Enrollment No: _____ Exam Seat No:_____

C. U. SHAH UNIVERSITY

Summer Examination-2022

Subject Name: Elements of Mechanical Engineering

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

Semester: 1 Date: 26/04/2022 Time: 11:00 To 02:00 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)

1. A carburetor is used to supply 01
A. petrol, air and lubricating oil
B. air and diesel
C. petrol and lubricating oil
D. petrol and air

2. One ton of refrigeration is equal to the refrigeration effect corresponding to melting of 1000 kg of ice 01
(a) in 1 hour (b) in 1 minute (c) in 24 hours (d) in 12 hours

3. An open system is one in which 01
(a) Mass does not cross boundaries of the system, though energy may do so
(b) Neither mass nor energy crosses the boundaries of the system
(c) Both energy and mass cross the boundaries of the system
(d) Mass crosses the boundary but not the energy

4. In a four stroke engine, the working cycle is completed in 01
A. one revolution of the crankshaft
B. two revolutions of the crankshaft
C. three revolutions of the crankshaft
D. four revolutions of the crankshaft

5. Fire tube boilers are 01
A. internally fired
B. externally fired
C. internally as well as externally fired
D. none of these

6. The type of break commonly used on railway train wheels is _____ 01
(a) External block brake (b) Band break
(c) Internal expanding shoe brake (d) Disc brake

7. The clearance ratio is defined as the ratio of 01
(a) clearance volume to cylinder volume

(b) swept volume to clearance volume
(c) clearance volume to swept volume
(d) cylinder volume to clearance volume

8. Absolute zero temperature is……0C 01
(a) 0 (b) 273 (c) -273 (d) 100

9. Babcock & Wilcox boiler is a type of ……boiler. 01
(a) Fire tube (b) Low pressure
(c) Water tube (d) Vertical tube

10. The unit of temperature in S.I. units is 01
(a) Centigrade (b) Celsius (c) Fahrenheit (d) Kelvin

11. The ratio of brake power to the indicated power is known as 01
A. mechanical efficiency
B. overall efficiency
C. indicated thermal efficiency
D. brake thermal efficiency

12. Priming is necessary in 01
a) Centrifugal pump b) Vapour Compression refrigeration system
c) 4-Stroke Diesel Engine d) Babcock Wilcox boiler

13. The volume of air delivered by the compressor is called 01
A. free air delivery
B. compressor capacity
C. swept volume
D. none of these

14. In the Polytropic Process $PV^n = C$, if $n = \infty$, the process is called 01
A) Isochoric B) Isobaric C) Isothermal D) Adiabatic

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

Q-2		**Attempt all questions**	**(14)**
	a)	With neat sketch explain construction and working of pressure gauge	**07**
	b)	Prove that relation between C_p and C_v is $C_p - C_v = R$	**07**
Q-3		**Attempt all questions**	**(14)**
	a)	During testing of single cylinder two stroke oil engines, following data were obtained. Brake torque = 640 N-m, cylinder diameter = 21 cm, speed = 350 rpm, stroke = 28 cm, mean effective pressure = 5.6 bar, oil consumption = 8.16 kJ/hr, calorific value= 42705kJ/kg. Determine: (i) mechanical efficiency (ii) indicated thermal efficiency (iii) brake thermal efficiency (iv) specific fuel consumption	**07**
	b)	What is the function of a pump? Explain with neat sketch, working of centrifugal Pump.	**07**
Q-4		**Attempt all questions**	**(14)**
	a)	Give comparison between a flywheel and a governor	**04**
	b)	Explain with sketch watt governor.	**04**
	c)	Differentiate between Petrol engine and Diesel engine with suitable examples	**06**
Q-5		**Attempt all questions**	**(14)**

	a)	Classify various types of coupling and explain Oldham coupling with neat sketch	**07**
	b)	One kg of an ideal gas is heated from 18o C to 98o C. Assuming R = 0.264 KJ/kgK and $\gamma = 1.2$ for gas and work done 200 KJ Calculate: (i) Specific heats (Cp and Cv) (ii) Change in Internal Energy (iii) Change in enthalpy (iv) The heat supplied	**07**
Q-6		**Attempt all questions**	**(14)**
	a)	Explain construction and working of Cochran boiler with figure.	**07**
	b)	Explain Four stroke petrol engine with figure.	**07**
Q-7		**Attempt all questions**	**(14)**
	a)	What is centrifugal compressor? With a neat sketch describe its construction and working.	**07**
	b)	Discuss various types of belt drives with neat sketch	**07**
Q-8		**Attempt all questions**	**(14)**
	a)	Derive equation of efficiency of the Carnot engine working between the temperature units T1 and T2	**07**
	b)	With neat sketch explain working of combine separating and throttling calorimeter	**07**