GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER–I & II(NEW) EXAMINATION – WINTER 2022

Subject Code:3110006   Date:03-03-2023
Subject Name:Basic Mechanical Engineering
Time:10:30 AM TO 01:00 PM   Total Marks:70

Instructions:
1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.
5. Steam Table is allowed

Q-1	(a)	Define Specific heat and enthalpy.	03
	(b)	Explain different between renewable and non-renewable energy.	04
	(c)	Define adiabatic process. Prove that pV^γ = constant	07
Q-2	(a)	Explain classification of engineering materials.	03
	(b)	Explain with neat sketch the working of fast and loose pulley.	04
	(c)	How much heat to be added to convert 4kg water at 20^0 C into steam at 8bar and 200^0 C. take C_p of superheated steam as 2.1KJ/kg and specific heat of water of water as 4.187KJ/kgK.	07

OR

	(c)	1kg of air at 7bar pressure and 90^0C temperature undergoes a non flow polytropic process. The law of expansion is $pV^{1.1}$=constant. The pressure falls to 1.4bar during process. Calculate: (1) final temperature (2) Work done (3) change in internal energy (4)heat exchange take R= 287J/kg K and γ =1.4 for air.	07
Q-3	(a)	Explain with neat sketch throttling calorimeter.	03
	(b)	Explain different between fire tube boiler and water tube boiler.	04
	(c)	Derive equation for efficiency of constant pressure heat addition cycle.	07

OR

Q-3	(a)	Explain dryness fraction of steam.	03
	(b)	The engine working on ideal Otto cycle. The temperature at the beginning and at the end of compression is 50^0 C and 400^0 C. Calculate the air standard efficiency and compression ratio.	04
	(c)	Explain with neat sketch Cochran boiler.	07
Q-4	(a)	Draw net figures of any three types of belt drive.	03
	(b)	What are the uses of compressed air?	04
	(c)	The following reading were taken during the test on a single cylinder four stroke oil engine : Cylinder diameter =270 mm Stroke length= 380 mm Mean effective pressure= 6 bar Engine speed=250 rpm Net load on brake =1000 N Effective mean diameter of brake=1.5 m Fuel used = 10 kg/hr C.V of fuel = 44400KJ/kg Calculate: (1) Brake power	07

(2) Indicated power

(3) Indicated thermal efficiency.

<div align="center">OR</div>

Q-4 **(a)** Write function of clutch, Break and Coupling.   **03**

(b) Classify internal combustion Engine.   **04**

(c) Two cylinder four stroke diesel has total swept volume of 870cm^3 following data available with test on the engine.   **07**

Engine speed = 300rpm

Brake torque= 50 N-m

p_m= 10bar

calculate (1) indicated power

          (2) brake power

          (3) Mechanical efficiency

Q-5 **(a)** Explain difference between belt drive and chain drive   **03**

(b) Explain with the help of neat sketches, the working of two stroke petrol engine.   **04**

(c) Explain vapour compression refrigeration cycle.   **07**

<div align="center">OR</div>

Q-5 **(a)** Define the following mechanical properties   **03**
(i) Ductility (ii) Hardness (iii) Plasticity

(b) What is coupling? Explain internal expanding shoe brake with a neat sketch?   **04**

(c) What is priming? Explain with neat sketch centrifugal pump.   **07**