C.U.SHAH UNIVERSITY
Winter Examination-2020

Subject Name: Elements of Mechanical Engineering

Subject Code: 4TE01EME1   **Branch: B.Tech (All)**

Semester: 1   **Date: 12/03/2021**   **Time: 03:00 To 06:00**   **Marks: 70**

Instructions:
1. Use of Programmable calculator & any other electronic instrument is prohibited.
2. Instructions written on main answer book are strictly to be obeyed.
3. Draw neat diagrams and figures (if necessary) at right places.
4. Assume suitable data if needed.

Q-1   **Attempt the following questions:**   **(14)**

a)   Compressor & Turbine are examples of
(a) Open system (b) Closed system (c) Isolated system (d) None of these

b)   The type of brake widely used in automobiles is (a) Cone brake (b) Block brake
(c) Internal expanding shoe brake (d) Simple band brake

c)   The efficiency of carnot cycle is
(a) $1-T_1/T_2$ (b) $1-T_2/T_1$ (c) $1+T_1/T_2$ (d) $1+T_2/T_1$

d)   Babcock & Wilcox boiler is a type of ………boiler.
(a) Fire tube (b) Low pressure water tube (c) High pressure water tube
(d) Vertical tube

e)   Throttling is a…………..Process
(a) Isothermal (b) Constant volume (c) Constant pressure (d) Isenthalpic

f)   The compression ratio is defined as the ratio of
(a) clearance volume to cylinder volume (b) swept volume to clearance volume
(c) clearance volume to swept volume (d) cylinder volume to clearance volume

g) C_p - C_v is equal to
(a)   0   (b)   R   (c)   n   (d)   Rv   (e) γ

h)   In the engine, working on diesel cycle, the heat is supplied at
(a) Constant temperature (b) Constant volume (c) Constant pressure (d) Constant
heat

i)   1 TR equals to
(a) 5.25 KW (b) 100 kJ/min (c) 200 kJ/min (d) 3.52 kW

j)   Wetness fraction of steam is equal to (a) x-1   (b) x   (c) 1-x   (d) 1

k)   Heat is rejected by a refrigerant during a refrigeration cycle in a
(a) Evaporator (b) Compressor (c) Throttle Valve (d) Condenser

l)   Which one of the following is a Dead weight type governor
(a) Porter governor (b) Hartnell governor (c) Wilson-Hartnell governor (d) Watt
governor

m)   For same compression ratio, the thermal efficiency of otto cycle is……….diesel cycle.
(a) Less than (b) Greater than (c) Equal to (d) Less than or equal to

n)   Temperature measurement by mercury in glass thermometer is based on

(a) Zeroth law (b) First law (c) Both a and b (d) None of these

Attempt any four questions from Q-2 to Q-8

Q-2		**Attempt all questions**	
	a)	Define specific heat and write its types. Derive- Mayor's relationship.	**(07)**
	b)	Derive PV^{γ}=constant, where γ=Cp/Cv	**(07)**
Q-3		**Attempt all questions**	
	a)	Differentiate among wet, dry, saturated, superheated steam and define dryness fraction of steam.	**(07)**
	b)	Explain any one type of calorimeter with neat sketch and also write its working and calculation of dryness fraction.	**(07)**
Q-4		**Attempt all questions**	
	a)	Comparison between mountings and accessories and write list all types of mountings and accessories of boiler.	**(07)**
	b)	Explain with neat sketch any water tube boiler. Also write its advantages & disadvantages.	**(07)**
Q-5		**Attempt all questions**	
	a)	Discuss briefly Otto cycle with the help of P-V diagram and derive an expression for the ideal efficiency of Otto cycle.	**(07)**
	b)	Differentiate between Petrol engine and Diesel engine with suitable examples.	**(07)**
Q-6		**Attempt all questions**	
	a)	Define the following with formula: (i) Indicated power (ii) Brake power (iii) Friction power (iv) Mechanical efficiency (v) Thermal efficiency (vi) Brake thermal efficiency (vii) Relative efficiency.	**(07)**
	b)	Classify various types of pumps and sketch any pump with working principle & limitations.	**(07)**
Q-7		**Attempt all questions**	
	a)	Classify various types of brakes, explain any one with neat sketch and also write its functions.	**(07)**
	b)	What is the function of a compressor? Explain with neat sketch, working of centrifugal compressor.	**(07)**
Q-8		**Attempt all questions**	
	a)	Define refrigeration and types of refrigerant and explain with a neat sketch, describe the working of vapour compression refrigeration.	**(07)**
	b)	State Zeroth law of thermodynamics and Second law of thermodynamics & write the limitations of First law of thermodynamics.	**(07)**