

6E3050

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B. Tech. VI Sem. (Main & Back) Exam. May/June-2014
Mechanical Engineering
6ME2 I.C. Engines & Diesel Power Plant

Time: 3 Hours

Maximum Marks: 80

Min. Passing Marks: 24

Instructions to Candidates:-

Attempt any five questions, selecting one question from each unit. All Questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly.

Units of quantities used/ calculated must be stated clearly.

Use of following supporting material is permitted during examination.

1. _____

2. _____

UNIT-I

- Q.1 (a) Discuss various elements in Energy Balance of a typical diesel engine. [5]
- (b) Give a historical view of different emission standards applicable in India. [6]
- (c) Describe with the help of a sketch any one method for measurement of air consumption of a single cylinder gasoline engine. [5]

OR

- (a) Discuss first law analyses for an I.C. Engine. [4]
- (b) Calculate (i) BHP (ii) Torque (iii) bsfc and (iv) volumetric efficiency for the six cylinder four stroke engine for which BHP is measured by a water brake

(law $WN/20000$ where W is in Newton and speed N is in rpm). The air consumption is measured by an orifice system. [12]

Bore = 100mm

Stroke = 120mm

Brake load = 560N

Orifice diameter = 30mm

C_d of orifice = 0.6

Pressure drop across orifice = 14.5 Cms of Hg

Fuel density = 831 Kg/m³

Time taken to consume 100 cc fuel = 20 sec

Ambient pressure = 1 bar

Ambient Temperature = 27⁰c

UNIT-II

Q.2 (a) Discuss the effect of various engine design and operating variables on different combustion parameters for a diesel engine. [8]

(b) Define engine knock. How it differs from detonation? [2+6]

Discuss in detail various factors affecting knocking in an S.I. Engine

OR

(a) Discuss in detail types of abnormal combustion in SI and CI engines. Also suggest methods for controlling these abnormal combustions in an actual engine. [8]

(b) Compare important characteristics of methanol and ethanol fuels with gasoline fuel and explain their effect on important engine performance parameters. [8]

UNIT-III

- Q.3 (a) Explain in detail working of a common rail fuel injection system for a diesel engine and enumerate main advantages of CRDI over a conventional fuel injection system. [8]
- (b) Discuss the effect of air-fuel ratio on various performance parameters of diesel and gasoline engines. [8]

OR

- (a) Discuss in detail any one type of Electronic Ignition system for a SI engine and explain its benefits over conventional ignition system. [7]
- (b) Write short notes on –
- (i) Firing order of a multi-cylinder engine [3]
 - (ii) Aircraft carburetor [3]
 - (iii) Spark advance and its effects [3]

UNIT-IV

- Q.4 (a) Discuss different lubrication regimes and explain which of them is applicable for bearings, piston rings and tappets of an engine. [6]
- (b) Find IHP, BHP and draw neat balance sheet for a single cylinder four stroke engine with following data: [10]

Bore = 20cm Stroke = 40cm mep = 6bar
Torque = 407N_m Speed = 250rpm Fuel consumption = 4kg/h
C.V of fuel = 43MJ/kg Air used/kg of fuel = 30kg
Cooling water flow = 4.5kg/min
Rise in cooling water temp = 45⁰c
Exhaust gas temp = 420⁰c
Room Temperature = 20⁰c
Specific heat of exhaust gas = 1 kJ / kgK
Specific heat of water = 4.18 kJ / kgK

OR

- (a) Explain in detail different ratings and classification of engine oils. [8]
- (b) Describe different methods of super charging CI and SI engines and explain their limiting factors. [8]

UNIT-V

Q.5 Explain working principles of - [4×4]

- (a) Variable compression ratio engine
- (b) Rotary combustion engine
- (c) Stratified charge engine
- (d) Free piston engine

OR

- (a) Explain how a dual fuel engine works? How combustion in a dual fuel engine is different from a conventional diesel engine. What modifications are needed to convert a conventional diesel engine to a dual fuel engine? [4×3]
- (b) Explain how the speed of an engine generator is controlled. [4]
