Code No: RT22013 **R13** SET - 1

II B. Tech II Semester Regular Examinations, April/May - 2016
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 **THREE** Questions from **Part-B**

~~~~~~

PART –A

1. a) Write about Principal stress theory
   b) Explain the Theory of pure torsion?
   c) What the different types of columns?
   d) Write the stresses in dams?
   e) What is moment of inertia?
   f) Write a note on method of joint?

PART -B

2. a) Write a note on Mohr's circle of stresses. What is the importance of this circle?
   b) A rectangular block of 1200 mm^2 cross-sectional area is subjected to a longitudinal compressive load of 1200kN. Determine the normal stress across the cross section of the block. If the block is cut by an oblique plane making an angle of 40^0 with normal section of the block. Determine:
      (i) Normal stress on the oblique plane
      (ii) Tangential stress along the oblique plane, and
      (iii) Resultant stress on the oblique plane.

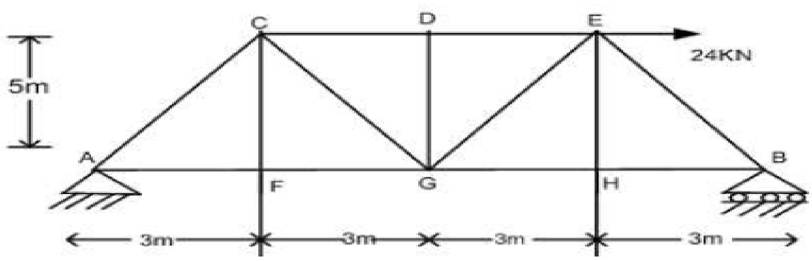
3. The external diameters of a steel collar are 200mm, and the internal diameter decreases by 0.125mm when shrunk on to a solid steel shaft of 125mm diameter. Find the reduction in diameter of the shaft, the radial pressure between the collar and the shaft and hoop stress at the inner surface of the tube. Take E = 210GN/m^2 and 1/m=0.3.

4. Starting from secant formula, derive Perry's formula for long columns

5. a) Explain briefly how stresses in beams due to un symmetric bending is considered.
   b) Explain briefly the method of locating shear centre.

6. Determine of stresses in the case of chimneys, retaining walls

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


~~~~~~

Code No: RT22013 **R13** SET - 2

II B. Tech II Semester Regular Examinations, April/May - 2016
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 **THREE** Questions from **Part-B**

~~~~~~

PART –A

1. a) What are the different Theories of Failures?
   b) Write about close and open coiled helical springs
   c) What is the difference between short and long column?
   d) Write the stresses in retaining walls?
   e) What is the difference between symmetrical and unsymmetrical bending?
   f) Explain the concept of indeterminate trusses

PART -B

2. a) Explain the terms principal stresses and principal planes.
   b) Derive expressions for principal stresses, principal planes and max shear stress if there are like direct stresses accompanied by a state of simple shear.

3. a) Define helical spring? Name the two important types of helical springs.
   b) A hollow shaft of diameter ratio 3/5 is required to transmit 400KW at 140 r.p.m with a uniform twisting moment. The shear stress in the shaft must not exceed 60 MPa and the twist in a length 2.5 m must not exceed 1^0. Calculate the minimum external diameter of the shaft. Take C=$8X10^4$ MPa.

4. a) Derive the Rankine's formula for crippling load.
   b) A column of circular section has 160mm diameter and 4m length. Both ends of the column are fixed. The column carries a load of 150kN at an eccentricity of 15mm from the geometrical axis of the column. Find the maximum compressive stress on the column section.

5. Distinguish between direct stress and bending stress by means of a diagram.

6. a) What do you mean by unsymmetrical bending?
   b) Locate the shear centre of the section shown in Figure 1. Thickness is 6mm throughout.

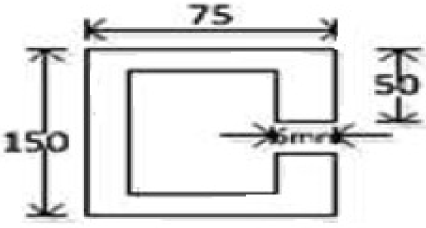


Figure 1

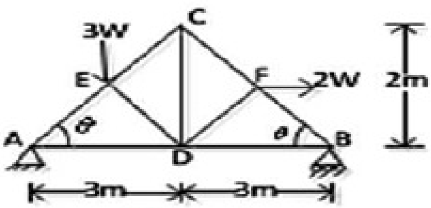


Figure 2

7. Calculate the magnitude and nature of the forces in the member of the truss as shown is Figure 2, by method of joints.
~~~~~~

