Printed Pages: 7   EME-102/EME-202

(Following Paper ID and Roll No. to be filled in your Answer Books)

Paper ID : 199217   Roll No.

B.TECH.

Theory Examination (Semester-II) 2015-16

ENGINEERING MECHANICS

Time : 3 Hours   *Max. Marks : 100*

Note: This paper having three sections. Attempt question from each section as per instruction.

Section-A

Q1. Attempt all questions. Each question carries equal marks   (2×10=20)

(a) Classify the force system and explain parallel force system.

(b) Explain the principal of transmissibility.

(c) Explain varignon's theorem, and its importance.

(d) Define couple, in what way it is different from moment.

(1)   P.T.O.

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(e) What are the various supports which are used in beam. Also explain various types of beam.

(f) Explain the angle of friction & angle of repose.

(g) Define radius of gyration of a rigid body.

(h) Explain the principle of work and Energy.

(i) Explain D' Alembert principle with example.

(j) Write down the principle of conservation of momentum.

Section-B

**Q2. Attempt any five parts**   (5×10=50)

(a) Three smooth spheres of weight 'P', 'P', 'Q' are placed in a smooth trench as shown in fig. find the support reactions at point of contact A,B,C,D. The following numerical data are given: P=300N, Q = 600N, r_1 = 400mm, r_2 = 600mm, r_3 = 400mm and α = 30°.
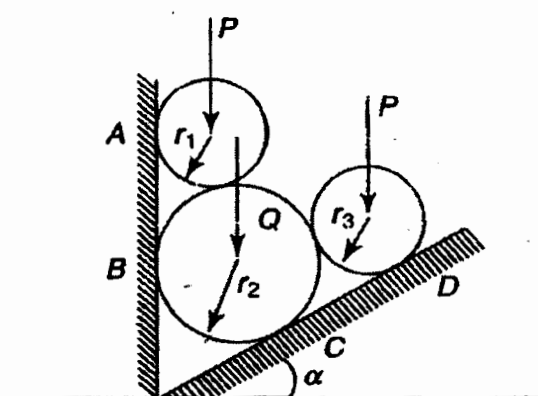

