

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-VI (NEW) - EXAMINATION – SUMMER 2018

Subject Code:2161902

Date:01/05/2018

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) Explain with neat sketch actual valve timing diagram of petrol engine. **03**
(b) Define in relation to I.C. Engine : (1) Compression ratio (2) Cut-off ratio **04**
(3) Volumetric efficiency (4) Relative efficiency.
(c) Explain the variation in specific heat and loss due to it in an Otto cycle with the help of P-V diagram. **07**
- Q.2** (a) Explain following terms with respect to combustion in SI engine. **03**
(1) Enthalpy of formation, (2) Adiabatic flame temperature, (3) Lean mixture and Rich mixture.
(b) Mention the assumptions made in air-standard cycle analysis of I.C. engine. **04**
(c) What is the effect of carbon monoxide on dissociation? Explain the effect of dissociation on maximum temperature and brake power with the help of suitable diagram. **07**
- OR**
- (c) What is stoichiometric air fuel ratio? Find stoichiometric air fuel ratio for Iso-octane. **07**
- Q.3** (a) Enlist and draw neat sketch of methods of supercharging. **03**
(b) Write the advantages and limitations of supercharging SI and CI engines? **04**
(c) Describe different types of injection nozzles with their injection rate characteristics and discuss their relative advantages and disadvantages. **07**
- OR**
- Q.3** (a) Differentiate between I.C. engine governor and flywheel. **03**
(b) Explain construction and working of simple carburetor with neat sketch. **04**
(c) Explain requirement of air fuel mixture ratio at various working condition of SI engine with suitable diagrams. **07**
- Q.4** (a) Explain effect of following parameters on abnormal combustion in SI engine. **03**
(1) Engine speed, (2) Engine size, (3) Mixture quality.
(b) Draw and explain various stages of combustion in C.I. engine. **04**
(c) Explain battery ignition system with neat sketch. **07**
- OR**
- Q.4** (a) Classify C.I. engine combustion chamber. **03**
(b) Explain following terms in brief related to surface ignition in SI engine: **04**
(1) Run on surface ignition, (2) Run away surface ignition (3) Wild ping
(4) Rumble.
(c) Explain dry sump lubrication system of IC engine with neat sketch. **07**
- Q.5** (a) Draw a layout of diesel engine power plant. **03**
(b) Write merits and demerits of diesel power plant. **04**
(c) Describe the Morse test. Comment the assumption made in Mores test. **07**
During trial on a four cylinder petrol engine running at 3000 rpm the brake load was 267 N when all cylinder were working. When each cylinder was cut out in turn and the speed returned to 3000 rpm the brake load reading were 178 newton, 187 newton, 182 newton and 182 newton. For the brake dynamometer, brake

power = $W \times N / 27300$ in kW, where W is brake load in newton and N is engine speed in rpm. Determine the brake power of the engine and estimate its indicated power and mechanical efficiency.

OR

- Q.5** (a) Enlist major pollutants from gasoline & diesel engines? **03**
(b) Write a short note on three way catalytic convertor with neat sketch. **04**
(c) The power of a six cylinder four stroke diesel engine attached with hydraulic dynamometer for which the law is brake power = $WN/20000$ in kW, Where W= brake load in newton and N = speed in rpm. The air consumption was measured by an air box with the orifice having diameter 30 mm and coefficient of discharge = 0.6. The following readings were obtained:
Bore = 95 mm, stroke = 120 mm, speed = 2400 rpm, brake load = 550 N, Ambient air pressure = 750 mmHg, Ambient air temperature = 25⁰C, Manometric head over orifice for air flow = 145 mmHg, time to use 100 cc fuel = 19.3 sec, specific gravity Hg of 13.6, Fuel specific gravity= 0.831.
Calculate: (1) Brake mean effective pressure (2) Torque in Nm (3) Brake specific fuel consumption (4) Volumetric efficiency. **07**
