**COMBINED FIRST AND SECOND SEMESTER B.TECH (ENGINEERING)**

**DEGREE EXAMINATION, APRIL 2015**

**EN 14 105 : ENGINEERING MECHANICS**

(2014 Scheme- Common for all Branches)

Model Question Paper

Time: Three Hours Maximum: 100 Marks

**Part A**

Answer any **Eight**questions, each carry **Five** marks

1. A force of 50 N is directed from origin to a point A(0, 3, 4). Determine moment of this force about point B (3,0,4)
2. A force of 200 N is suspended by means of strings as shown in figure. Find tension in the strings.

 Fig .Question 2

1. State and prove theorem of Varignon.
2. Determine the slope of an inclined plane, above which a weight will slide down. The coefficient of friction is μ.
3. i) List advantages of Method of sections over method of joints

ii) Differentiate between perfect truss and deficient truss

1. Derive the expression for moment of inertia of a slender rod of length ‘l’ and mass ‘m’ about an axis perpendicular to the rod and passing through one end.
2. The horizontal range of a projectile is 4√3times its maximum height. Find the angle of projection.
3. A ball dropped onto a floor from a height of 5m rises to a height of 2m after 3 bounces. Determine the coefficient of restitution.
4. A rigid body rotates about a fixed axis and slows down from 300 rpm to 150 rpm in 2 minutes. Determine the angular acceleration and the number of revolutions completed in 2 minutes.
5. Explain the method of constructing Maxwell’s diagram

**Part B**

Answer **All** questions, each carry **fifteen** marks

**Module I**

1. Determine the resultant of the force system shown in figure with respect to ‘O’. Use Vector approach.



Fig .Question 11

**OR**

1. Two smooth spheres each of radius 100mm and weight 100N, rest in a horizontal channel having vertical walls separated by a distance of 360mm. Find the reactions at the contact

pointsA, B, C, and D shown in figure.



Fig .Question 12

**Module II**

1. Analyse the simple truss shown in figure and tabulate the magnitude and sense of forces in its members.



Fig .Question 13

**OR**

1. Determine the polar moment of inertia of the area shown in figure about its centroidalaxes



Fig .Question 14

**Module III**

1. Motion of a particle along a straight line is given by the equation , where *a* is the acceleration in m/s2 and *t* is the time in seconds. After 1 second the distance travelled by the particle and the velocity of the particle were found to be 14.75m and 6.33 m/s.

Find the (i) distance travelled, (ii) velocity and (iii) acceleration of the particle after 2 seconds.

**OR**

1. Two weights 800 N and 200 N are connected by a thread and they move along a rough horizontal plane under the action of a force of 400 N applied to the 800 N weight as shown in figure. The coefficient of friction between the sliding surface of the weights and the plane is 0.3. Using D’ Alembert’s principle determine the acceleration of the weight and tension in the thread.



Fig .Question 16

**Module IV**

1. A flywheel weighing 50 kN and having radius of gyration 1m loses its speed from 400 rpm to 280 rpm in 2 minutes. Calculate
2. The retarding torque acting on it
3. Change in kinetic energy during the above period and
4. Change in its angular momentum during the same period

**OR**

1. A wheel of diameter 1m rolls without slipping on a flat surface. The centre of the wheel is moving with a velocity of 10m/s. Find the velocity of the points A, B and C



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Question paper setters—Please note:

1. Diagrams are neatly drawn and is fully labeled and dimensioned
2. Avoid missing of data
3. Avoid repetition of questions in Part A and Part B
4. Try to have uniform distribution of syllabus
5. In part A , it is preferred to have 3 questions each from module 1 and 2 and 2 questions each from module 3 and 4