Student Exam No._____

GANPAT UNIVERSITY

B. Tech. Semester: V (Mechanical Engineering)

CBCS Regular Examination Nov – Dec 2015

2ME502: Energy Conversion & Utilization System

Time: 3 Hours **Total Marks: 70**

Instructions: 1. *Attempt all questions. Use separate answer sheet for each section.*
2. *Use of non-programmable scientific calculator is permitted.*
3. *Use of psychometrics table & chart and Refrigeration table are permitted.*
4. *Assume suitable data if missing.*

Section - I

Que. – 1	(A)	What are the Desirable properties of I.C. Engine fuel?	(4)
	(B)	Enlist Non-conventional gaseous fuels. Explain any one of them.	(4)
	(C)	Compare Solid, Liquid and Gaseous fuels.	(4)
		OR	
Que. – 1	(A)	What do you mean by stoichiometric air fuel (A/F) ratio?	(4)
	(B)	During Mores test of on a 4 cylinder engine, following measurement of brake power as taken at constant speed. When all cylinders are firing BP = 3037KW, When first cylinder is not running BP = 2102 KW, When second cylinder is not firing BP = 2102 KW, When the third cylinder is not firing BP = 2100 KW, When forth cylinder is not firing BP = 2098 KW, Then find the mechanical efficiency.	(4)
	(C)	Draw ideal and actual valve timing diagram for petrol & diesel engine.	(4)
Que. – 2	(A)	What is the function of carburetor in I.C. Engine? Explain the working of simple carburetor with neat sketch.	(5)
	(B)	Why injection system used in diesel engine? What are the elements of fuel injection system? Differential solid and air blast injection system.	(6)
		OR	
Que. – 2	(A)	Derive an expression for change of internal energy and enthalpy during process with variable specific heats.	(5)
	(B)	What are the objectives of lubrication system in I.C.Engine. What are the Requirements of an ideal lubricant?	(6)
Que. – 3	(A)	What are the needs of cooling in I.C.Engine? Explain air and water cooling system.	(6)
	(B)	Explain various engines losses and energy Balance also Explain morse test.	(6)

Section – II

Que. – 4	(A)	What is the need of refrigeration in Aircrafts? Write Merits and Demerits of Air refrigeration System.	(6)
	(B)	An air refrigeration open system operating between 1 MPa and 100 kPa is required to produce a cooling effect of 2000 kJ/min. Temperature of the air leaving the cold chamber is – 5°C and at leaving the cooler is 30°C. Neglect losses and clearance in the compressor and expander. Determine : (i) Mass of air circulated per min (ii) Compressor work and expander work (iii) COP and power in kW required.	(6)

OR

Que. – 4 (A) Explain Vapour Absorption Refrigeration system with neat sketch. Discuss the advantages of vapour absorption refrigeration system over vapour compression refrigeration system. (6)

(B) In an absorption type refrigerator, the heat is supplied to NH_3 generator by condensing steam at 2 bar and 90% dry. The temperature in the refrigerator is to be maintained at -5^0C .Find the Maximum C.O.P Possible. If the refrigeration load is 20 tonnes and actual C.O.P. is 70% of the maximum C.O.P. find the mass of steam required per hour. Take temperature of the atmosphere as 30°C. (6)

Que. – 5 (A) Explain Vapour compression refrigeration system with P-V and T-S diagram also derive the expression of C.O.P for the same (5)

(B) 28 tonnes of ice from and at 0°C is produced per day in an ammonia refrigerator. The temperature range in the compressor is 25°C to -15°C. The vapour is dry and saturated at the end of compression and an expansion valve is used. Assuming a co-efficient of performance of 62% of the theoretical, calculate the power required to drive the compressor. (6)

Temp (^0C)	Enthalpy (kJ/kg)		Entropy (kJ/kg K)	
	Liquid	Vapour	Liquid	Vapour
25	100.04	1319.22	0.3473	4.4852
-15	-54.56	1304.99	-2.1338	5.0585

Take latent heat of ice = 335 kJ/kg.

OR

Que. – 5 (A) Explain the following terms: (5)

a) Room Sensible Heat Factor
b) By-pass factor
c) Adiabatic humidification
d) Apparatus dew point
e) Mixing of two streams

(B) The atmospheric conditions are 20°C and specific humidity of 0.0095 kg/kg of dry air. Calculate the following with the use of psychometric table : (6)

(i) Partial pressure of vapour
(ii) Relative humidity
(iii) Dew point temperature
Also compare values with psychometric charts.

Que. – 6 (A) What are the needs of air conditioning? Explain split air conditioning with neat sketch. (6)

(B) What do you understand by Heat, Ventilation and Air Conditioning? What is the role of duct in air conditioning also classify ducts. (6)

END OF PAPER