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(b) Two blocks of weights W1 and W2 rest on rough inclined plane and connected by a short piece of string as shown in fig. If coefficient of friction are 0.2 for block1 and 0.3 for block 2 respectively, find the angle of inclination of plane for which sliding will impend. Assume W1=W2=225N
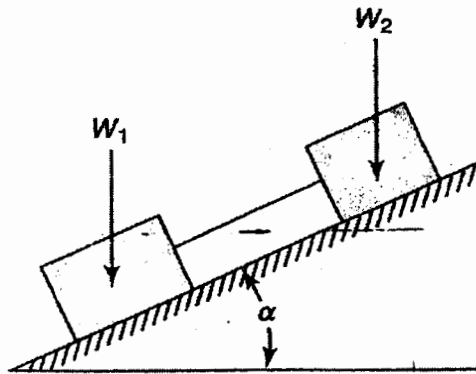
(c) Draw the shear force and bending moment diagram for the beam as shown in fig.
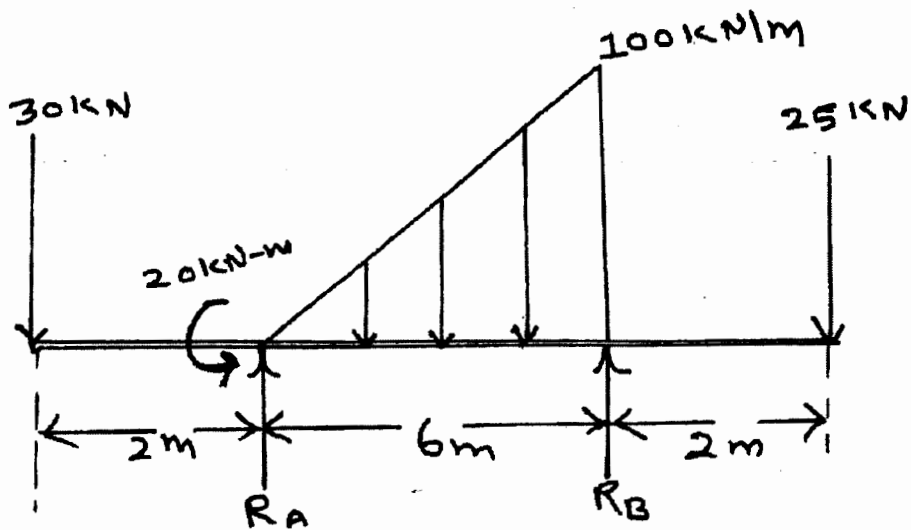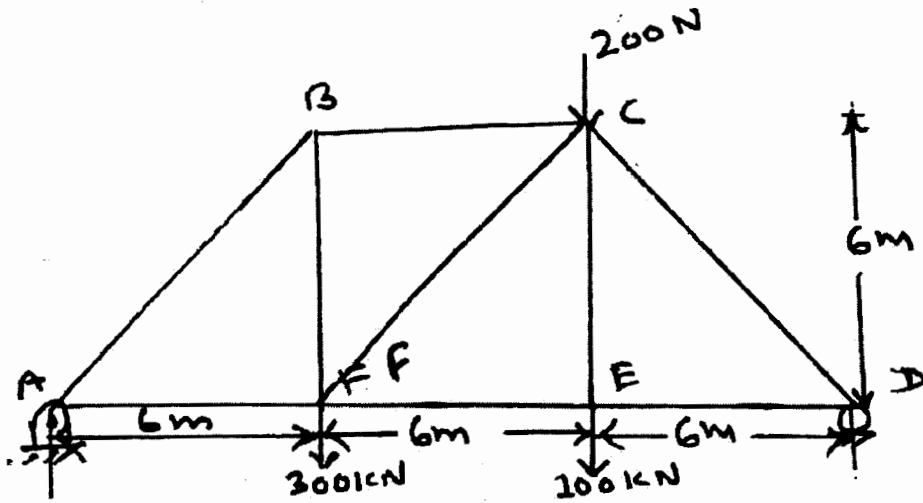
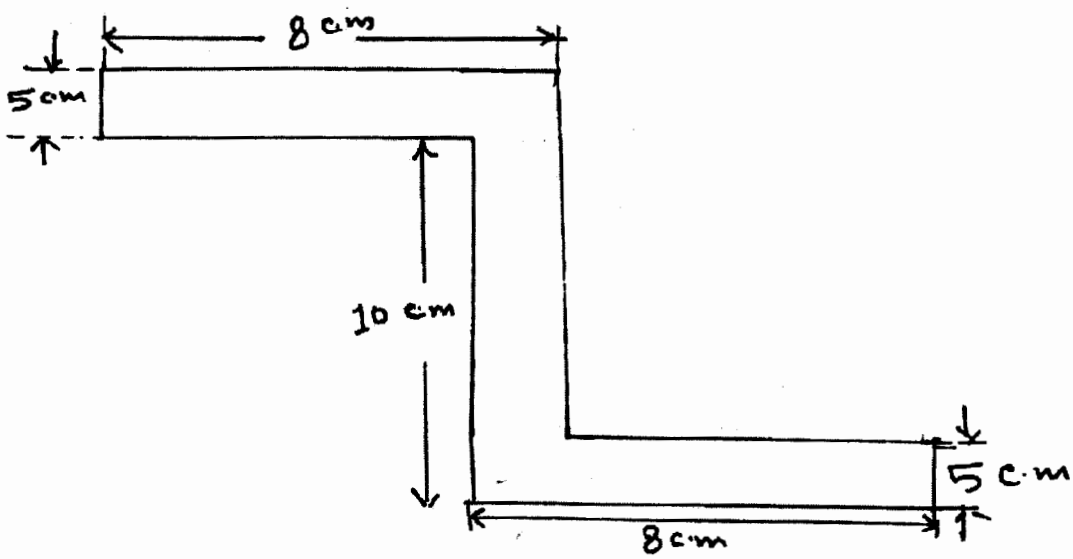(3)   P.T.O.

