Code: 15A01201 **R15**

B.Tech I Year II Semester (R15) Supplementary Examinations December 2016

ENGINEERING MECHANICS

(Civil Engineering)

Time: 3 hours Max. Marks: 70

PART – A

(Compulsory Question)

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1 Answer the following: (10 X 02 = 20 Marks)

(a) State the law of parallelogram of forces and law of triangles.
(b) What are the conditions of equilibrium?
(c) Explain any four laws of solid friction.
(d) Define limiting force of friction and kinetic friction.
(e) Explain about radius of gyration.
(f) State and prove the perpendicular axis theorem.
(g) A force of unknown magnitude acts on a body of mass 150 kg and produces an acceleration of 3 m/s^2 in the direction of force. Find the force.
(h) Explain about motion on inclined smooth surfaces.
(i) Explain about different types of frames.
(j) What is method of sections?

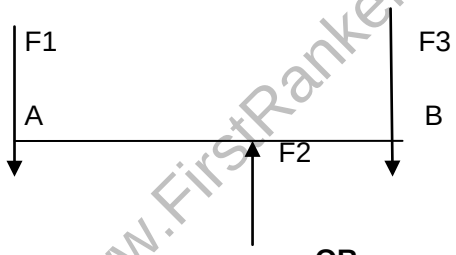
PART – B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT – I

2 (a) State and prove the Varignon's theorem.

(b) Three parallel forces F1, F2 and F3 are acting on a body. If the force F1= 250 N and F3 = 1000 N and the distance between F1 and F2 = 1.0 m, then determine the magnitude of force F2 and the distance of F2 from force F3.



OR

3 (a) Explain about different types of loads.

(b) A simply supported beam AB of length 9 m carries a uniformly distributed load of 10 kN/m for a distance of 6 m from the left end. Calculate the reactions of A and B.

UNIT – II

4 A uniform rod AB of length 50.8 cm weighing 100 N is resting on a rough horizontal surface whose coefficient of friction is 0.1. It is subjected to a force P applied horizontally at the end A in the direction perpendicular to its length. Determine the point O about which it would commence to turn.

OR

5 Find the least force required to drag a body of weight W, placed on a rough inclined plane having inclination α to the horizontal. The force is applied to the body in such a way that it makes an angle of θ to the inclined plane and the body is:

(a) On the point of motion up the plane.
(b) On the point of motion down the plane.

Contd. in page 2

UNIT – III

6 Derive the centre of gravity of circular, rectangular and triangle section from integration method.

OR

7 Find out the moment of inertia of the following sections:
(a) Hollow circular section.
(b) Uniform thin rod.
(c) Curve.

UNIT – IV

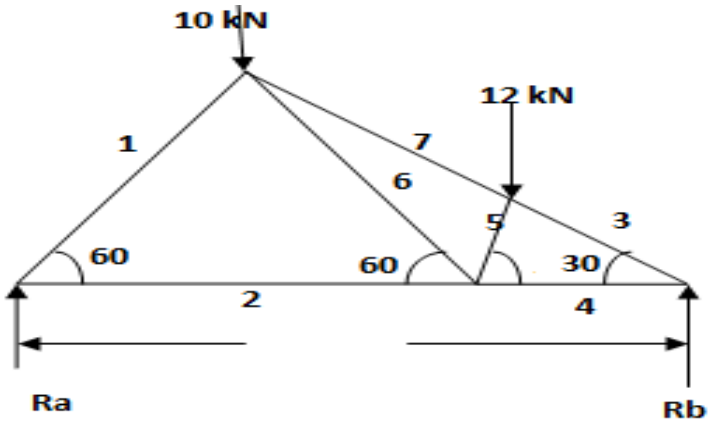
8 Three marks A, B and C at a distance of 100 m each are made along a straight road. A car starting from rest and with uniform acceleration passes the mark A and takes 10 seconds to reach B and further 8 seconds to reach the mark C.
Calculate: (i) The magnitude of the acceleration of the car.
(ii) The velocity of the car at A.
(iii) The velocity of the car at B.
(iv) The distance of the mark A from the starting point.

OR

9 (a) Derive the expression of rotary motion by using D' Alembert's principle.
(b) Find an expression for the radius of gyration of circular lamina and a solid sphere.

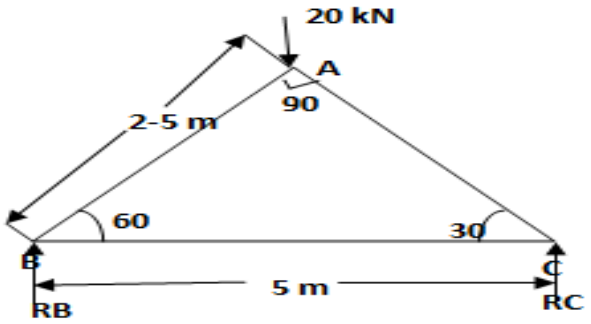
UNIT – V

10 A truss of span 5 m is loaded as shown in figure below. Find the reactions and forces in the members of the truss.



OR

11 Find the forces in the members AB and AC of the truss show in figure below. Use method of sections.



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