

Experiment No. Bases of Eng. Mechanics

Date _____

Experiment _____

Q1 It is the change in length by original length i.e., $\frac{\Delta L}{L}$ = longitudinal strain

Q2 It is the restoring force by area i.e., $\frac{F}{A}$ longitudinal stress.

Q3 longitudinal stress has two types: tensile stress & compressive stress

Q4 The S.I unit of stress is $\frac{F}{A} = \frac{N}{m^2} = Nm^{-2}$ & lbs

dimensional are $ML^{-1}T^{-2}$

Q5 Strain is a dimensionless quantity.

Q6 Shearing strain is $\tan \theta$ or θ

Q7 Bending moment is L due to torque direction force

Q8 Torsion is due to longitudinal axis / twisting moment / torque

Q9 In stress-strain curve OA is stress & strain

Q10 A is = limit of (stress) proportionality

Q11 slope = $\frac{\Delta \sigma}{\Delta \epsilon}$ = stress \rightarrow Modulus of elasticity

Q12 B is = yield limit or elastic limit \rightarrow if deformation force is removed up till B wire returns to its original state.

Q13 B D = plastic region & OB = elastic region

Q14 D is the max stress & breaking stress

Q15 E is the rupture point

Q16 Ductile / brittle is a wire plastic region large

Q17 like Biscuit () Small

Q18 elastomer like rubber No plastic region

DIAGRAM

Q20 sublim has 2 degrees of freedom in elastic region.

Q21 Value of elongation $\Delta l = \frac{Pl}{AE}$

Q22 It is the combination of bars with different materials. Composite bars.

Q23 Poisson's ratio is $\nu = \frac{\text{Lateral strain}}{\text{Longitudinal strain}}$

$$\nu = \frac{-\Delta R/R}{\Delta l/l} \quad \text{or} \quad \frac{-\Delta D/D}{\Delta l/l}$$

Q24 Young modulus (Y) = $\frac{\text{Longitudinal stress}}{\text{Longitudinal strain}} = \frac{F/A}{\Delta l/l}$

Q25 Bulk modulus (K) = $\frac{\text{Normal stress}}{\text{Volumetric strain}} = \frac{F/A}{-\Delta V/V}$

Q26 Modulus of rigidity (η) = $\frac{\text{Tangential stress}}{\text{Shear strain}} = \eta = \frac{F/A}{\phi}$

Q27 C.G. is a pt at which entire weight of a body may be considered concentrated. It will remain in equilibrium at any position.

Q28 Centroid is a pt at which total area of a plan figure (like rect, square, \odot) is assumed to be concentrated.

Q29 MoI is used to find angular acceleration.

Q30 Perpendicular theorem is $I_Z = I_X + I_Y$

Dated _____

Teacher's Signature _____

Q 30: Parallel axis theorem should be used for =
 1D, 2D, 3D body.

Q 31: IY theorem // // // // = 2D Body

Q 32: // theorem is $I = I_{COM} + Ma^2$ (laminae plate)

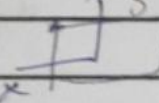

Hollow ring $\frac{2}{3} MR^2$ K=1.1 thin spherical shell $\frac{2}{3} MR^2$ 0.6

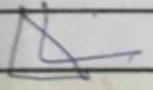

Hollow cylinder $\frac{2}{3} MR^2$ 1.2 Semi $\odot A = MR^2$

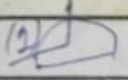
Solid disk $\frac{1}{2} MR^2$ 0.5 2.

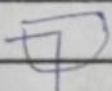
Solid cylinder $\frac{1}{2} MR^2$ 0.5 Quarter $A = mR^2$

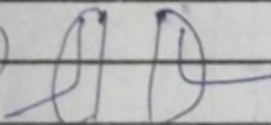
Solid sphere $\frac{2}{5} MR^2$ 0.4 $\frac{1}{4}$

Rectangle  $I_x = \frac{bh^3}{12}$, $I_y = \frac{hb^3}{12}$  $I_x = I_y = 0.049a^4$

Triangle  $I_x = \frac{bh^3}{36}$, $I_y = \frac{hb^3}{36}$ Quarter  $I_x = I_y = 0.0584$

Semicircle  $I_x = 0.118r^4$

 $I_y = 0.392r^4$

(2)  $I_x = 0.392r^4$
 $I_y = 0.118r^4$