Subjective Questions on MET – 06

Q1. What do you mean by strength of materials? What are the uses of strength of materials?

Q2. What are Mechanical Properties of Material? Define stress and strength?

Q3.Define the following terms

(i)Stress (ii) Strain (iii) Hooke's Law (iv) Modulus of Elasticity

Q4.What are the different types of stresses and strains? Write its formula and unit?

Q5.A mild steel rod 2m long &3cm diameter is subjected to an axial pull of 10kN. E for Youngs modulus for steel is 2 x 105 N/mm2. Find the stress, strain.

Q6.A steel bar 900mm long its 2ends are 40mm &30mm in diameters &the length of each rod is 200mm. The middle portion of the bar is 15mm in diameters &500mm in long if the bar is subjected an axial tensile load of 15KN. Determine the stress in each section &total extension. Take E=200 103N/mm2.

Q7.The following are the results of a tensile on test on a molested rod is 16 mm gaugh length is 50 mm, load at proportionality limit is 48.5 kN. Extension at the proportionally limit is 0.05mm. Load at yield point is 50.3 KN ultimate loads is 90KN. Final length between gauges points is 64mm, diameter of the neck at fracture is 13.7 mm. Determine the e you Stress, % of elongation& % of reduction in area.

Q8. A wire 2 m long and 2mm in diameter, when stretched by weight of 8 kg has its length increased by 0.24mm. Find stress, strain and Young's modulus of material of the wire. g=9.8m/sec2.

Q9. A mild steel wire of radius 0.5 mm and length 3m is stretched by a force of 49 N. Calculate (a) Longitudinal Stress (b) Longitudinal Strain (c) Elongation produced in the body if Y for steel 2.0x1011 N/m2.

Q10. A wire of length 2 m and cross sectional area 10-4 m2 is stretched by a load 102 kg. The wire is stretched by 0.1 cm. Calculate longitudinal stress, longitudinal strain and Young's modulus of the material of wire. g= 9.8 m/sec2.

Q11.What is Stress-Strain Curve? Explain

Q12.Define the following terms

(i)Proportional limit (ii) Elastic limit (iii) Yield point (iv) Ultimate stress point

(v) Fracture or breaking point

Q13.What is the relation between stress and strain?

Q14.What does Poisson's ratio mean?

Q15.What is the three modulus of elasticity?

Q16. Define Bulk modulus. Write its formula and units.

Q17.What is the difference between Young's modulus and bulk modulus?

Q18.What is the relationship between Poisson's ratio and Young's modulus?

Q19: A bar of 20mm diameter is tested in tension it is observed that when a lead of 40KN is applied the extension measured over a gauge length of 200mm us 0.12mm&contraction in diameter is 0.0036mm. Find poisson's ratio, young's modulus.

Q20.What is elastic constants of a material? Write relation between elastic constants?

Q21.What is the difference between modulus of elasticity and rigidity?

Q22.What is the Centre of gravity?

Q23.What is difference between Centre of mass and Centre of gravity?

Q24.What does center of gravity depends on?

Q25. What is a Centroid of a triangle? Write its formula.

Q26. Determine the coordinate of the center of gravity of the object as shown in the figure below.

Q27.What is moment of inertia in simple terms? Write its formula?

Q28.Why is the moment of inertia important? What are the 3 types of inertia?

Q29.How do you find the moment of inertia of a parallel axis theorem?

Q30.What is the theorem of parallel axis proves it?

Q31. What is the moment of inertia theorem of perpendicular axes?

Q32. A disc of radius R and thickness R/6 has a moment of inertia I about an axis passing through its center and perpendicular to its plane. The disc is melted and recast into a solid sphere. Find the moment of inertia of the sphere about its diameter as axis of rotation.

Q33. If the moment of inertia of a body along a perpendicular axis passing through its centre of gravity is 50 kg•m2 and the mass of the body is 30 Kg. What is the moment of inertia of that body along another axis which is 50 cm away from the current axis and parallel to it? Use Parallel Axis Theorem Formula.

Q34. What do you mean by beam? What is classification of beams?

Q35.What is types of loads on beams? Explain with figures.

Q36. Define the following terms- (i) Shear force in beam (ii) Shear force diagram (SFD) (iii) Bending moment diagram (BMD)

Q37. What is Contra flexure point?

Q38. .A cantilever beam is subjected to various loads as shown in figure. Draw the shear force diagram and bending moment diagram for the beam.

