PAPER ID-311621

Roll No: | | | | | | | | | | | | | |

BTECH
(SEM I) THEORY EXAMINATION 2023-24
FUNDAMENTALS OF MECHANICAL ENGINEERING

TIME: 3HRS **M.MARKS: 70**

ote: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. **2 x 7 = 14**

a.	Write the characteristics of force.
b.	What do you mean by shear strain?
c.	Describe weakness of hybrid vehicles.
d.	What do you understand by total cylinder volume?
e.	A pressure of 2000 Pa is transmitted throughout a liquid column due to a force being applied on a piston. If the piston has an area of 0.1 m^2, what force is applied?
f.	Give example for a low head, medium head and high head turbine.
g.	Give the names of types of transducers based on quantity to be measured.

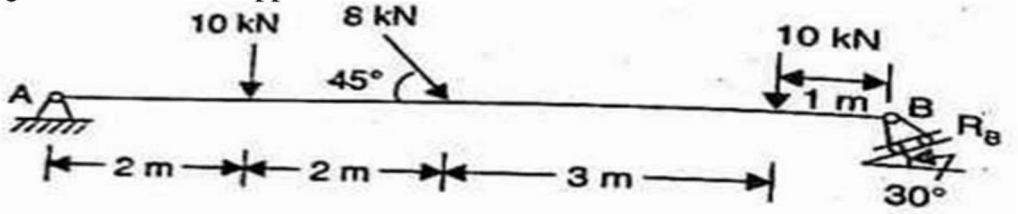
SECTION B

2. Attempt any *three* of the following: **7 x 3 = 21**

a.	A metallic wire ($Y = 20 \times 10^{10}$ N/m². and $\sigma = 0.26$) of length 3 m and diameter 0.1 cm is stretched by a load of 10 kg. Calculate the decrease in diameter of the wire.
b.	Explain the working of two stroke petrol engine with diagram.
c.	Explain the following: (i) DPT (ii) Comfort Conditions (iii) Specific Humidity
d.	Draw velocity triangle diagram for Pelton Wheel turbine. Differentiate between the turbines and pumps.
e.	Describe the construction and operation of a Prony brake dynamometer. And Derive the formula for break power of engine.

SECTION C

3. Attempt any *one* part of the following: **7 x 1 = 7**

a.	A beam 8 m. long is hinged at A and supported on roller over a smooth surface inclined at an angle 30^0 to the horizontal at B. The beam is loaded as shown in fig. Determine the support reactions. 
b.	What is the shape of cross-section obtained after yielding in cases of brittle material? Explain in brief.

PAPER ID-311621

Subject Code: BME101

Roll No: | | | | | | | | | | | | | |

BTECH

(SEM I) THEORY EXAMINATION 2023-24

FUNDAMENTALS OF MECHANICAL ENGINEERING

TIME: 3HRS **M.MARKS: 70**

4. Attempt any *one* part of the following: 7 x 1 = 7

a.	Why an energy management control system is required in an HEV? Do you think an elaborate energy management system similar to that applied to a hybrid vehicle, is required in an electric vehicle? Explain.
b.	Give the types of energy storage technologies suitable for hybrid electric vehicle. Explain the lithium-ion batteries in detail.

5. Attempt any *one* part of the following: 7 x 1 = 7

a.	With a neat sketch, explain the working principle of vapour compression Refrigeration system. Also draw T-s and P-h diagram
b.	A cold storage is to maintained at -5° C while the surroundings are at 35° C. The heat leakage from the surroundings into the cold storage is estimated to be 29 kW. The actual C.O.P. of the refrigeration plants is one-third of an ideal plant working between some temperatures. Find the power required to drive the plant.

6. Attempt any *one* part of the following: 7 x 1 = 7

a.	Water flows through a pipe of internal diameter 20cm at the speed of 1m/s. What should the diameter of the nozzle be if the water is to emerge at the speed of 4m/s? By continuity equation.
b.	How does temperature affect the viscosity of a fluid? A square plate 0.1 m side moves parallel to second plate with a velocity of 0.1 ms−1, both plates being immersed in water. If the viscous force is 0.002 N and the coefficient of viscosity 0.001 poise, what is the distance between the plates?

7. Attempt any *one* part of the following: 7 x 1 = 7

a.	Explain with neat sketch optical pyrometer. Explain why an optical pyrometer for measuring high temperatures calibrated for an ideal blackbody radiation gives too low a value for the temperature of a red-hot iron piece in the open but gives a correct value for the temperature when the same piece in the furnace.
b.	What are the examples of mechatronic system? How does the evolution of mechatronics take place?