Code No: D-3503/CBCS

FACULTY OF ENGINEERING

B.E I - Semester (CBCS) (Backlog) Examination, March / April 2022
(Common for all Branches)
Subject: Engineering Mechanics - I

Time: 3 Hours **Max marks: 70**

(Missing data, if any may be suitably assumed)

PART – A

Note: **Answer all questions**. **(10 x 2 = 20 Marks)**

1 Define free body diagram.

2 A force of 100N is acting at a point, making an angle of 300 with the horizontal. Determine the components of this force along X and Y direction.

3 State Lami's theorem and its application.

4 State the theorems of Pappu – I & II.

5 Define Varignon's theorem.

6 How do you analyse wedge friction?

7 What is limiting friction.

8 State the location of centroid of semi-circle, whose radius is R, with a sketch.

9 How do you analyse a truss using method of sections?

10 What are Perfect frames.

PART - B

Note: Answers any five questions. **(5 x 10 = 50 Marks)**

11. Determine the resultant of the concurrent forces shown in Figure 1.

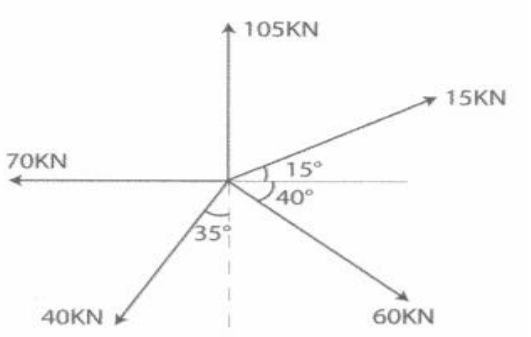

Figure 1

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12. A vertical load of 1500N is supported by the three members bars as shown in Figure 2. Find the force in each bar. Point C, O and D are in the XZ plane, while B is 5m above this plane.

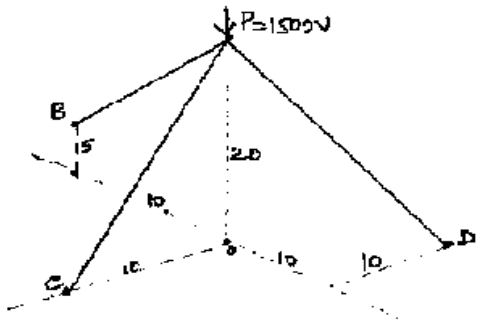

Figure 2

13. Find the moment of inertia of the section shown in figure-3, about horizontal and vertical centroidal axes.

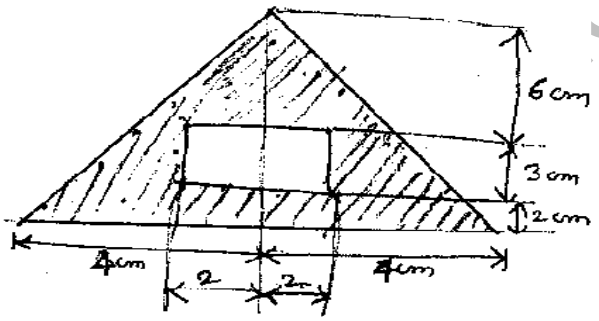

Figure 3

14. Two blocks A and B of weights W_A and W_B respectively rest on a rough inclined plane and are connected by a short piece of string as shown in Figure 4. If the coefficient of friction between block and planes are respectively $\mu_A = 0.2$ and $\mu_B = 0.3$. Find:
    a) The angle of inclination of plane for which the sliding will impend and
    b) The tension of the spring take $W_A = W_B = 20$ N.

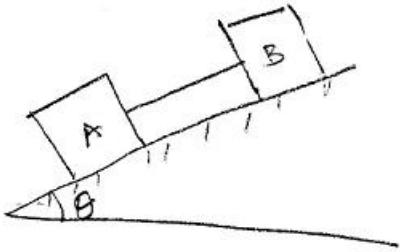

Figure 4

15. Determine the centroid of the shaded area which is bounded by a straight line and circular as shown in Figure 5.

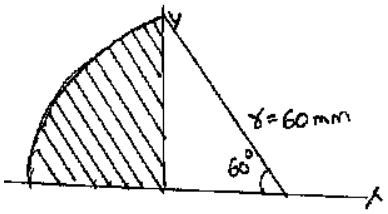

Figure 5

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16. Find the magnitude and nature of forces in three members of the truss AE, BC and AB as shown in Figure 6 by method of joints.

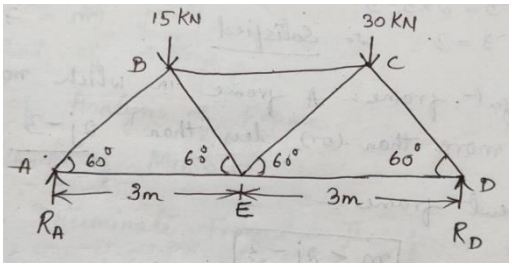

Figure 6

17. Write short notes on any **TWO** of the following:
    (a) Radius of Gyration.
    (b) Laws of friction.
    (c) Parallel axis theorem.

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Code No. D-3003/NON-CBCS

FACULTY OF ENGINEERING

B.E. I Year (NON-CBCS) (Backlog) Examination, March / April 2022

Subject: Engineering Physics

Time: 3 Hours **Max. Marks: 75**

(Missing data, if any, may be suitably assumed)

PART – A

Note: Answer all questions. **(25 Marks)**

1 Newton's rings are observed between a spherical surface of 100 cm radius and a plane glass plate. Calculate the wave length of light used if diameter of 12^{th} bright ring is 0.59 cm.
2 Calculate Packing Fractions for SC, BCC, FCC.
3 Explain optical activity.
4 Get the Rayleigh Jean's law and Wein's law from Planck's law.
5 Write a note on frequency dependence of dielectric polarization.
6 Discuss the success and failures of classical free electron theory.
7 Give any two differences between Spontaneous and Stimulated emissions
8 Define diffraction.
9 Distinguish between dia, para, ferro, antiferro and ferri magnetic materials based on their spin alignment.
10 Explain how the properties of materials change at nano scale.

PART – B

Note: Answer any five questions. **(5 x 10 = 50 Marks)**

11 (a) Derive the grating equation and also discuss the intensity conditions with intensity distribution graphs.
(b) Explain construction and working of Laurent's half shade polarimeter.

12 (a) Derive an expression for 1 D Schrodinger time independent wave equation.
(b) Discuss in detail the general properties of super conductors.

13 (a) Explain the construction and working of He – Ne laser with neat diagram.
(b) Describe the classification of optical fibers in detail.

14 (a) What are bravais lattice and explain in detail about different crystal systems.
(b) What is a P-N junction diode? Explain its I-V Characteristics.

15 (a) Derive an expression for Maxwell-Boltzman's Statistics.
(b) Discuss Weiss molecular field theory of ferromagnetism.

16 (a) Explain the sol-gel method of preparing nano materials.
(b) Describe the construction and working of Atomic Force Microscope (AFM).

17 (a) Derive the formula for the diameter of n^{th} bright ring and n^{th} dark ring in Newton's rings experiment.
(b) Write a short note on Quarter wave plate and Half wave plate.

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