MODEL QUESTION PAPER

BF5

## I Semester B.TECH Examination, August 2011
MECHANICS

Time: 3 Hours   Max. Marks: 75

GROUP A : Answer any three questions.

Q.1   State and explain different types of loads with respect to a beam?

Q.2   Find the principal moment of inertia about centroidal axes for the section show in fig.

(a)   (b)
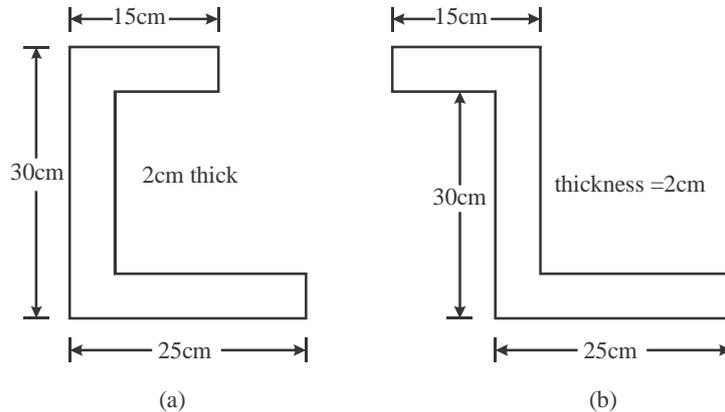
Q.3   The force of 60kN acts along the line joining P(1,0,2) and Q(1,1,0)
       a) Find the moment of this force about A(1,12)
       b) Find the moment of this force about the line AB if B(0,1,0)

Q.4   Explain Newton's law of motions.

Q.5   A specimen of steel 25 mm diameter with a gauge length of 200 mm is tested to destruction. It has an extension of 0.16 mm under a load of 80 kN and the load at elastic limit is 160 kN. The maximum load is 180 kN.

       The total extension at fracture is 56 mm and diameter at neck is 18 mm. Find:

       (i)   The stress at elastic limit   (ii)   Young's Modulus

       (iii) Percentage elongation   (iv)   ultimate tensile stress.

       (v)   Percentage reduction in area

GROUP B : Answer any three questions.

Q.6   Two cylinders of diameters, 60mm and 30mm weighing 160N and 40N respectively are placed as shows in fig. Assuming all the contact surfaces to be smooth, find the reactions at A, B and C
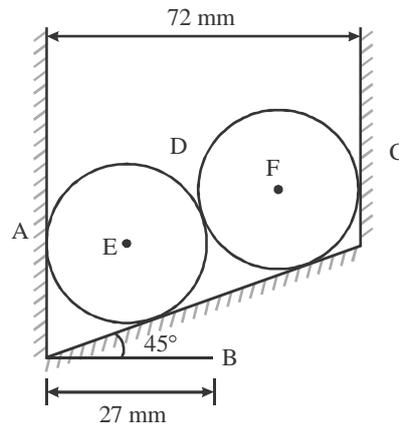
Q.7   The x, y, z components of a force are36 kN, -24 kN and 24 kN respectively. Find the component of this force along the line joining A(1,2,-3) and B(-1,-2,2)

Q.8   Explain parallel axis theorem.

Q.9   Draw the shear force and bending moment diagram for the over hanged beam show in figure.
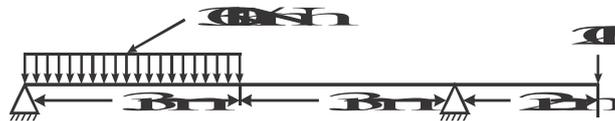
Q.10   State and explain: Principle of transmissibility and varignon's theorem.

GROUP C: All Questions are Compulsory.

Q.11   Fill in the blanks

(i)   Equations of equilibrium of a particle subjected to coplanar force system are_____.

(ii)   Modulus of rigidity is the ratio of shearing stress to _____within elastic limit.

(iii) Two couples acting in a plane may be in equilibrium only when their moments are _____in magnitude and _____ in direction.

(iv)   The moment of a force (Mo) about a point 'O' is _____.

(v)   The expression for the moment of inertia of a triangle, in term of its base 'a' and height 'h', about its (triangle) base is given as _____.

Q.12   Multiple choice question.

(i)   Which of the following types of supports are provided for two dimenal structures:
       (a) Roller, Hinge and fixed
       (b) Stable, Unstable and neutral.
       (c) Single , Double and Parallel.
       (d) Uniform, concentrated and varying.

(ii)   If two forces $\overline{P}$ & $\overline{Q}$ are such that $\left|\overline{P}+\overline{Q}\right| = \left|\overline{P}-\overline{Q}\right|$, then angle between the two forces is _____.

(a) 0° (b) 180°

(c) 90° (d) 45°

(iii) A tripod carrying a dumpy level is the example of _____.
(a) Non coplanar concurrent forces
(b) Coplaner concurrent forces
(c) Collinear forces
(d) None of the above

(iv)   The moment of inertia of a thin spherical shell is
(a) Mr^2 (b) $1/2\ Mr^2$
(c) $1/3\ Mr^3$ (d) $2/3\ Mr^2$

(v)   Formula for Resilience is _____.

(a) $\dfrac{p^2}{2E}$ (b) $\dfrac{p^2 v}{2E}$

(c) $\dfrac{2p}{E}$ (d) $\dfrac{2pv}{E}$

Q.13 True or false

(i)   Ratio of load to original cross sectional area is known as Yield stress.
(ii)   If two equal forces of magnitude 'F' act at an angle of θ, their resultant is F $\cos\theta$.
(iii) The moment of a Square of side A about an axis through it's centre of gravity is equal to $A^3 1/1$.
(iv)   Centroid of ellipse lies at intersection of major and minor axes.
(v)   1 GPa = $1KN/mm^2$.

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