Student Exam No:

GANPAT UNIVERSITY B.TECH SEM. I (ME, MC, CIVIL, EE) REGULAR EXAMINATION NOV/ DEC -2012 ME 101: ELEMENTS OF MECHANICAL ENGINEERING TIME:- 3 HOURS TOTAL MARKS :-

INSTRUCTIONS:

- (1) All questions are compulsory.
- (2) Assume suitable data if necessary.
- (3) Figure to the right indicates full marks.
- (4) Scientific calculator, steam table is allowed

SECTION – I

(A)	Explain working and construction of water tube boiler.	P to	06
(B)	Derive $\eta = 1 - (1/r^{r+1})$ for Otto cycle with P-V and T-S diagram.		06

OR

(A)	An engine operating on diesel cycle has maximum pressure and temperature of 45	06
	bar and 1500 °C. Pressure and temperature at the beginning of compression are 1	
	bar and 27 °C. Determine air standard efficiency of the cycle. Take $\gamma = 1.4$ for air.	
(\mathbf{B})	Explain the working principle of Air preheater with neat sketch	06

O-2

Q-1

A)	Derive an expression of work done for adiabatic process with P-V diagram	05
B)	Calculate the heat supplied to the boiler kg of steam when the steam is generated	06

(B) Calculate the heat supplied to the boiler / kg of steam when the steam is generated at a constant pressure of 12 bar absolute. The water supplied to the boiler is at 50° C and at the same pressure (i) if the steam formed is dry saturated (ii) the steam is wet with the dryness fraction of 0.91 (iii) the steam is superheated to 300° C. Take Cp_s = 2.1 kJ/kg K.

OR

(A)	Explain the working and construction of the Separating calorimeter.	05
(B)	In air compressor, air enters at 1.013 bar and 27 °C having volume of 5 m ³ /kg and	06
	it is compressed to 12 bar isothermally. Determine (i) work done (ii) heat transfer and (iii) change in internal energy.	
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	Attempt any three.	12
(A)	Define the following terms:	
	(i) Heat (ii) Work (iii) Kinetic energy (iv) Potential energy.	
(B)	Define the following terms: (i) Dry steam (ii) Wet steam	
	(iii) Superheated steam (iv) Degree of superheat	
(C)	Explain the T-H diagram for conversion of ice into steam at constant	
	pressure.	
(D)	What is calorific value? Explain HCV and LCV.	

0-3

SECTION – II

- (A) Explain the following pumps: (i) Volute Pump (ii) Vertex Pump 06
 (B) Explain the working of Hartnell governor with a neat sketch. 05
 OR
 (A) Explain the working of Vapour Compression Refrigeration system with 06
- (A) Explain the working of Vapour Compression Refrigeration system with diagram.

05

12

(B) What is drive? Differentiate between individual drive and group drive

Q-5

Q-6

Q-4

- (A) Define the term scavenging process ? Explain scavenging process in two stroke Compression Ignition engine with neat sketch.
- (B) A four cylinder four stroke cycle petrol engine has 110 mm bore and stroke
 06 is 1.3 times bore. It consumes 4 kg of fuel per hour having calorific value of 41100 kJ/kg. If the engine speed is 800 r.p.m. Find its indicated thermal efficiency. The mean effective pressure is 0.7 N/mm².

OR

- (A) Derive the work done equation of Single Stage Reciprocating Compressor
 06 with consideration of clearance volume.
- (B) A single stage, single acting compressor has a bore of 170 mm and stroke of 260 mm. It runs at 130 rpm. The suction pressure is 1 bar and delivery pressure is 9 bar. Find the indicated power if compression (i) follows the law PV^{1.25}= Constant (ii) compression is isothermal. Also find isothermal efficiency. Assume there is no clearance volume.

Attempt any three.

- (A) Derive the equation of volumetric efficiency for compressor.
- (B) Write short note on Window Air -Conditioner.
- (C) Write the function of the following components:
 (i) Carburctor
 (ii) Piston
 (iii) Fuel Pump
 (iv) Cam shaft
- (D) Differentiate between clutch and coupling.

END OF PAPER

