concentrated loads 120KN and 80KN at two points 3m and 4.5m from the two ends respectively. I for the section of the girder is 16×10^4 cm^4 and E for steel is 210 GPa.

Calculate the deflection of the girder at points under the two loads. 20

9. Explain the Castigiliano's theorem with suitable example. 20

Roll No. .....

24086

B. Tech 3rd Semester (AUE) Examination – December, 2017

STRENGTH OF MATERIALS

Paper : AUE-201-F

Time : Three Hours] *[Maximum Marks : 100*

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt ***five*** questions in all, selecting at least ***one*** question from each Section. Question No. 1 is ***compulsory.***

1. (a) Define Hooke's law. 2
   (b) Draw stress strain diagram for mild steel. 2
   (c) Write the name of different types of stresses. 2
   (d) Define the strain. 2
   (e) What is simply supported beam ? 2
   (f) Define Principal stress and Principal planes. 2

(g) What is column ? Write the name of different types of column. 2

(h) What is mohar circle ? 2

(i) What is difference between thin and thick pressure vessel ? 2

(j) Define strain energy. 2

SECTION – A

2. Establish the relation in between Elastic Constants. 20

3. The principal stresses at a point in a strained material are 126 MPa (tensile) and 63 MPa (tensile), the third principal stress being zero. Find by a circular diagram of stresses, the magnitude and direction of resultant stress. On a plane inclined at 30° to the direction of the smaller principal stress and perpendicular to the plane across which the stress is zero. Also find the maximum obliquity of the resultant stress and its magnitude. 20

SECTION – B

4. A horizontal girder which is freely supported at its end and has a span of 9 m supports a uniformly distributed load of 20kN/m run over the whole span and also two concentrated loads of 30KN and 40KN at points 6 m and 7.5 m respectively from the left support. Draw the bending moment and shearing force diagrams and state the values of the maximum bending moment and maximum shear force. 20

5. Write the short notes on the following : 20

(a) Concept of shear force and bending moment.

(b) Assumption of shear force and bending moment diagram.

SECTION – C

6. A solid shaft of 200 mm diameter has the same cross sectional area as that of a hollow shaft of the same material with inside diameter 150 mm. Find the ratio of power transmitted by the two shafts at the same speed. 20

7. A flat spiral spring is 6 mm wide and 0.25 mm thick, the length being 2.5 m. Assuming the maximum stress of 800MN/m^2 to occur at the point of greatest bending moment, calculate the torque the work that can be stored in the spring, and the number of complete turns to wind up the spring. Take E = 200GN/m^2. 20

SECTION – D

8. A horizontal girder of steel having uniform section is 14m long and is simply supported at its ends. It carries