PAPER ID-421235

Subject Code: KME201T

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

BTECH

(SEM II) THEORY EXAMINATION 2021-22

FUNDAMENTALS OF MECHANICAL ENGINEERING & MECHATRONICS

Time: 3 Hours ***Total Marks: 100***

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

SECTION A

1. Attempt *all* questions in brief. **2 x 10 = 20**

Q. No.	Questions	CO
a.	Define Young's modulus, Bulk modulus and Poisson's ratio.	1
b.	Define point of contra-flexure.	1
c.	Define scavenging process in IC Engine.	2
d.	List the components of a vapor compression refrigeration system and show them in sequence on a block diagram.	2
e.	Define specific gravity of a fluid.	3
f.	Describe the range and span of a measuring instrument.	3
g.	Explain the calibration in measurement.	4
h.	Differentiate between gauge pressure and absolute pressure.	4
i.	Define mechatronics and its key elements.	5
j.	Write any four mechanical actuators.	5

SECTION B

2. Attempt any *three* of the following: **10 x 3 = 30**

Q. No.	Questions	CO
a.	Draw S.F.D. and B.M.D. for cantilever beam carrying a uniformly distributed load W (KN/m) throughout its length L (m). What is the maximum bending moment?	1
b.	Explain the working of four stroke CI engine with P-V diagram and with suitable sketch.	2
c.	Describe the turbine and its classification with example. Explain the working and construction details of Kaplan Turbine.	3
d.	Define Pressure. Explain the construction and working of Bourdon Tube pressure gauge.	4
e.	Define mechanical actuators. Explain the following in brief: (i) Kinematic chain (ii) Gear and its types (iii) Cam-Follower, and its types	5

SECTION C

3. Attempt any *one* part of the following: **10 x 1 = 10**

Q. No.	Questions	CO
(a)	Calculate the shear force and bending moment for the beam subjected to the loads as shown in the figure then draw the shear force diagram (SFD) and bending moment diagram (BMD).	1

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	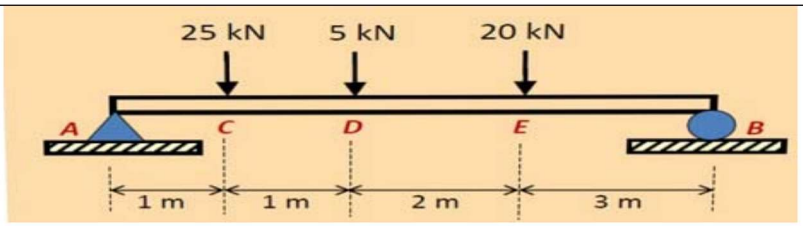	
(b)	A composite bar of uniform cross-section area 200 mm^2 consists of an aluminum section rigidly fastened between a bronze section and a steel section as shown in figure. Axial loads are applied at the positions indicated. Determine: the Axial load P (kN) to make it in equilibrium, Stress in each section and the total change in length of the bar. Given: E_{Bronze} = 100GPa, E_{Al} = 70GPa, E_{Steel} = 200GPa. 	1

4. Attempt any *one* part of the following: 10 x 1 = 10

Q. No.	Questions	CO
(a)	Explain basic components and working of Window Air Conditioner.	2
(b)	What do you mean by refrigeration? Explain basic components and working of domestic refrigerator with suitable sketch.	2

5. Attempt any *one* part of the following: 10 x 1 = 10

Q. No.	Questions	CO
(a)	Describe the Pascal Law. Explain the working of Hydraulic Lift with the help of a neat diagram.	3
(b)	With a neat sketch illustrate the construction and working of Centrifugal Pump.	3

6. Attempt any *one* part of the following: 10 x 1 = 10

Q. No.	Questions	CO
(a)	Define error in measurement. Discuss different types of errors in measurement in detail.	4
(b)	Briefly explain temperature measuring device based on the principle of radiation with neat sketch.	4

7. Attempt any *one* part of the following: 10 x 1 = 10

Q. No.	Questions	CO
(a)	Differentiate between (i) Open loop control system and Close loop control system. (ii) Hydraulic system and Pneumatic system.	5
(b)	Explain directional control valve and its significance with neat sketch.	5