Q39. A cantilever beam carries a uniform distributed load of 60 k N/m as shown in figure. Draw the shear force and bending moment diagrams for the beam.

Q40. A simply supported beam is subjected to a combination of loads as shown in figure. Sketch the shear force and bending moment diagrams and find the position and magnitude of maximum bending moment.

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Q45. .A cantilever beam is subjected to various loads as shown in figure. Draw the shear force diagram and bending moment diagram for the beam.

Q46. . A simply supported beam is subjected to concentrated loads as shown in figure. Sketch the shear force and bending moment diagrams.

Q47.What stresses can a beam experience? What is shear stress and maximum shear stress in beams?

Q48. What is bending of beam? Define bending stress in beam. What are types of bending stresses?

Q49. What is theory of simple bending? Write bending stress formula?

Q50. What is the bending equation? Write the meaning of symbols used in equation.

Q51. What are assumptions are made in the theory of the simple bending?

Q52. Derive the bending equation.

Q53.Define the following terms-

(i)Section modulus (ii) Moment of resistance of the section.

Q54. A cantilever beam of length 2m fails when a load of 2KN is applied at the free end. If the section is 40mmx60mm, find the stress at the failure.

Q55. A rectangular beam 200mm deep and 300mm wide is simply supported over the span of 8m. What uniformly distributed load per meter the beam may carry, if the bending stress is not exceeding 120N/mm2.

Q56. A beam is simply supported and carries a uniformly distributed load of 40KN/m run over the whole span. The section of the beam is rectangular having depth as 500mm.If the maximum stress in the material of the beam is 120N/mm2 and moment of inertia of the section is 7x108 mm4, find the span of the beam.

Q57. Calculate the maximum stress induced in a cast iron pipe of external diameter 40mm,of internal diameter 20mm and length 4m when the pipe is supported at its ends and carries a point load of 80N at its centre.

Q58. A rectangular beam 300mm deep is simply supported over a span of 4m. Determine the uniformly distributed load per meter which the beam may carry, if the bending stress should not exceed 120N/mm2.Take I=8x106 mm4.

Q59. A square beam 20mmx20mm in section and 2m long is supported at the ends. The beam fails when a point load of 400N is applied at the centre of the beam. What uniformly distributed load per meter length will break a cantilever of the same material 40mm wide,60 mm deep and 3m long?

Q60. A timber beam of rectangular section is to support a load of 20KN uniformly distributed over a span of 3.6m when beam is simply supported. If the depth is to be twice the breadth, and the stress in timber is not exceed 7N/mm2, find the dimensions of the cross section. How could you modify the dimensions with 20KN of concentrated load is present at centre with same breadth and depth ratio.

Q61. What is torsion in strength of material? Where is the maximum shear stress in a circular shaft due to torsion?

Q62. What is difference between torque and torsion?

Q63.What is a twisting moment? Is it same as torque? Define angle of twist in torsion?

Q64.Write torsion formula and also describe the meaning of symbols used in the formula.

Q65.Define the following terms- (i) Torsional section modulus (ii) Torsional rigidity (iii) Polar Moment of Inertia.

Q66.A circular shaft has to transmit 550 KW power at 115 RPM. Allowable shear stress=78MPa. Find i) The required diameter of solid shaft ii) The diameters of hollow section such that internal diameter=0.75 x external diameter.

Q67.A metal bar of 10mm diameter when subjected to a pull of 23.55KN gave and elongation of 0.3mm on a gauge length of 200mm. In a torsion test maximum shear stress of 40.71N/mm2 was measured on a bar of 50mm dia. The angle of twist measured over a length of 300mm being 0°21'. Determine poisson's ratio.

Q68.A hollow shaft diameter ratio 3/5 is required to transmit 450 Kw at 120 rpm, the shearing stress in the shaft must not exceed 60N/mm2 and the twist in a length of 2.5m is not to exceed 10. Calculate the minimum external diameter of the shaft. Take, G=8.0 KN/mm2.

Q69.What must be the length of a 5mm diameter aluminium wire so that it can be twisted through 1 complete revolution without exceeding a shear of 42N/mm2? Take, G=27 GPa.

Q70.A solid steel shaft has to transmit 75KW power at 200 rpm.Taking allowable shear stress 70MPa. Find suitable dia. of shaft with the maximum torque transmitted on each revolution exceeds by 1.3 times mean.