Code No: R1622012 **R16** SET - 1

II B. Tech II Semester Regular /Supplementary Examinations, April/May - 2019

STRENGTH OF MATERIALS-II

(Civil Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**

2. Answer **ALL** the question in **Part-A**

3. Answer any **FOUR** Questions from **Part-B**

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PART –A

1. a) Write different types of failures.
   b) Write the assumptions made in the theory of pure torsion.
   c) State the Euler's assumption in column theory.
   d) Define the 'Beam' and the type of action and deformation it undergoes.
   e) What is deflection?
   f) What are the advantages of trusses over beams?

PART -B

2. a) Explain Mohr's Theory?
   b) Explain the Energy of Distortion (shear strain energy) and Dilatation.

3. A solid circular shaft of diameter d has the same weight as a hollow circular shaft of mean diameter d. Assuming the same maximum shear stress in both the cases; determine the ratio of torques transmitted by the two shafts. Also compare the angles of twist per unit length in these two shafts.

4. A steel column is of length 8 m and diameter 600 mm with both ends hinged. Determine the crippling load by Euler's formula. Take E =2.1 x 10^5 N/mm^2

5. Derive the expression for core of a solid circular section of diameter D.

6. a) Obtain the principal moment of inertia for an unequal angle section 200*mm x* 150*mm x*10*mm*. Name the reasons for unsymmetrical bending.
   b) A beam of rectangular section 80mm wide and 120mm deep is subjected to a bending moment of 12kN.m The trace of the plane of loading is inclined at 45^0 to the y-y axis of the section. Locate the natural axis of the section and calculate the maximum bending stress induced is the section.
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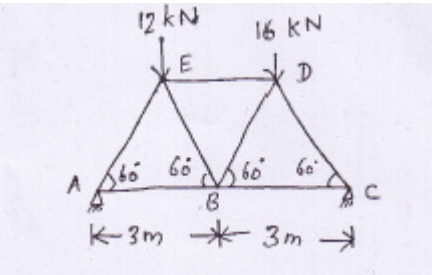
7. Determine the forces in all the members of the frame shown in fig . Use method of joints



Code No: R1622012 **R16** SET - 2

II B. Tech II Semester Regular /Supplementary Examinations, April/May - 2019

STRENGTH OF MATERIALS-II

(Civil Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **FOUR** Questions from **Part-B**

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PART –A

1. a) Define strain energy and Proof stress.
   b) Write different types of springs.
   c) Write Perry's formula.
   d) Define Stress.
   e) Draw Bending moment diagram for simply supported beam with full UDL.
   f) Define 'tension coefficient'.

PART -B

2. In a material the principal stresses are 50 N/mm^2, 40 N/mm^2 and - 30 N/mm^2, calculate:
   i. Total strain energy
   ii. Volumetric strain energy
   iii. Shear strain energy and
   iv. Factor of safety on the total strain energy criterion if the material yield at 100 N/mm^2.
   Take E = 200 x 10^3 N/mm^2 and poission ratio = 0 .28

3. A solid circular shaft of diameter d has the same weight as a hollow circular shaft of mean diameter d. Assuming the same maximum shear stress in both the cases; determine the ratio of torques transmitted by the two shafts. Also compare the angles of twist per unit length in these two shafts.

4. a) Derive an expression for the Rankine's crippling load for a column.
   b) How will you justify the Rankine's formula is applicable for all lengths of columns, ranging from short to long columns.

5. Determine stresses in case of Retaining wall with suitable example.
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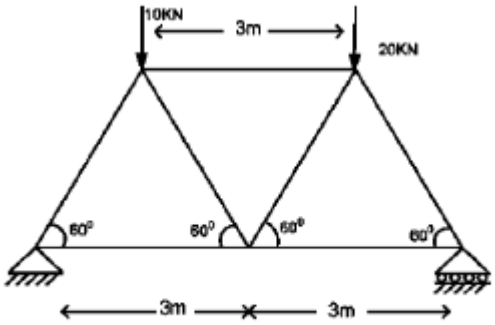
6. a) Explain briefly how stresses in beams due to unsymmetric bending is considered.
   b) Explain briefly the method of locating shear centre.

