S. B. Roll. No.....

STRENGTH OF MATERIALS
4th Exam/Mech./Auto/2093/Nov'24
(For 2018 Batch Onwards)

Duration: 3Hrs. **M.Marks:75**

SECTION-A

Q1. Give answer in one line. **15x1=15**

a. Which section will be the best in section?
b. What is factor of safety?
c. Give formula for Euler's load for a column hinged at both ends.
d. Where the C.G. of a Circle is lie?
e. At which layer bending stress is maximum?
f. What is point of contra flexture?
g. What is poisson's ratio?
h. Give formula of hoop stress.
i. What do you mean by gradual load?
j. What is moment of inertia?
k. What do you understand by stiffness?
l. What is the unit of section modulus?
m. What is column?
n. Give value of total extension, when two springs are connected in series?
o. What is strength of solid shaft?

SECTION-B

Q2. Attempt any six questions. **6x5=30**

i. Find the maximum shear stress induced in a solid circular shaft of diameter 200mm when shaft transmit 188 kW at 190 r.p.m.?
ii. What is laminated spring? Explain its advantage over helical spring.
iii. A steel rod of 25 mm diameter and 2.5 m long is subjected to a sudden axial pull of 75 kN. Find the amount of work done and calculate the maximum instantaneous stress and elongation produced. Take value of Young's modulus 2×10^5 N/mm^2.
iv. State and prove theorem of perpendicular axis?
v. Define stress and strain? Write down various types of stresses.
vi. Explain principle of superposition?
vii. Give short note on the following terms:-
a) Slenderness ratio b) safe load c) Buckling load d) Buckling factor
viii. What are the assumptions made while deriving the torsion equation?
ix. Where does the C.G. of the following solids lie:-
a) Right cylinder b) Solid hemisphere c) Right circular solid cone

SECTION-C

Q3. Attempt any three questions. **3x10=30**

a. Drive the expression for hoop stress and longitudinal stress in a thin seamless cylindrical shell?
b. Derive the bending equation $M/I = f/y = E/R$?
c. A mild steel tube, 25 mm external diameter, 2.5 mm thick is 3m long and is used as strut. Determine the safe compressive load when this strut is used with the following end condition i) both ends are hinged. ii) Both ends are fixed. iii) One end is fixed and the other end is free.
Take factor of safety = 3 and E =2 ×105 N/mm^2.
d. Calculate the safe working load for a circular steel strut of 6 m length and having diameter 80 mm which is hinged at both ends. The factor of safety is 4. Take $E = 2.1 \times 10^5$ N/mm^2.
e. Draw S.F. and B.M. diagrams for a simply supported beam carrying several point loads?