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(d) Analyze the truss as shown in fig and calculate the magnitude and nature of forces in each member of truss.

(e) Derive the mass moment of inertia of right circular cylinder.

(f) Find the moment of inertia about centroidal axis X-X and Y-Y of the section as shown in fig

(4)

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(g) A bullet weighing 4 N is fired horizontally in to a wooden block weighing 300 N, which is hanging from the ceiling by a wire, 3m long. The bullet gets embedded in the block and causes the block to swing forward such that the wire makes an angle of 30° with the vertical. Determine the velocity of the bullet before striking the block and the loss of energy in the process.

(h) A rectangular section beam of length 6m is simply supported at its ends. The section of the beam is 60mm wide and 150mm deep. Beam carries a concentrated force of 15 KN in downward direction at a distance of 2m from one support. Find the maximum bending stress in the beam.
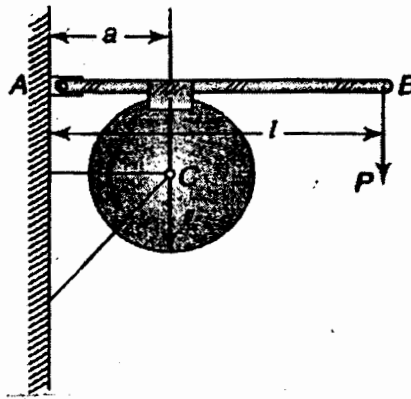
Section-C

Q3. Attempt any TWO part of the following: (2×15=30)

(a) A heavy rotating drum of radius r' is supported in bearing at C' and is braked by the device as shown in fig Calculate the braking moment M' with respect to point C if the coefficient of kinetic friction between drum and brake shoe is μ.
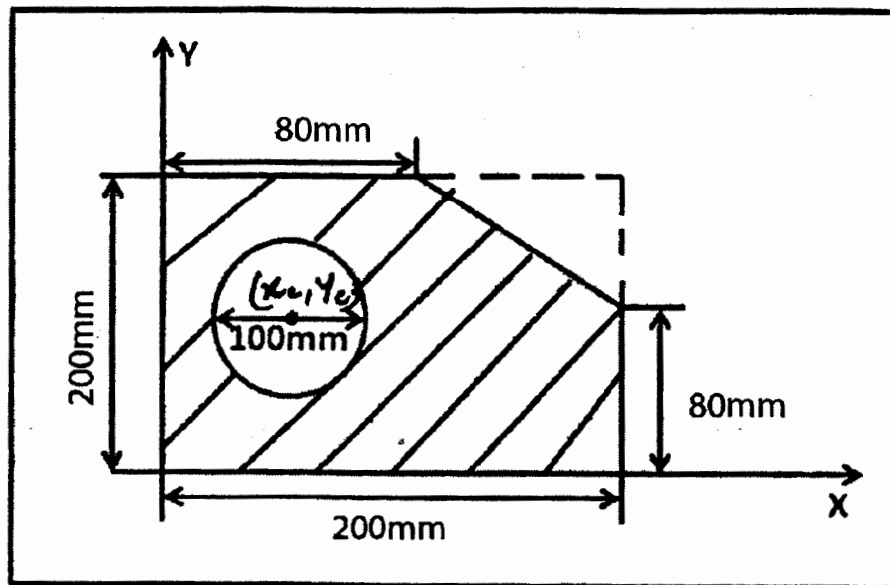
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(b) Determine the Xc and Yc of the center of 100mm diameter circular hole cut in a thin plate so that this point will be the centroid of the remaining shaded area shown in fig.

(c) What do you meant by pure torsion? Write down the assumption taken during torsion.

(6)

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Determine the suitable values of inside and outside diameters of hollow steel shaft whose internal diameter is 0.6 times external diameter. The shaft tranmits 220KW at 200 rpm. The allowable shear stress is limited 45MPa. The modulus of rigidity for shaft material is 80kN/mm². The angle of twist is 1° per meter.

(7)