* K C - 6 0 1 9 *

KC-6019

B. E. I (All) (Sem. I & II) Examination

November / December – 2012

Engineering Mechanics

Time : **3** Hours] [Total Marks : **100**

Instructions : (1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ **B. E. 1 (All) (Sem. 1 & 2)**

Name of the Subject :

☛ **Engineering Mechanics**

☛ Subject Code No. : **6 0 1 9** ☛ Section No. (1, 2,.....) : **Nil**

Seat No. :

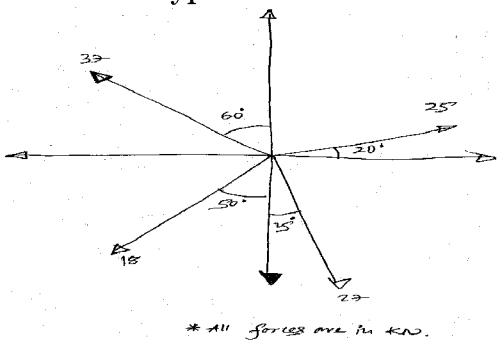
Student's Signature

(2) Answers to the two sections must be written in two separate answer books.
(3) Figures to the right indicate full marks.
(4) Use of non-programmable calculator is permitted.
(5) Assume suitable data is required justify your answer with suitable diagram.

1 (a) Answer in brief : (any **four**) 8

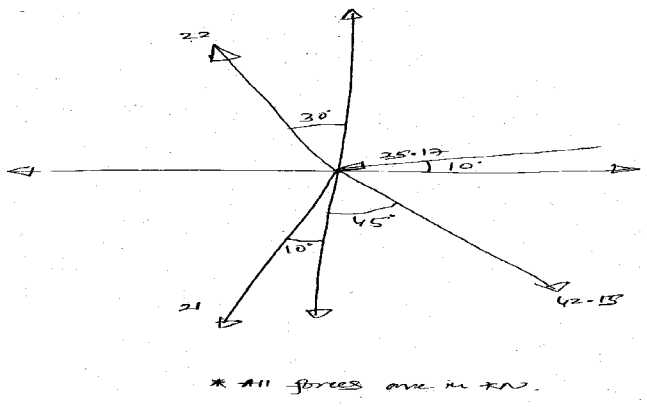
(1) Define - Equilibrium
(2) Draw diagrams of rollers and hinge support for beams.
(3) Explain - Force
(4) Explain - Principle of transmissibility
(5) Explain various types of beams.

(b) Obtain resultant force the forces shown in image below. 8
State the type of forces.



OR

(b) 8

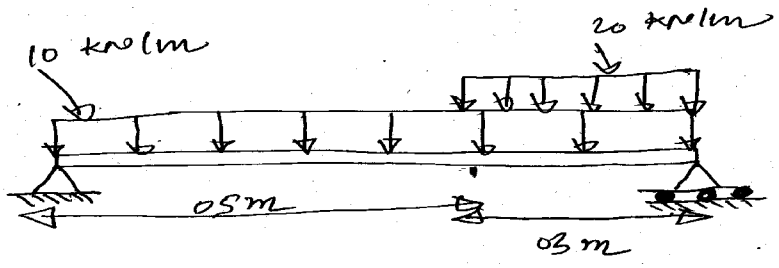


2 (a) Discuss - Types of Friction in detail. 4

(b) A ladder of weight 390 N and 06 mt long is placed against a vertical wall at an angle of 30°. The co-efficient of friction between - ladder and wall is - 0.25 ladder and floor is - 0.38 Obtain how high a man of weight 1170 W km as and, before the ladder begins to slip. 10

OR

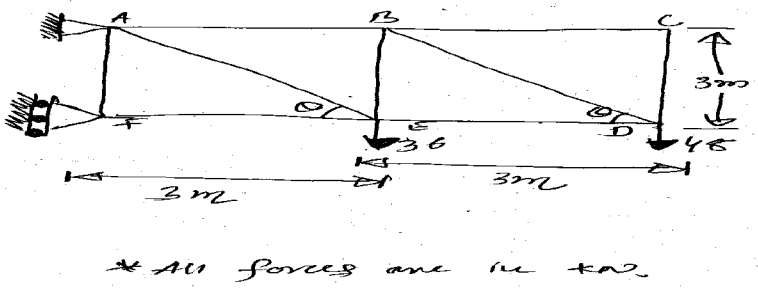
(b) For the beam shown below, obtain ractions at A and B. 10



3 (a) State clearly the assumptions in analysis of truss. 3

(b) Obtain forces in members of truss shown below using method of joints. 14

(c) Verify any of one force obtained abone, using method of sections. 3



4 (a) Answer the following in brief : **10**

(i) Define Radius of Gyration and Moment of Inertia.

