

Date: 20/05/2016
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Exam No: _____

GANPAT UNIVERSITY
B. TECH - SEM I & II AN BRANCH ENGINEERING
REGULAR & REMEDIAL EXAMINATION - APRIL-JUNE-2016
2ME101: ELEMENTS OF MECHANICAL ENGINEERING

TIME: 3 HRS

TOTAL MARKS: 60

- Instructions: (1) Attempt all questions.
(2) Figures on right indicate full marks.
(3) Be precise and to the point in answering the descriptive questions.
(4) Assume suitable data if missing.
(5) Use of steam table is permissible.

SECTION: I

- Q.1 a) What is Thermodynamic Systems? Describe thermodynamic systems with examples. (5)
b) Derive Universal Gas Equation using gas laws. (5)

OR

- Q.1 a) Derive Poisson's Equation associated with isentropic process. (5)
b) Derive an expression of heat transfer for closed system polytropic process. (5)

- Q.2 a) Describe the following terms: (5)
i) Latent Heat of Steam ii) Dryness Fraction iii) Wet Steam
iv) Superheated Steam v) Dry Saturated Steam
b) What are Boiler Mountings? Explain any two with figure. (5)

OR

- Q.2 a) What is Refrigeration? Explain Vapour Compression refrigeration system with diagram. (5)
b) Which cycle uses in commercial bikes? Derive the expression of efficiency for the same. (5)

- Q.3 a) A cylinder contains 0.2 m^3 of gas at 1 bar and 100°C . This is compressed to volume 0.05 m^3 so that the pressure becomes 6 bar. Calculate (5)
i) mass of gas ii) index of process iii) internal energy iv) workdone v) heat transfer
b) Find the internal energy of 1 kg of superheated steam at a pressure of 10 bar and 300°C . if this steam is expands to 1.5 bar and 0.9 dryness. Find the change in internal energy. (5)

SECTION: II

- Q.4 a) What is the function of governor? Describe Porter governor with neat sketch (5)
b) Differentiate between flywheel and governor. Draw turning moment diagram of flywheel. (5)

OR

- Q.4 a) What is hydraulic pump? Explain centrifugal pumps with neat sketch. (5)
b) Derive an expression of work done for single stage reciprocating compressor with clearance. (5)

- Q.5 a) What is the function of coupling? Classify various coupling. (5)
b) Differentiate brake and clutch. (5)

OR

- Q.5 a) Briefly Explain Belt, Chain and Gear drive for Power Transmission. (5)
b) Explain the following terms: (5)
i) Ductility ii) Malleability iii) Hardness iv) Toughness v) Stiffness

- Q.6 a) In an Otto Cycle, air at 15°C and 1 bar is compressed adiabatically until the pressure is 15 bar. Heat is added at constant volume until the pressure rises to 40 bar. Calculate: (5)
i) air standard efficiency ii) compression ratio iii) mean effective pressure
assume $C_v = 0.718 \text{ kg/kg-K}$, $\gamma = 1.4$ $R = 8.314 \text{ kg/kg-mole-K}$

- b) A six cylinder petrol engine operates on the 4 stroke cycle. the bore of each cylinder is 70 mm (5)
and stroke 100 mm. the clearance volume per cylinder is 67 cm^3 . At a speed of 3960 rpm the full consumption is 119.5 kg/h and the torque developed is 140 N-m. calculate
i) Brake Power
ii) Brake mean Effective Pressure
iii) relative η on brake power basis
assume LCV = 44MJ/kg, $\gamma = 1.4$ consider engine works on constant volume cycle

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