

B.Tech. (CSE/CH/CS(SF)/CE, SEM I)/CSE (REC)

Institute of Engineering and Technology, Lucknow

First Class Test 2023-24

Fundamentals of Mechanical Engineering (IME101/BME101)

[TIME: 1 hr.]

[Max. Marks: 20]

Note: Attempt any five Questions. All Question carry equal marks.

1. Define the followings

- Parallelogram Law of forces
- Varignon's Theorem
- Law of transmissibility of force
- Poisson's Ratio

2. Calculate the tensile force in the cables AB and BC as shown in fig.1. Assume the pulleys to be friction-less.

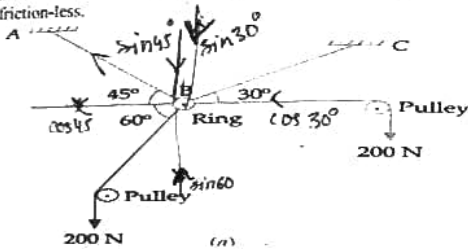
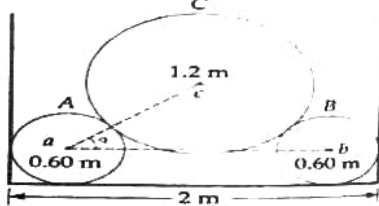


Fig.1

3. As shown in the fig.2. The cylinders A and B weigh 1000 N each and the weight of cylinder C is 2000 N . Determine the reaction at the contact points.



4. A weightless bar AB placed on a smooth inclines as shown in fig.3. Calculate the distance x at which the 100 N load be placed from end B so that the bar remains horizontal.

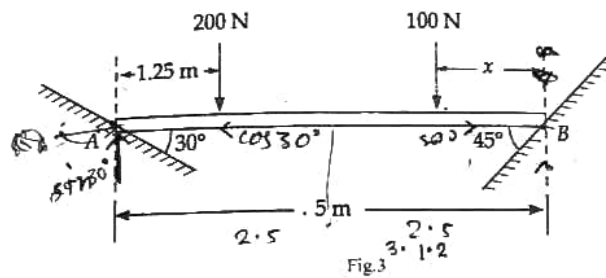
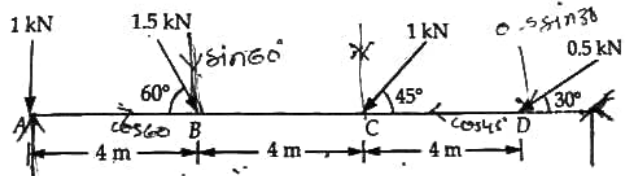


Fig.3

5. A bar $2\text{ cm} \times 4\text{ cm}$ in cross section and 40 cm long is subjected to a radial tensile load of 70 kN . It is found that the length increases by 0.176 mm and lateral dimension of 4 cm decreases by 0.0044 mm . Find

- Young's modulus
- Poisson's ratio
- Change in volume
- Bulk modulus.

A horizontal beam AD of length 12 m is acted upon by set of forces as shown in fig.4. Determine the magnitude, direction and position of the resultant.



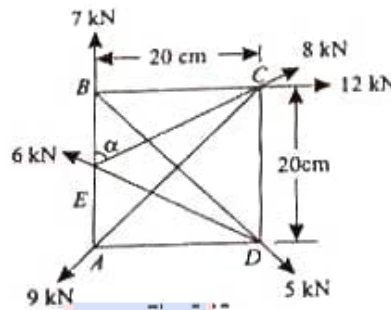
B.TECH.
(SEM I) ODD SEMESTER EXAMINATION 2023-24
FUNDAMENTALS OF MECHANICAL ENGINEERING

[Max. Marks: 70]

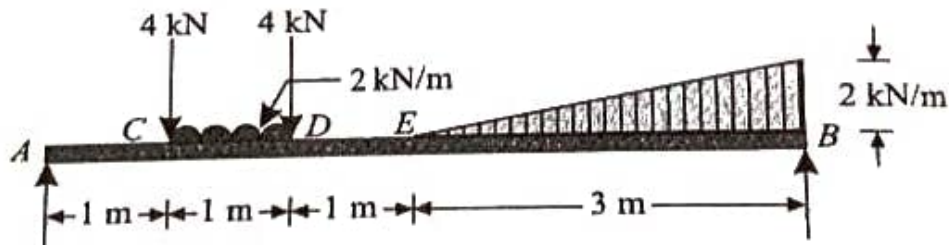
[TIME: 3 hrs.]

Note: Attempt All Questions. All Question carry equal marks.

- Q1.** Answer ALL parts. Marks
- (a) Define the followings: 3.5
- (i) Lami's theorem
- (ii) Modulus of rigidity
- (iii) Poisson Ratio
- (b) ABCD is a square, each side being 20 cm and E is the middle point of AB. Forces of 7, 8, 12, 5, 9 and 6 kN act on the lines of directions AB, EC, BC, BD, CA and DE respectively. Find the magnitude and direction of the resultant. 3.5



- (c) A simply supported beam AB of span 6 m is loaded as shown in given Figure. Find the support reactions at A and B. 7



OR

A hollow steel tube 3.5 m long has external diameter of 120 mm. In order to determine the internal diameter, the tube was subjected to a tensile load of 400 kN and extension was measured to be 2 mm. If the modulus of elasticity for the tube material is 200 GPa, determine the internal diameter of the tube.

- Q2.** Answer ALL parts.

- (a) Explain with figures what do you understand by quasi-static process. State Zeroth law of thermodynamics. 7

OR

Explain thermodynamic system? Explain the various types of thermodynamic systems and thermodynamic equilibrium.

- (b) Discuss Kelvin-Planck statement and explain PMM-II also. 7

Q3. Answer **ALL** parts.

- (a) Discuss different types of fluids. Calculate the specific weight, density, specific volume and specific gravity of two litre of a petrol whose weight is 14 N. 7

OR

How do you measure pressure by bourdon tube pressure gauge? Explain with the help of suitable diagram.

- (b) Give the classification of turbine. Explain the construction details and working of Pelton turbine. 7

Q4. Answer **ALL** parts.

- (a) Explain the working of four stroke S.I. engine with suitable sketch. Differentiate between SI and CI engines. 7

- (b) Explain the functions of the basic engine components with suitable diagram. 7

OR

What do you understand by regenerative braking? How hybrid Electric vehicle differs from conventional engine? Write down the advantages and disadvantages of electric vehicle.

Q5. Answer **ALL** parts.

- (a) What do you understand by error? Give its type with suitable example. Discuss what is calibration and why it is necessary? 7

- (b) What do you understand by mechatronics? Write down the objectives, advantages, disadvantages, and application of mechatronic in brief. 7

OR

Give short notes on:

- (i) Sensors and transducers
(ii) Venturimeter

PYQORA

CO-BL Mapping

Odd Semester Examination 2023-24			
Subject Code: IME101			
Subject Name: Fundamentals of Mechanical Engineering			
Q.No.	Marks	CO	BL
1(a)	4	1	1
1(b)	4	1	3
1(c)	6	1	3
2(a)	7	2	2
2(b)	7	2	2
3(a)	7	3	2
3(b)	7	3	2
4(a)	7	4	2
4(b)	7	4	2
5(a)	7	5	2
5(b)	7	5	3