Code No: PT32051/R13   **RA**   **SET - 1**

III B. Tech II Semester Supplementary Examinations, November - 2019
ENGINEERING MECHANICS
(Computer Science and Engineering)

Time: 3 hours   Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**
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PART –A   (22 Marks)

1. a) Write about coplanar concurrent forces. [3M]
   b) State the converse of the law of triangle of forces. [4M]
   c) Define centroid and centre of gravity. [3M]
   d) Write about polar moment of inertia. [4M]
   e) Differentiate between Kinematics and Kinetics. [4M]
   f) List the work-energy applications to particle motion. [4M]

PART –B   (48 Marks)

2. Forces P_1, P_2, P_3 and P_4 of magnitudes 10 kN, 20 kN, 25 kN and 40 kN are [16M]
   concurrent in space and are directed through the points A(3, 2,5), B(1, 7, 4),
   C(4, -2, 4) and D(-2, 4, -3) respectively. Determine the resultant of the system of
   forces. Given the system forces are concurrent at the origin.

3. a) Explain converse of the law of polygon of forces. [6M]
   b) Find resultant of given system of forces for the figure shown below: [10M]
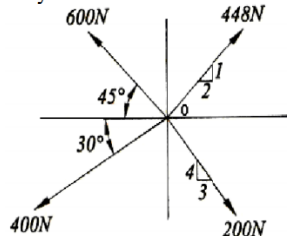
4. a) Determine the centroid of the shaded area, which is bounded by straight lines and [8M]
   a circular arc as shown in below figure:
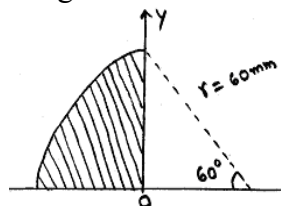
   b) Find the centre of gravity of the lamina as shown in below figure. All dimensions [8M]
   are in mm.

1 of 2
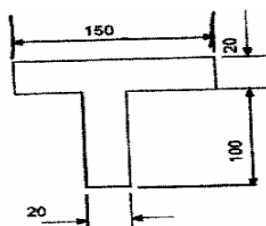
5. a) Find out the mass moment of inertia of a right circular cone of base radius 'R' and mass 'M' about the axis of the cone. [8M]

   b) Determine the product of inertia of a right angle triangle with respect to x and y axes. [8M]

6. a) A body moves along a straight line and its acceleration 'a' which varies with time 't' is given by a = 2-3t. Five seconds after the start of observation, the velocity is 20 m/s. The distance moved by the body 10 sec after the start of observation of motion from origin is 85 m. Determine: i) the acceleration, velocity and distance from the origin at the start of observation. ii) the time after the start of observation at which the velocity becomes zero and the distance travelled from the origin. [8M]

   b) A car is uniformly accelerated and passes successive kilometer-stones with velocities of 20 km/hour and 30 km/hour respectively. Calculate its velocity when it passes the next kilometer stone and the time taken for each of these two intervals of one kilometer. [8M]

7. a) In what distance will body A of below figure attain a velocity of 3 m/s starting from rest? Use work-energy method to solve the problem. [10M]
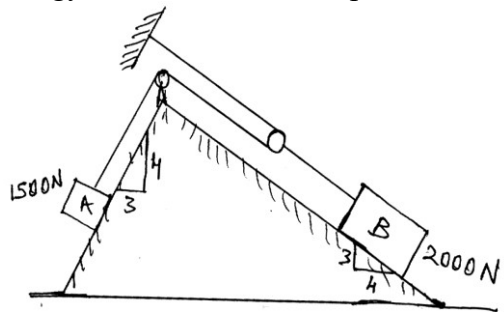
   b) State and explain the equations for translation. [6M]

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