Printed Pages: 4 **EAG-202**

(Following Paper ID and Roll No. to be filled in your Answer Books)	
Paper ID : 180214	**Roll No.**

B.TECH.

Theory Examination (Semester-II) 2015-16

ENGINEERING MECHANICS

Time : 3 Hours ***Max. Marks : 100***

Section-A

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

(a) Define Lami's theorem and state its applications.

(b) State coloumb law of forces.

(c) State the assumptions made in the analysis ot pin jointed trusses.

(d) What do you means by point of contraflexture in beams.

(e) Differentiate between centroid and Centre ot gravity.

(f) Define Radius of gyration.

(g) What is general planar motion?

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(h) State D' Alembert's principle.

(i) Define Hooke's law and Modulus of rigidity.

(j) Differentiate betweon bending moment and moment ot resistance.

Section-B

Q2. Attempt any five parts. (10×5=50)

(a) Prove that belt tension ratio. $T_1/T_2 = e^{\mu\theta}$ where T_1 is the tight side and T_2 is the slack side.

(b) A man climbs on a 5 m long ladder. makes an angle of 60º from the horizontal. The other end of the ladder is supported on a vertical wall. The coefficient of friction between the ladder and wall is 0.2 and between the ladder and floor is 0.3. The weight of ladder and man are 150 N and 800 N. How far can the man climb on the ladder?

(c) Find reactions at the support for the given beam as shown in fig 1.

(d) Determine the forces in all the members of the truss structure shown in fig 2.

(e) Derive the espression of mass moment of inertia for spherical body.

(f) Calculate the centroid tor the LINE segment as shown in the fig 3.

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(g) A cylindrical roller, 50cm in diameter, is in contact with two horizontal conveyor belts running at uniform speed of 5m/s and 3 m/s as shown in figure4. Assuming that there is no slip at points of contact, determine (a)position of the instantaneous center of roller. (b) Linear velocity of the center. (c) Angular velocity of roller. (d) How these parameters would be affected if the velocities of the belts are in opposite direction refer fig 4.

(h) State the assumptions made in the theory of pure torsion. Derive the torsion formula $\frac{T}{J} = \frac{G\theta}{L} = \frac{\tau}{R}$.

Section-C

Attempt any TWO. Each question carries equal marks. **(2×15=30)**

Q3. Draw the shear force and bending moment diagrams for the simple supported beam as shown in fig 5, and also find the point of contra flexure.

Q4. Find the moment of inertia about the centroidal axis and also polar moment of inertia for the section shown in fig 6.

Q5. State the assumptions made in the theory of pure bending, derive the relationship for pure bending $\frac{M}{I} = \frac{\sigma}{Y} = \frac{E}{R}$ and also find the neutral axis location.

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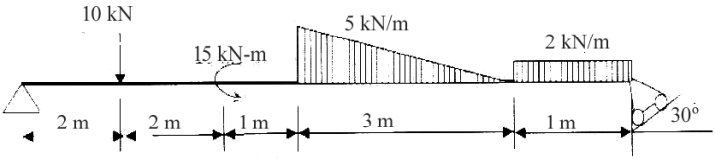

FIG 1

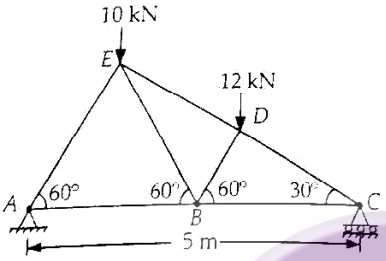

FIG 2

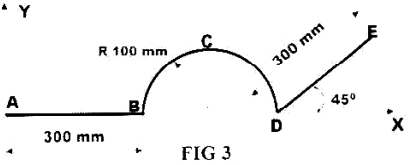

FIG 3

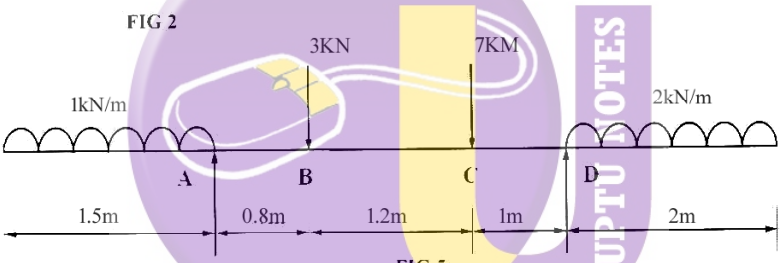

FIG 5

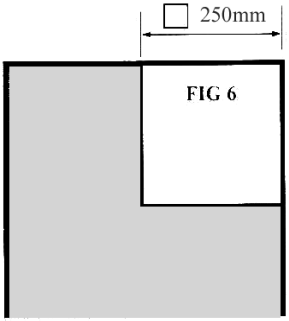

FIG 6

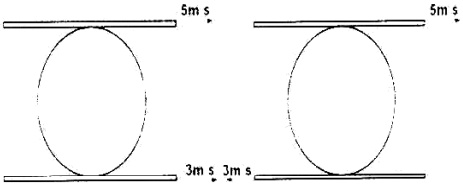

FIG 4

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