STRENGTH OF MATERIALS (SOM)

DEPARTMENT OF CIVIL ENGINEERING

Term Test QP Code **Second Half**

Q1. The equivalent length is of a column of length having both the ends fixed, is
(Option A) 2L
(Option B) L
(Option C) L/2
(Option D) L

Q2. The ratio of the length and diameter of a simply supported uniform circular beam which experiences maximum bending stress equal to tensile stress due to same load at its mid span, is
(Option A) 1/8
(Option B) 1/4
(Option C) 1/2
(Option D) 1/3

Q3. A composite beam is composed of two equal strips one of brass and other of steel. If the temperature is raised
(Option A) Steel experiences tensile force
(Option B) Brass experiences compressive force
(Option C) Composite beam gets subjected to a couple
(Option D) All the above

Q4. The ratio of the stresses produced by a suddenly applied load and by a gradually applied load on a bar, is
(Option A) 1/4
(Option B) 1/2
(Option C) 1
(Option D) 2

Q5. A road of uniform cross-section A and length L is deformed by δ , When subjected to normal force P. The Young's Modulus E of the material, is
(Option A) $E = P.\delta/A.L$
(Option B) $E = A.\delta/P.L$
(Option C) $E = P.L/A.\delta$
(Option D) $E = P.A/L.\delta$

Q6. A simply supported beam carries varying load from zero at one end and w at the other end. If the length of the beam is a, the maximum bending moment will be

(Option A) wa/27
(Option B) $wa^2/27$
(Option C) $w^2a/\sqrt{27}$
(Option D) $wa^2/9\sqrt{3}$

Q7. The tangential component of stress on a plane inclined θ° to the direction of the force may be obtained by multiplying the normal stress by

(Option A) Sin θ
(Option B) Cos θ
(Option C) Tan θ
(Option D) $\text{Sin}^2\ \theta$

Q8. Pick up the incorrect statement from the following:
The torsional resistance of a shaft is directly proportional to

(Option A) Modulus of rigidity
(Option B) Angle of twist
(Option C) Reciprocal of the length of the shaft
(Option D) Moment of inertia of the shaft section

Q9. The shearing stress in a piece of structural steel is 100 MPa. If the elastic modulus is 200 GPa and the Poisson's ratio is 0.25, then the shearing strain γ would be

(Option A) 8 rad
(Option B) 0.00125 rad
(Option C) 0.8 rad
(Option D) 1.25 rad

Q10. Maximum shear stress acting on a cylindrical shell having internal diameter 1.2m and pressure 6Mpa having thickness 20mm and length 2m is

(Option A) 180 Mpa
(Option B) 90 Mpa
(Option C) 45 Mpa
(Option D) 360 Mpa

Q11. A simply supported beam subjected to uniformly distributed load of 10 KN/m over a span of 6m. Total length of the beam is 6m. and a point load of 20 KN acting downward at a distance of 2 m from left end. Find the maximum moment developed at the centre.

(Option A) 47 KNm
(Option B) 65 KNm
(Option C) 23.33 KNm
(Option D) 32 KNm

Q12. A cylindrical air drum is 1.125m in diameter of plate 6mm thick.. The efficiencies of longitudinal and circumferential joints are 0.40 and 0.75 respectively.. If the tensile stresses in platting is to be limited to 100 MN/mm^2. Determine safe air pressure.

(Option A) 0.80
(Option B) 0.426
(Option C) 0.852
(Option D) 0.213

Q13. . Determine the thickness of steel plate of a spherical pressure of 1.2m dia, pressure 3Mpa . The ultimate strength of steel is 450 Mpa and FOS = 4, take E= 2.1 x 10^5 Mpa.

(Option A) 8 mm
(Option B) 16 mm
(Option C) 4 mm
(Option D) 12 mm

Q14. A load of 1960 N is raised at the end of a steel wire. The minimum diameter of the wire so that stress in the wire does not exceed 100 N/mm^2 is:

(Option A) 4.0 mm
(Option B) 4.5 mm
(Option C) 5.0 mm
(Option D) 5.5 mm

Q15. If a solid shaft (diameter 20 cm, length 400 cm, N = 0.8 × 10^5 N/mm^2) when subjected to a twisting moment, produces maximum shear stress of 50 N/mm^2, the angle of twist in radians, is

(Option A) 0.001
(Option B) 0.002
(Option C) 0.0025
(Option D) 0.003

Q16. The strain energy stored in a spring when subjected to greatest load without being permanently distorted, is called

(Option A) Stiffness
(Option B) Proof resilience
(Option C) Proof stress
(Option D) Proof load

Q17. A simply supported beam which carries a uniformly distributed load has two equal overhangs. To have maximum B.M. produced in the beam least possible, the ratio of the length of the overhang to the total length of the beam, is

(Option A) 0.207
(Option B) 0.307
(Option C) 0.407
(Option D) 0.508

Q18. The ratio of maximum shear stress to average shear stress of a circular beam, is

(Option A) 2/3
(Option B) 3/2
(Option C) 3/4
(Option D) 4/3

Q19. At any point of a beam, the section modulus may be obtained by dividing the moment of inertia of the section by

(Option A) Depth of the section
(Option B) Depth of the neutral axis
(Option C) Maximum tensile stress at the section
(Option D) Maximum compressive stress at the section

Q20. If a concrete column 200 × 200 mm in cross-section is reinforced with four steel bars of 1200 mm^2 total cross-sectional area. Calculate the safe load for the column if permissible stress in concrete is 5 N/mm^2 and Es is 15 Ec

(Option A) 264 MN
(Option B) 274 MN
(Option C) 284 MN
(Option D) 294 MN

Q21. A simply supported rolled steel joist 8 m long carries a uniformly distributed load over it span so that the maximum bending stress is 75 N/mm^2. If the slope at the ends is 0.005 radian and the value of $E = 0.2 \times 10^6$ N/mm^2, the depth of the joist, is

(Option A) 200 mm
(Option B) 250 mm
(Option C) 300 mm
(Option D) 400 mm

Q22. Principal planes are subjected to

(Option A) Normal stresses only
(Option B) Tangential stresses only
(Option C) Normal stresses as well as tangential stresses
(Option D) None of these

Q23. The eccentricity (e) of a hollow circular column, external diameter 25 cm, internal diameter 15 cm for an eccentric load 100 t for non-development of tension, is

(Option A) 2.75 cm
(Option B) 3.00 cm
(Option C) 3.50 cm
(Option D) 4.25 cm

Q24. The radius of gyration of a section of area A and least moment of inertia I about the centroidal axis, is

(Option A) A/I
(Option B) I/A
(Option C) $\sqrt{I/A}$
(Option D) $\sqrt{A/I}$

Q25. The general expression for the B.M. of a beam of length l is the beam carries
M = (wl/2) x - (wx^2/2)

(Option A) A uniformly distributed load w/unit length
(Option B) A load varying linearly from zero at one end to w at the other end
(Option C) An isolated load at mid span
(Option D) None of these