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BTECH(AEROSPACE)–2014

STRENGHT OF MATERIALS I

Paper Code (ME-201)

Paper Id. [A0801]

Time : 03 Hours Maximum Marks : 60

Instruction to Candidates:

1) Section – A is compulsory consisting of Ten questions carrying Two marks each.
2) Section – B containing Five questions carrying Five marks each and students has to attempt any Four questions.
3) Section – C containing Three questions carrying Ten marks each and students has to attempt any Two questions.

Section – A

Q 1) a) What do you mean by 'a bar of uniform strength'?

b) What do you mean by point of contra flexure?

c) What do you mean by 'simple bending' or 'pure bending'?

d) What is moment –area method? Where is it conveniently used?

e) Define torsional rigidity of a shaft?

f) What is 'equivalent length of a column?

g) What are the different methods of reducing hoop stresses?

h) What is 'equivalent length of a column?

i) Define slenderness ratio. ?

j) What do you mean by moment of resistance?

Section – B

Q2) Derive the torsion equation, also state assumptions made for derivations of torsion equation.

Q3) Prove that maximum shear stress in a circular section of beam is 4/3 times the average shear stress.

Q4) Derive an expression for the slope and deflection of a cantilever of length L, carrying a point load W at the free end by double integration method.

Q5) A hallow shaft of diameter ratio 3/8 (internal dia. to outer dia.)Is to transmit 375 kW power at 100 r.p.m. The maximum torque being 20% greater than the mean. The shear stress is not to exceed 60 N/mm^2 and twist in a length of 4 m not to exceed 2^0 .Calculates its external and internal diameters which would satisfy both the above conditions. Assume modulus of righty=$0.85x10^5 N/mm^2$.

Q6) How will you draw the shear stress distribution diagram for composite section?

Section – C

Q7) A cylindrical shell 3 meters long which is closed as the ends has an internal diameter of 1 m and a wall thickness of15mm.calculate the circumferential and longitudinal stresses induced and also changes in the dimensions of the shell, if it is subjected to an internal pressure of 1.5 N/mm^2.Take E=$2x10^5$ N/mm^2 and 1/m=0.3.

Q8) A beam of length 5 m and of uniform rectangular section is simply supported at its ends. It carries a uniformly distributed load of 9 kN/m run over the entire length. Calculate the width and depth of the beam if permissible bending stress is 7N/mm^2 and central deflection is not to exceed 1 cm. Take E for beam material =$1x10^4$ N/mm^2.

Q9) At a certain point in a strained material, the intensities of stresses on two planes at right angles to each other are 20N/mm^2 and 10 N/mm^2.both tensile. They are accompanied by a shear stress of magnitude 10N/mm^2.Find graphically or otherwise the location of principal planes and evaluates the principal stresses.

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