with neat sketch valve timing diagram for 4-stroke diesel engine. **07**
- (b) What are the different methods of cooling I.C. engine? Compare different methods. **07**
- Q.2** (a) Explain pumping loss and rubbing friction loss as applied to I.C.Engines. **07**
- (b) What is fuel air cycle? Explain the phenomenon of dissociation. **07**
- OR**
- (b) Explain construction and working of Junker's gas calorimeter with neat sketch. **07**
- Q.3** (a) Define the following terms: - (i) Octane number (ii) Cetane number (iii) HUCR (iv) Diesel index (v) Performance number (vi) Flash and Fire point (vii) Vapour lock. **07**
- (b) A 4 cylinder 4-stroke engines have 10 cm bore and 14 cm strokes runs at 4000 rpm. A: F ratio supplied to engine is 16:1 with volumetric efficiency of 75%. Manometer shows reading of 12 cm of mercury causing the air flow through the venture. Find diameter of venture and nozzle orifice. Neglect the compressibility of air. Take: - $C_{da} = 0.85$, $C_{df} = 0.75$, $\rho_a = 1.25 \text{ kg/m}^3$, $\rho_f = 750 \text{ kg/m}^3$, $\rho_m = 13600 \text{ kg/m}^3$. **07**
- OR**
- Q.3** (a) Explain with neat sketch of simple carburetor and its limitations. **07**
- (b) What do you mean by solid injection system? Explain with neat sketch of common rail fuel injection system. **07**
- Q.4** (a) What is the function of S.I engine ignition system? Explain with neat sketch of magneto ignition system. **07**
- (b) What type of governing used in S.I engine and C.I engine? Explain any one of them. **07**
- OR**
- Q.4** (a) Define Supercharging and give its advantages. Also explain the methods of supercharging and explain with sketch any one of them. **07**
- (b) Explain with neat sketch the pulse turbo charging (Buchi type). **07**
- Q.5** (a) Classify different types of combustion chambers in S.I and C.I engine. Also explain any one of them. **07**

- (b) A two stroke diesel engine was motored when energy meter reading was 1.5 KW. Then the test on the engine was carried out for 1 hour and following observations were recorded:- Brake torque = 120 Nm, RPM = 600, Fuel used = 2.5 kg, C.V of fuel = 40.3 MJ/kg, Cooling water used = 818 kg, Rise in cooling water temperature = 10°C , $C_{pw} = 4.2\text{ KJ/kg K}$, Exhaust gas temperature = 345°C , Room temperature = 25°C , A:F used = 32:1, $C_{pg} = 1.05\text{ KJ/kg K}$. Draw heat balance sheet indicating units in KJ/min basis and also on percentage basis. 07

OR

- Q.5 (a) Describe the “Morse test”. Write the assumptions made and limitation of this test. 07
- (b) A diesel engine working on diesel cycle uses compression ratio of 18. The cut off is 6% of stroke at a particular load. The specific heat at constant volume increases by 1.2%. Find the percentage change in the air-standard efficiency of the cycle. Take $C_v = 0.72\text{ KJ/kg K}$ and $R = 287\text{ J/kg K}$ as an average values. 07
