GANPAT UNIVERSITY
B. TECH SEM-I & II   All Branch
NEW CBCS REGULAR & Remedial   Nov - Dec 2016
2ME101 Elements of Mechanical Engineering

TIME: 3 HRS   **TOTAL MARKS: 60**

Instructions: (1) This question paper has two sections.
(2) Attempt each section in separate answer book.
(2) Figures on right indicate marks.
(3) Be precise and to the point in answering the descriptive questions.

SECTION: I

Q.1	(a)	Compare individual drive and group drive.	(3)
	(b)	Define power and energy.	(2)
	(c)	What is heat? What is positive and negative heat? What are the factors on which the heat flow depends?	(3)
	(d)	Explain the terms: melting point, boiling point.	(2)

OR

Q.1	(a)	What is flow work? Explain.	(3)
	(b)	Define thermodynamic work? How work done is designated? Which sign convention is used for work?	(3)
	(c)	What is specific heat of the fuel? Explain.	(2)
	(d)	Explain open system and isolated system.	(2)

Q.2	(a)	What is Refrigerant?, what is refrigerating Effect?, what is 1 TR? And difference between Heat Pump and refrigerator.	(5)
	(b)	Describe with neat sketch vapour absorption refrigeration system.	(5)

OR

Q.2	(a)	Derive an expression of work done when a gas is expanded as per law $PV^{\gamma} = C$ with usual notations.	(5)
	(b)	5 kg of air is heated from 25°C to 150°C. Determine (1) specific heats (2) change in internal energy (3) change in enthalpy (4) heat supplied. Assume R = 0.287 kJ/kg K, specific heat ratio = 1.4 for air and work done 500 kJ.	(5)

Q.3 (a) With a neat sketch describe the working of combined separating and throttling calorimeter. (5)

(b) Determine enthalpy and internal energy of 1 kg of steam at a pressure 12 bar when (i) the (5) dryness fraction of steam is 0.8 (ii) steam is dry and saturated (iii) steam is superheated to 280°C. take $C_{ps} = 2.1$ kJ/kg K.

SECTION: II

Q.4 (a) Derive the equation of efficiency for Diesel Cycle with usual notations. (5)

(b) Describe the working of a Lancashire boiler with neat sketch. (5)

OR

Q.4 (a) Derive an expression for efficiency of Rankine Cycle with pump work. (5)

(b) Explain with neat sketch the construction and working of Babcock and Wilcox boiler, (5) advantages, disadvantages and application.

Q.5 (a) What is economizer? Why it is used in a boiler plants? What are the advantages and (5) disadvantages of economiser?

(b) Explain following terms related to I. C. Engines, (i) Indicated power, (ii) Brake power (5) (iii) Indicated thermal efficiency, (iv) Friction power, (v) Mechanical efficiency

OR

Q.5 (a) What is priming? Explain with a neat sketch vane pump. (5)

(b) With a simple line sketch explain the working of single stage reciprocating compressor. And (5) also derive expression for work done with consideration of clearance volume.

Q.6 (a) A single stage air compressor is required to compress 90 m³ air/min from 1 bar and 27°C to 10 bars. Find the temperature at the end of compression, work done, power required and heat rejected during each of the following process (i) isothermal (ii) adiabatic (iii) polytropic following the law $PV^{1.25}$ = constant. Assume no clearance.

(b) With a simple sketch explain the working of disc clutch.

---END OF PAPER---