

- i) Normal reaction
- ii) Limiting force of friction

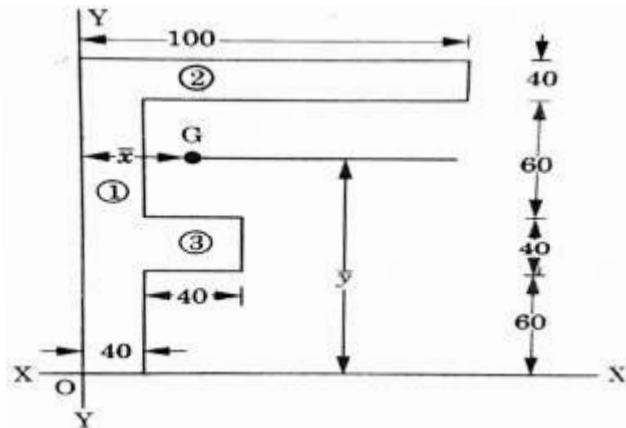
Q.35 Two forces of magnitude 15 N and 10 N are acting at a point. If the angle between them is  $60^\circ$  determine the magnitude and direction of the resultant by parallelogram law of force. (CO3)

### SECTION-D

**Note:** Long answer type questions. Attempt any two questions out of three questions. (2x10=20)

Q.36 Derive the expression for magnitude and direction of resultant of two forces acting simultaneously on a particle by parallelogram law of forces. (CO2)

Q.37 Find the position of centroid of F-section as shown in fig- (CO5)



Q.38 Explain second system of pulleys and derive the expression for its mechanical Advantage and velocity ratio. (CO6)

(**Note:** Course outcome/CO is for office use only)

No. of Printed Pages : 4

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### Automation and Robotics Subject:- Applied Mechanics

Time : 3Hrs.

M.M. : 100

### SECTION-A

**Note:** Multiple choice questions. All questions are compulsory (10x1=10)

- Q.1 Applied mechanics deals with forces in (CO1)
- a) solids
  - b) liquids
  - c) gases
  - d) all of the above
- Q.2 The amount of matter contained in a body is called its (CO1)
- a) mass
  - b) weight
  - c) volume
  - d) density
- Q.3 The principle of lever was developed by (CO2)
- a) Kelvin
  - b) Watt
  - c) Newton
  - d) Archimedes
- Q.4 The coefficient of friction depends upon. (CO2)
- a) strength of surfaces
  - b) area of contact
  - c) shape of surfaces
  - d) nature of surfaces
- Q.5 The centre of a plane lamina is not at its geometrical centre, if it is a (CO4)
- a) square
  - b) rectangle
  - c) quadrant of a circle
  - d) circle
- Q.6 Which of the following is dimensionless (CO3)

- a) Mechanical advantage
  - b) Velocity ratio
  - c) Efficiency
  - d) All of the above
- Q.7 The law of machine is given by the relation (CO3)
- a)  $P=mW+C$
  - b)  $P=mW+C^2$
  - c)  $P=mW^2+C$
  - d)  $P^2=mW+C$
- Q.8 The product of mass and velocity is known as (CO5)
- a) work
  - b) energy
  - c) impulse
  - d) applied force
- Q.9 A pair of scissors is an example of lever of (CO 6)
- a) first order
  - b) second order
  - c) third order
  - d) none of the above
- Q.10 Equilibrium conditions for coplanar concurrent forces are (CO4)
- a)  $\Sigma H=0$
  - b)  $\Sigma V=0$
  - c) both a & b
  - d) none of the above

### SECTION-B

**Note:** Objective type questions. All questions are compulsory. (10x1=10)

- Q.11 Define rigid body. (CO1)
- Q.12 Acceleration is a \_\_\_\_\_ quantity. (CO1)
- Q.13 The sense of force is indicated by \_\_\_\_\_. (CO2)
- Q.14 Write the S.I unit moment. (CO3)
- Q.15 Define couple. (CO3)
- Q.16 Name types of friction. (CO4)
- Q.17 Angle of friction always \_\_\_\_\_ than  $90^\circ$ . (CO2)
- Q.18 Define axis of reference. (CO5)
- Q.19 Name any two simple machine. (CO6)
- Q.20 Define momentum. (CO6)

(2)

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### SECTION-C

**Note:** Short answer type questions. Attempt any twelve questions out of fifteen questions. (12x5=60)

- Q.21 Differentiate between scalar and vector quantities. (CO1)
- Q.22 Write the characteristics of a force. (CO2)
- Q.23 Define non-coplanar force system and classify it. (CO2)
- Q.24 State the condition of equilibrium for bodies under co-planar concurrent force system. (CO3)
- Q.25 Differentiate between like and unlike parallel forces. (CO3)
- Q.26 State the laws of static friction. (CO4)
- Q.27 What are the harmful effects of friction. (CO4)
- Q.28 Differentiate between centroid and centre of gravity. (CO5)
- Q.29 Where does the centroid of following lies. (CO5)
  - i) Parallelogram
  - ii) Equilateral triangle
  - iii) Semi-circle
- Q.30 Explain the uses of machine. (CO5)
- Q.31 Derive the condition for a machine to be reversible. (CO6)
- Q.32 Explain law of conservation of momentum. (CO5)
- Q.33 Derive an expression for the velocity ratio of an inclined plane. (CO6)
- Q.34 A body of weight 100 N is placed on rough horizontal plane. If a horizontal Force of 50 N just causes the body to slide on horizontal plane, then determine : (CO4)

(3)

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