**Code No. 3445**

# FACULTY OF ENGINEERING & TECHNOLOGY

## B.E. (Bridge Course) II-Semester (Backlog) Examination, June / July 2017

## Subject : Engineering Mechanics

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

***Note: Answer all questions from Part-A. Answer any FIVE questions from Part-B.***

### PART – A (25 Marks)

1 Write the static equilibrium equations for non-concurrent and non co-planar force system. 3

2 The component of a force 3i + 5k along a line 4j + 3k is: 2
a) 3 b) 4 c) 5 d) Zero

3 Define the terms angle of friction and cone of friction. 3

4 The centroid of a semi-circular arc of radius r is : 2
a) $4r/3\pi$ b) $3r/4\pi$ c) $2r/\pi$ d) $2\pi/r$

5 Write whether the following statement are true or false : 3
a) The reactions at supports of a beam will be considered as internal forces for drawing its free body diagram.
b) The frictional resistances in rolling are lesser than static friction.
c) Parallel axes theorem is $I_{cg} = I_{xx} + ah$ with usual notation.

6 State and prove the parallel axis theorem. 2

7 The motion of a particle is given by the equations, $x = t^3-15t^2-20$, where x is displacement in meters and t is in sec. determine the acceleration of particle after 4 sec. 3

8 Differentiate between kinematics and kinetics of a particle motion. 2

9 Determine the work done in pulling a block of wood weighing 100 kN for a length of 10m up on a smooth inclined plane which makes $30^0$ with the horizontal. 3

10 Compound pendulum is an example of _____ motion. 2

### PART – B (50 Marks)

11 a) In Fig.1 a force P passing through C produces a clockwise moment of 600 N-Cm about 'A' and a counterclockwise moment of 300N-Cm about 'B'. Determine the moment of P about 'O'. 5

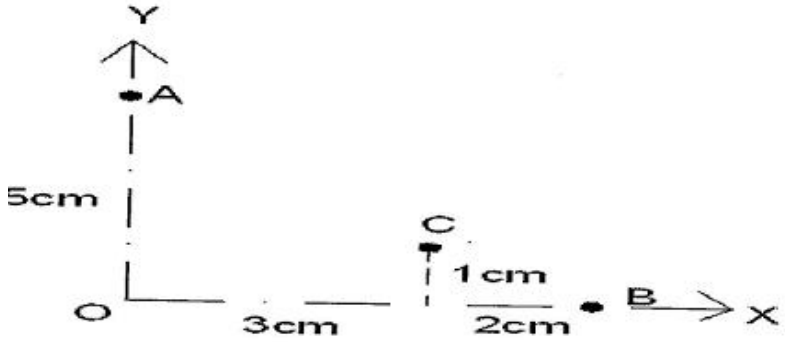



*Fig.1.*

..2

b) Find the resultant for concurrent co-planar force system shown in Fig.2. 5

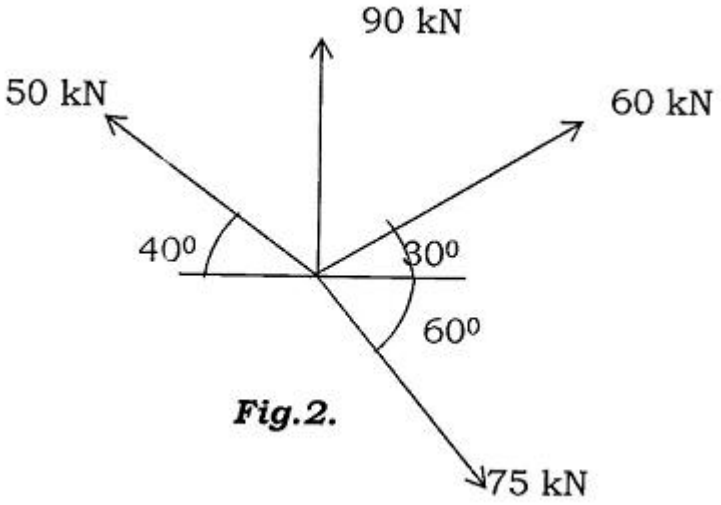



*Fig.2.*

12 For the system shown in Fig.3, the force multiplier of P acting from A to E is Pm = 100 N/m. Determine the following : 5+5