Code No: RT22013 **R13** SET - 3

II B. Tech II Semester Regular Examinations, April/May - 2016
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 **THREE** Questions from **Part-B**

~~~~~~

PART –A

1. a) Explain about Mohr's circle?
   b) Write the different Types of springs?
   c) What is slenderness ratio
   d) Write about bending stresses?
   e) Explain briefly about unsymmetrical bending?
   f) Explain the concept of determinate trusses

PART -B

2. a) Derive an expression for the normal stress and shear stress on an oblique section of a rectangular body when it is subjected to direct stress in one plane only.
   b) A rectangular element is a strained body is subjected to tensile stresses of 250 N/mm^2 and 180 N/mm^2 on mutually perpendicular planes together with a shear stress of 80N/mm^2. Determine:
   i) Principal stresses ii) Principal planes
   iii) Maximum shear stress and iv) Plane of maximum shear stress

3. A closely coiled helical spring is made out of 10mm dia. steel rod, the coil having 12 complete turns. The mean dia. of spring is 10mm. Calculate the shear stress induced in the section of the rod due to an axial load of 250N. Find also the deflection under the load, energy stored in the spring and the stiffness of spring. Take N = 8 x10^4 *N/mm*^{2}.

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 strut with both ends hinged. Determine the buckling load for the bar and the safe load, consider factor of safety as 3.0.

5. Determine of stresses in the case of dams and explain the conditions for stability?

6. A beam of rectangular section 100mm wide and 180mm 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.

7. Find the forces in the members of truss by method of joints as shown in Figure 1.

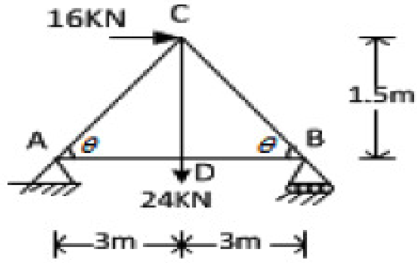


Figure 1
~~~~~~

Code No: RT22013 **R13** SET - 4

II B. Tech II Semester Regular Examinations, April/May - 2016
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 **THREE** Questions from **Part-B**

~~~~~~

PART –A

1. a) Explain about Normal and tangential stresses on an inclined plane
   b) Write about Polar section modulus with one example?
   c) Write the Limitations of Euler's theory
   d) Write the stresses in chimneys
   e) Explain about centroid in rectangular section
   f) Write a short nore on method of section?

PART -B

2. a) Briefly illustrate the shear strain energy theory.
   b) Using the above theory estimate the factor of safety for a certain type of steel whose Proportional limit is 280 MPa. The principal stresses were found to be 100 MPa (tensile),60 MPa (tensile) and 30 MPa (compressive)

3. Design a close coiled helical spring made of by steel wire. The diameter of the coil is 10 times the diameter of the wire. A load 650N is applied on the spring which causes a deflection of 60mm. Take allowable maximum shear stress is $80N/mm^2$ and $C=8X10^4$ N/mm^2.

4. a) Define slenderness ratio of a column. What is its importance?
   b) A column of circular section has 160mm diameter and 4m length. Both ends of the column are fixed. The column carries a load of 150kN at an eccentricity of 15mm from the geometrical axis of the column. Find the maximum compressive stress on the column section.

5. A square chimney 25m high, having an opening of l*n* by l*n* is subjected to a horizontal wind pressure of $1.5 KN/m^2$. Find the necessary thickness of brick work at base if the density of the masonry is $21 KN/m^3$ and the max permissible stress on brick masonry is limited to $0.8N/mm^2$.

6. a) What do you mean by 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

7. Find the forces in the members of truss by method of section as shown in Fig 1.

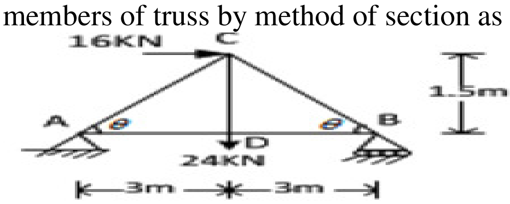


Fig-1
~~~~~~