Roll No. | | | | | | | | | | | | |

Total No. of Pages: 02
Total No. of Questions: 09

B. Tech (Sem.-3rd)

MECHANICS OF MATERIALS

Subject Code: AE-201
Paper ID: [A0701]

Time: 3 Hrs. **Max. Marks: 60**

INSTRUCTIONS TO CANDIDATE:

1. **Section- A is compulsory consisting of TEN questions carrying TWO marks each.**
2. **Section-B contains five questions carrying FIVE marks each and student has to attempt any four questions**
3. **Section- C contains THREE questions carrying TEN marks each student has to attempt any TWO questions.**

Section –A

Q.1. Write briefly: **10x2=20**

(a) Draw stress- strain diagram for brittle material.

(b) Define principal planes.

(c) Write the uses of Mohr's circle.

(d) Define slenderness ratio.

(e) Define crippling load.

(f) Write Rankine formula for columns.

(g) Write various assumptions while deriving torsion equation of shaft.

(h) Define proof resilience.

(i) Describe castigiliano's theorem of bending.

(j) What is value of equivalent stiffness when springs are connected in series?

Section –B

Q.2. Prove that $K = \frac{ME}{3(m-2)}$ **4x5=20**

Where k= Bulk Modulus

1 =Poisson's ratio
m

Q.3. Explain Mohr's circle as applicable to an oblique section of a body subjected to a direct stress in one plane.

Q.4. Draw the shear force and bending moment diagram of a cantilever as shown in Fig-1

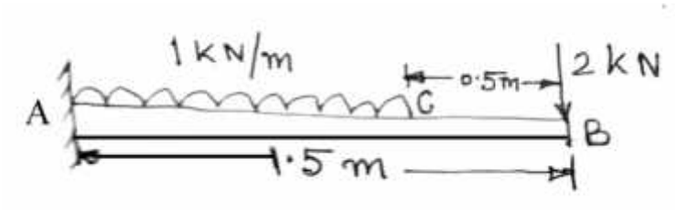

FIG-1

Q.5. For a solid shaft prove that

T = CQ = fs

J l R

Where symbols have their usual meanings

Q.6. Derive the suitable mathematical expression for strain energy in torsion.

Section –C

10x2=20

Q.7. Describe Double integration method as applicable to simply supported beam and derive suitable mathematical expression also.

Q.8. An I Section joist 400 mm x 200 mm x 20 mm and 6 m long is used as a strut with both ends fixed. What is Euler's crippling load for the column? Take young's Modulus for the joist as 200 GPa.

Q.9. A solid aluminium shaft 1m long and of 50 mm diameter is to be replaced by a hollow shaft of the same length and same outside diameter, so that the hollow shaft could carry the same torque and has the same angle of twist. What must be the inner diameter of the hollow shaft?

Take modulus of rigidity for the aluminium as 28 GPa and that of steel as 85 GPa.

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