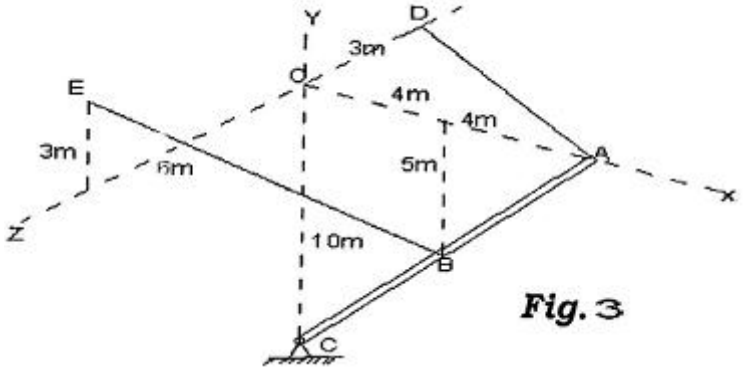



*Fig. 3*

a) Component of force P along AC. b) Moment of P about C.

13 A 100N cylinder shown in Fig.4 is held at rest by a weight 'P' suspended from chord wrapped around the cylinder if the slipping impends between the cylinder and the inclined, determine the value of 'P' and also the co-efficient of friction. 10

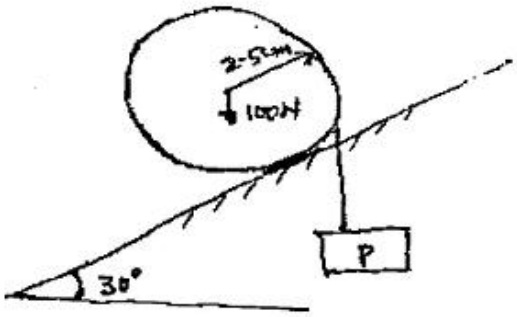



Fig. 4

14 a) State and prove the PAPPU's theorem-I and II. 4

b) Locate the centroid of hatched plate about the axes shown in fig.5. 6

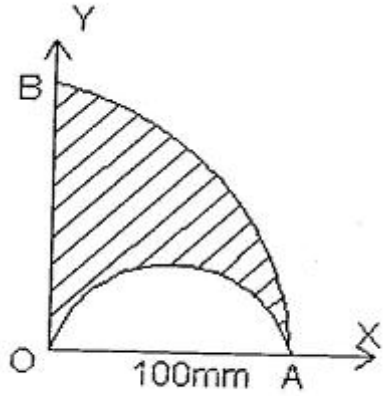
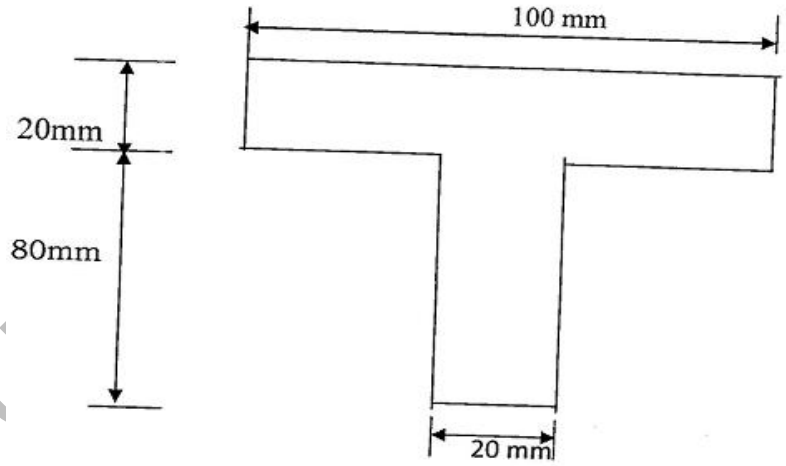



***Fig.5***

15 a) Derive from first principles the moment of inertia of a right angled triangle about the base. 5

b) Calculate the moment of Inertia of T-section shown below, about Centroidal X-axis. 5




16 a) State 'D' Alembert principle. 3

b) The location of a particle defined as $r = 5 + 7t^2$ and $\theta = 6 + 3t^2$. Determine the magnitude of velocity and the accelerations of the particle at t = 4 sec. 7

17 a) Derive work energy equation for translation. 3

b) In a particular SHM performed by a particle of mass m, the amplitude is 160 cm and time period of oscillation is 4 sec. determinate the time required by the particle to pass two points at 1.4m and at 0.5m away from the central point of oscillation. Both the points lie on the same side of this central point. 7

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