PARUL UNIVERSITY
FACULTY OF ENGINEERING & TECHNOLOGY
B.Tech. Winter 2022 – 23 Examination

Semester: 1   Date: 31/01/2023
Subject Code: 303104155   Time: 02:00 pm to 04:30 pm
Subject Name: Mechanics of Solids   Total Marks: 60

Instructions:
1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

Q.1 Objective Type Questions - (Fill in the blanks, one-word answer, MCQ-not more than Five in case   **(15)**
of MCQ) (All are compulsory) (Each of one mark)
  1. Which of the following is a branch of mechanics?
      a) Statics and kinetics   b) Statics and dynamics
      c) Kinematics and dynamics   d) Kinetics and kinematics
  2. Which of the following is the characteristic of force?
      a) Magnitude of force   b) Point of application of force
      c) Direction of application of force   d) All of the mentioned
  3. The point of application where the total weight can be expected to be concentrated if the
      gravitational force is dispersed across the volume of the body is called _____
      a) The surface of the body   b) The centroid of the body
      c) Center of gravity of the body   d) Moment of inertia
  4. Moving train is an example of ____ load.
      a) Point load   b) Cantered load
      c) Rolling load   d) Uniformly varying load
  5. Hogging is_____
      a) Negative bending moment   b) Positive shear force
      c) Positive bending moment   d) Negative shear force
  6.   SI units of Bending moment is _---------_____
  7. The stress which acts in a direction perpendicular to the area is called _____
  8. A diagram which shows the variations of the axial load for all sections of the pan of a beam is
      called _---------_____
  9. The property of a material by which it can be beaten or rolled into thin plates is called --------
  10. The material which have the same elastic properties in all directions are called------
  11. As the elastic limit reaches, tensile strain -------------
  12. ------------ friction is the force of friction experienced by a body when it is at rest.
  13. ----------- Friction is the force of friction experienced by a body when it is in motion.
  14. When a body rolls over another, frictional force experienced by the body is known as
      _____ friction.
  15. Co-efficient of rolling friction is ----------- than co-efficient of sliding friction.

Q.2 Answer the following questions. (Attempt any three)   **(15)**
      A) Find the direction and magnitude of resultant for a given coplanar concurrent force system as
   shown in figure
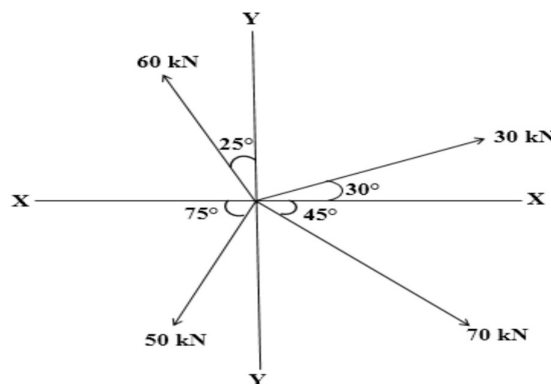
B) Explain in brief shear force diagram, bending moment diagram and define point of contra Flexure.

C) Find out magnitude and direction of the resultant of two coplanar concurrent forces.
   Force P = 20 KN (Tensile), Force Q = 10 KN (Tensile), Angle between P and Q = 30°

D) Explain different types of support and Loads with their Sketch.

Q.3 A) For a cantilever beam as shown in figure. Calculate SFD and BMD for the same   **(07)**
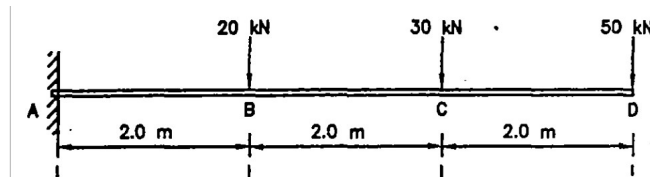
B) Explain with examples the following system of forces: (i) Coplanar concurrent forces (ii)   **(08)**
   Coplanar non-concurrent forces (iii) Non-coplanar non-concurrent forces
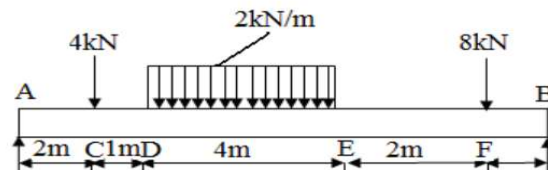
OR

B) Explain the terms: coefficient of friction, angle of friction and cone of friction.   **(08)**

Q.4 A) State and Derive the law of parallelogram of forces   **(07)**

OR

A) Calculate the reactions of the following beam as shown in figure   **(07)**

B) Find out the moment of inertia of T shape as shown in figure   **(08)**