P P SAVANI UNIVERSITY

First Semester of B. Tech. Examination

May 2019

SEME1030 Elements of Mechanical Engineering

28/05/2019, Tuesday **Time: 12:30 p.m. to 3:00 p.m.** **Maximum Marks: 60**

Instructions:

1. The question paper comprises of two sections.
2. Section I and II must be attempted in separate answer sheets.
3. Make suitable assumptions and draw neat figures wherever required.
4. Use of scientific calculator is allowed.

SECTION – I

Q - 1	**Answer the following. (Any Five)**	**[05]**
(i)	Which one is the Extensive Property? a) Pressure b) temperature c) density d) energy	
(ii)	Define Calorific Value.	
(iii)	What is the break power?	
(iv)	Which one from following does not fall under thermal category? a) Solar Energy b) Wind Energy c) Geothermal Energy d) Nuclear energy	
(v)	Constant volume process is also known as a) Isentropic process b) Adiabatic process c) Isochoric process d) Isobaric process	
(vi)	Condition of steam between saturated liquid and saturated vapor state is a) Superheated b) saturated c) wet d) subcooled	
(vii)	Following sources of energy is known as renewable source. a) Fossial fuel b) Nuclear c) CNG d) None of above	
Q - 2 (a)	How can you define prime mover? Give the classification of prime movers.	**[05]**
Q - 2 (b)	What is renewable energy? Classify the sources of renewable energy in brief.	**[05]**
	OR	
Q - 2 (a)	Explain Path, Process, Cycle.	**[05]**
Q - 2 (b)	Write the description of Bio fuels, Vegetable Oils as an alternative fuel.	**[05]**
Q - 3 (a)	Derive relation between P, V & T for adiabatic Process.	**[05]**
Q - 3 (b)	0.67 kg of gas at 14 bar and 290°C is expanded to four times the original volume according to the law $PV^{1.3}$ = Constant. Calculate 1) The original volume of gas 2) The final temperature of gas 3) The final pressure of Gas. Take R = 0.287 kj/kg k.	**[05]**
	OR	
Q - 3 (a)	What is adiabatic process? Prove with usual notations the law of governing adiabatic process as PV^{γ} = Constant.	**[05]**
Q - 3 (b)	One kg of gas at 1 bar pressure and 17°C is compressed isothermally to a pressure of 25 bar in cylinder. The characteristics equation of gas is PV=260 T per kg where T in K. Calculate 1) The final temperature, 2) final volume, 3) change in enthalpy 4) work done	**[05]**
Q - 4	**Attempt any One.**	**[05]**
(i)	Define following terms Critical point, Triple point, Sublimation, Evaporation, Latent Heat	
(ii)	What are the uses of compressed air?	

SECTION – II

Q - 1	**Answer the following. (Any Five)**	**[05]**
(i)	For Otto cycle compression ratio varies between a) 5 and 8 b) 10 and 15 c) 16 and 22 d) 25 and 30	
(ii)	In Babcock and Wilcox boiler the superheater is a set of a) Straight tubes b) U-tubes c) L-tubes d) C-tubes	
(iii)	Which one is water tube boiler? a) Cochran boiler b) Locomotive boiler c) Lancashire boiler d) Babcock & Wilcox boiler	
(iv)	What is the function of Coupling?	
(v)	What is the function of Clutch?	
(vi)	During refrigeration cycle, heat is absorbed by refrigerant in a) Compressor b) Evaporator c) Condenser d) Expansion Valve	
(vii)	To transmit the power at longer distance which belt is used? a) Flat b) V c) Timing d) none of above	
Q - 2 (a)	Explain construction and working of Locomotive Boiler with neat sketch.	**[05]**
Q - 2 (b)	For an air standard Otto cycle maximum and minimum temperature are 1350°C and 30°C. Heat supplied is 750 kj/kg of air. Calculate compression ratio, air standard efficiency, maximum to minimum pressure ratio.	**[05]**
	OR	
Q - 2 (a)	In an Otto cycle the compression ratio is 8. The temperature at the beginning of compression and at the end of heat supply are 310 K and 1600 K respectively. Assume γ = 1.4 and C_v = 0.717 kj/kg k. find 1) heat supplied 2) efficiency of the cycle.	**[05]**
Q - 2 (b)	What is Boiler Accessory? Write function of: Economizer, Superheater, Steam separator, Feed pump, Air Preheater.	**[05]**
Q - 3 (a)	With a neat sketch explain construction and working of Window Air-Conditioner.	**[05]**
Q - 3 (b)	Write the short note on Oldham and Universal Coupling.	**[05]**
	OR	
Q - 3 (a)	Explain VCR cycle with neat sketch.	**[05]**
Q - 3 (b)	What is the function of gear? List out different types of gears used with application.	**[05]**
Q - 4	**Attempt any One.**	**[05]**
(i)	Explain working of four stroke Petrol Engine with P-V diagram.	
(ii)	What is function of Clutch? List out different types of Clutch used with application.	

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