7. Find the forces in all the members of the simply supported truss loaded as shown in fig



Code No: R1622012 **R16** SET - 3

II B. Tech II Semester Regular /Supplementary Examinations, April/May – 2019

STRENGTH OF MATERIALS-II

(Civil Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**

2. Answer **ALL** the question in **Part-A**

3. Answer any **FOUR** Questions from **Part-B**

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PART –A

1. a) What is Factor of safety (F.O.S)?

b) Write Torsion equation.

c) Write the Types of column.

d) Define strain.

e) Define Moment of Inertia.

f) What is degree of in determinacy in trusses.

PART -B

2. Derive an expression for the major and minor principal stresses on an oblique plane, when the body is subjected to direct stresses in two mutually perpendicular directions accompanied by a shear stress.

3. A close-coiled helical compression spring is made of 10 mm steel wire closely coiled to a mean diameter of 100 mm with 20 coils. A weight of 100N is dropped on to the spring. If the maximum instantaneous compression is 60 mm, calculate the height of the drop. Take $N = 0.85X10^5 N/mm^2$

4. Derive the expression for crippling load when the both ends of the column are fixed?

5. Distinguish between direct stress and bending stress by means of a diagram, with suitable example.

6. a) Write about centroidal principal axes of a section.

b) A 60*mmx* 40*mmx* 6*mm* unequal angle is placed with the longer leg vertical and of used as a beam simply supported at the ends over a span of 2m. If it carries a U.D. of such magnitude as to produce the maximum bending moment of 0.12kn.m determine the maximum deflection of the beam. Take $E = 2{:}1\ x\ 10^5 N/mm^2$.

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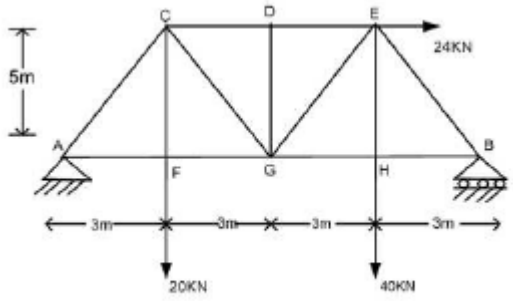
7. Determine the forces in all the members of the frame by method of joints.



Code No: R1622012 **R16** SET - 4

II B. Tech II Semester Regular /Supplementary Examinations, April/May - 2019

STRENGTH OF MATERIALS-II

(Civil Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answer **ALL** the question in **Part-A**
3. Answer any **FOUR** Questions from **Part-B**

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PART –A

1. a) Define shear strain.
   b) Draw springs in series.
   c) Define slenderness ratio.
   d) What is Bending Stresses?
   e) Define neutral axis.
   f) Write briefly on method of sections

PART -B

2. In a material subjected to strain, the resultant stress across a certain plane is 60MPa tensile, inclined at 30^0 to its normal inducing clockwise shear on the plane. The normal stress across the plane at right angles to this one is 40MPa, tensile. Find
(i) The principal stresses and locate their planes.
(ii) The maximum shear stress and specify its plane

3. A shaft transmits 300KW power at 120rpm. Determine the necessary diameter of solid circular shaft and the necessary diameter of hollow circular section, the inside diameter being 2/3 of the external diameter. The allowable shear stress is $70N/mm^2$. Taking the density at material as $77N/m^3$, calculate the % saving in the shaft if hollow shaft is used.

4. a) Deduce a formula for the critical load of a column having both ends hinged.
   b) A solid circular bar 6m long and 5 cm in diameter was found to extend 4.5 mm under a tensile load of 50KN. The bar is used as a street with both ends hinged. Determine the buckling load for the bar and the safe load consider factor of safety as 3.0.

5. a) State the assumptions involved in the theory of simple bending.
   b) Derive the Bending equation from first principle.
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6. A timber joist 100mm wide and 200mm deep, is freely supported over a span of 4m. It is subjected to a B.M of 30,000 cm kg at the central section, the trac OY of the plane of loading being inclined at 300 to the principal axis OY. Locate the neutral axis and calculate the bending stress induced. If the bending moment is due to a total load of 600kg uniformly distributed over the whole span, calculate the deflection. Take. $E = 10^5 kg/cm^2$

7. For the truss shown in figure, Investigate the horizontal movement of the roller at D. AB, BC, CD area = $8cm^2$. E= 2 x 10^5 N/mm^2.