Printed Pages : 4

NAG–304

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 180319

Roll No.

B.Tech.

(SEM. III) (ODD SEM.) THEORY EXAMINATION, 2014-15

STRENGTH OF MATERIALS

Time : **2** Hours] [Total Marks : **50**

Note : Attempt all questions.

SECTION - A

1 Attempt **all** parts. **(2×5=10)**

a) The cylinder of hydraulic ram is of 6 cm internal diameter. Find the thickness required to withstand an internal pressure of 40 N/mm^2, if the maximum tensile stress is limited to 60 N/mm^2 and the maximum shear stress to 50 N/mm^2.

b) Why beam deflection calculation is necessary ? Write the name of various methods used for calculating beam deflections.

c) i) What is the difference between strut and column ?

ii) Write down the limitations of Eular's formula for critical load.

d) Define :
   i) Compound stress
   ii) Poission's ratio.

e) Draw mohr's circle for 2D stress fields.

SECTION - B

2 Attempt any **three** parts. **(5×3=15)**

a) What is the difference between Direct and compound stresses ? Write the types of Direct stress.

b) Write Short notes on the following :
   i) Volumetric strain
   ii) Slenderness ratio
   iii) Thin Cylinders and spheres.

c) Derive an expression for the slope and deflection of Cantilever beam carrying uniformly distributed load.

d) Obtain expression for the hoop and longitudinal stresses in a thin cylinder subjected to an internal pressure.

e) Calculate the critical load of a strut, which is made of a bar circular in section and 5 m long and which is pin-jointed at both ends. The same bar when freely supported give mid span deflection of 10mm with a 80N load at the center.

SECTION – C

3 Attempt **all** parts : **(5×5=25)**

a) Derive an expression for the slope and deflection of a simple supported beam, span L ,carrying a uniformly distributed load w per unit length and a point load P at the mid span. Hence, find the slope and deflection at a point L/4 from the left support.

OR

a) Derive the Euler formula for Strut hinged at both ends. Write three most important assumptions made in deriving this formula.

b) Write short notes on :

i) Eular's theory of buckling

ii) Macaulay's Method.

OR

b) Write short notes on :

i) Failure of columns

ii) Circumferential stress and longitudinal stress.

c) A cylindrical shell 3m long which is closed at the ends has an internal diameter of 1m and a wall thickness of 15mm. Calculate the circumferential and longitudinal stresses induced and also change in the dimensions of the shell, if it is subjected to an internal pressure of 1.5MN/m2 . Take E= 200GN/m2 and μ = 0.3.

OR

A beam of uniform section, 10m long, is simply supported at the end. It carries point loads of 150kN and 65kN at distance of 2.5m and 5.5m respectively from the left end. Calculate deflection under each load.

d) i) Classify columns and struts with a short Description of each classification.

ii) Write short note on Equivalent length of column.

OR

Derive the Euler formula for column fixed at one end and free at the other end.

e) Obtain an expression for the hoop stress in thin spherical shell subjected to an internal pressure.

OR

Derive an equation of elastic curve.
