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3rd Sem / Auto, Mech, Mecatronics, Prod, T&D, Plastic, GE, CNC, CAD/CAM, Found. & Forg, Metallurgy, Print Making Tech., Mech (Ad. Manu. Tech.), Mech Engg (Fabrication Tech), Rubber Tech, Polymer Tech, AME, Mech. Engg. (Prod.)

Subject:- Strength of Materials / Basic Mech. Engg.

Time : 3Hrs. M.M. : 100

SECTION-A

Note: Multiple choice questions. All questions are compulsory (10x1=10)

Q.1 If a bar of length L, having co-efficient of liner expansion as a, is heated by T the temperature stress produced in the bar is equal
a) Zero b) aT
c) aTE d) aTE/L

Q.2 The hook law is hold good within
a) Plastic limit b) Yield point
c) Euler's limit d) Elastic limit

Q.3 If s_e is the elastic limit stress $s_e^2/2E$ is called
a) Ductile stress
b) Shock Proof
c) Resilience
d) Modulus of resilience

Q.4 A closed ended thin cylindrical shell subjected to a uniform internal pressure will be subjected to:
a) Circumferential stress only
b) longitudinal stress only
c) Both circumferential and longitudinal stress
d) None of the above

Q.5 Moment of inertia is a concept applicable in case of :
a) A rotating body
b) Body moving in straight line
c) Body at rest
d) both for (a) and (b) above

Q.6 If W is the udl per unit length on cantilever beam, max banding moment on the cantilever of length 1 is equal to:
a) W1 b) W1/2
c) $W^2I/2$ d) $W1^2/2$

Q.7 The bending stress at neutral axis is:
a) tensile b) Compressive
c) Shear d) Zero

Q.8 In a given beam subjected to bending moments:
a) is constant
b) is variable
c) s is the stress at the natural axis
d) s is the bending stress which remains constant throughout the section of the beam

Q.9 The polar moment of inertia of a circular shaft of radius R is:
a) $pR^2/2$ b) $pR^3/2$
c) $pR^4/2$ d) $pR^4/4$

Q.10 Two closed coiled helical spring of stiffness S_1 and S_2 are joined in series such that $S_2=2S_1$ then composite Stiffness is equal to:
a) 2S b) 3S
c) 1.5S d) 2S/3

SECTION-B

Note: Objective type questions. All questions are compulsory. (10x1=10)

Q.11 What is the co-efficient of liner expansion.

Q.12 What is lack of ductility known as?

Q.13 What is the term which indicates the capacity of a body to bear shocks?
Q.14 What is the effect of diameter of a thin shell on the stresses produced?
Q.15 Unit of section modulus is_____
Q.16 What is point of inflection?
Q.17 The bending stress in beam is directly proportional to_____
Q.18 Unit of torque is_____
Q.19 In a beam at what section the bending equation is applied ?
Q.20 What is stiffness of spring?

SECTION-C

Note: Short answer type questions. Attempt any twelve questions out of fifteen questions. (12x5=60)

Q.21 What do you understand by Passion ratio & Lateral Strain?
Q.22 Define temperature stress & strain.
Q.23 A steam boiler of 900mm diameter is made up of 12mm thick plates. If the boiler is subjected to an internal pressure of 2.5Mpa. Find the circumferential and longitudinal stresses induced in the boiler plates.
Q.24 Prove that stress induced due to suddenly applied is twice the to that of gradually applied load.
Q.25 A mild steel bar 2.5m long and 30mm in diameter hangs freely and has a collar firmly fixed with the lower end. Determine the instantaneous elongation of the bar. If a load of 250N falls on the collar from a height of 100mm. Take E=210 Gpa.
Q.26 Define radius of gyration and its unit.
Q.27 Find the M.O.I of a rectangular section(50X90) cm about its axes and about its base.
Q.28 Classify the beams.

Q.29 Draw SFD & BMD for a cantilever beam carrying a u.d.l over the whole span.
Q.30 Drive the formula of section modulus for
a) Hollow rectangular section
b) Circular section
Q.31 Classify the Columns.
Q.32 A solid round bar 6cm in diameter and 3m long is used as strut with one end fixed while other hinged. Find the safe load which strut can withstand using Euler's formula. E=210 Gpa, and FOS=4
Q.33 What are assumptions made in theory of pure torsion
Q.34 A circular shaft of 60mm diameter is running at 160rpm. If the shear stress is not to exceed 50Mpa. Find the power which can be transmitted by the shaft.
Q.35 Define spring and its functions.

SECTION-D

Note: Long answer type questions. Attempt any two questions out of three questions. (2x10=20)

Q.36 A simply supported beam 5m long is subjected to 3 point loads of 2KN, 1KN and 2.5 KN each at a distance of 1m, 2m and 3m respectively from the left hand support. Draw the SFD & BMD for the beam.
Q.37 Drive the expression for pure bending equation for a beam.
Q.38 A semi-elliptical leaf spring 1.2 m long provides a static deflection of 70mm under a central load of 3.5 KN. If the spring leaves are 70mm wide and 6mm thick. Determine the numbers of leaves required and maximum stress under 3.5 KN central loads. Take $E=2X10^5 N/m^2$