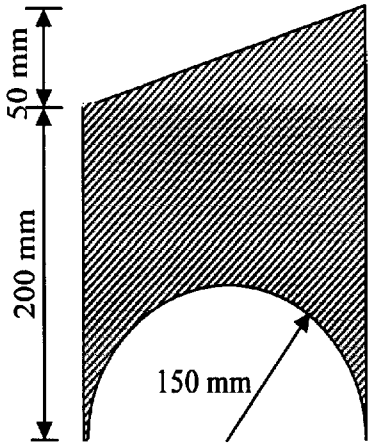
(ii) State basic difference between uniform rectilinear motion and uniformly accelerated rectilinear motion.

(iii) State Newton's Second Law of motion.

(iv) Define dependent relative motion.

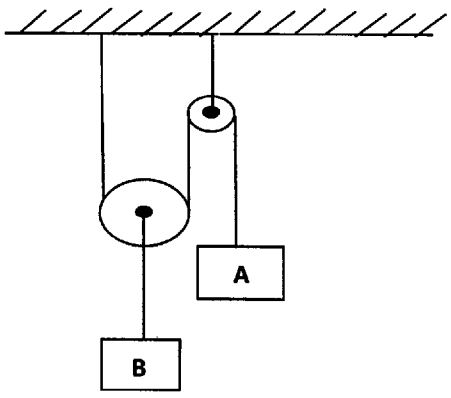
(v) Write equations to obtain the normal and tangential components of acceleration.

(b) Find the center of gravity of a lamina shown in figure : **6**

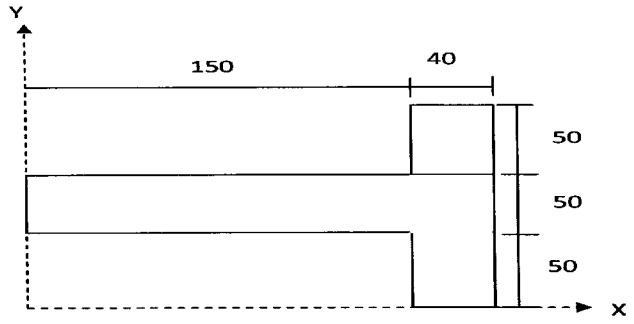


5 (a) Explain 1st, 2nd and 3rd system of pulleys with neat sketches. **4**

(b) If the velocity of the block - A shown in figure moving up is increasing at the rate of 0.50 m/s each seconds, determine the acceleration of block - B. **4**



6 (a) Determine the moment of inertia of lamina shown in figure about its horizontal and vertical centroidal axis. 8



ALL DIMENSIONS ARE IN MM

OR

(a) Answer the following : 8

(i) State and explain Pappus-Guldinus Theorem (any one).

(ii) Explain Centroid and Center of Gravity.

(b) Solve the following : (any **three**) 18

(i) An automobile enters a curved road at 50 kM/h and leaves the same at 68 km/h the curved road is in form of quarter circle and has length of 800 m. If the car travels at constant acceleration along the curve, obtain the resultant acceleration of both the ends.

(ii) A car starts from rest on a curved road with radius 350 m and then it accelerates at a constant tangential acceleration of 0.6 m/s^2. Determine the distance and the time for which the car will travel before the magnitude of total acceleration attained by it becomes 0.75 m/s^2.

(iii) A ballon rises from ground with a constant acceleration of 0.9 m/s^2. Five seconds later, a stone is thrown vertically up from the launching site. What must be the minimum velocity of the stone for it to be just touching the balloon ? Note that the balloon and the stone have the same velocity at contact.

(iv) Two steamers A and B start from the same port. A moves in North-West with 50 kmph and B moves with the velocity of 40 kmph in the direction 15^o South of West. After what time they will be separated by a distance of 200 km.