Lecture No	Unit No	Name of the Topic
1	1	**Simple Stresses & Strains**: Elasticity and plasticity, Types of stresses & strains
2		Hooke's law, stress – strain diagram for mild steel
3		Working stress, Factor of safety
4		Lateral strain, Poisson's ratio & volumetric strain
5		Elastic moduli & the relationship between them
6		Bars of varying section, composite bars
7		Temperature stresses, Strain energy – Resilience
8		Gradual, sudden, impact and shock loadings
9	2	**Shear Force and Bending Moment** : Definition of beam – Types of beams
10		shear force and bending moment – S.F and B.M diagrams for cantilever, subjected to point loads, u.d.l., uniformly varying loads
11		shear force and bending moment – S.F and B.M diagrams for simply supported , subjected to point loads, u.d.l., uniformly varying loads
12		shear force and bending moment – S.F and B.M diagrams for overhanging beams subjected to point loads, u.d.l., uniformly varying loads
13		– Point of contra flexure – Relation between S.F., B.M and rate of loading at a section of a beam.
14	3	**Flexural Stresses** : Theory of simple bending – Assumptions – Derivation of bending equation: M/I = f/y = E/R-- Neutral axis
15		Determination bending stresses
16		section modulus of rectangular sections (Solid and Hollow), I,T, Angle and Channel sections
17		section modulus of circular sections (Solid and Hollow), I,T, Angle and Channel sections
18		Design of simple beam sections
19		Shear Stresses: Derivation of formula
20		Shear stress distribution across various beams sections like rectangular,
21		Shear stress distribution across various beams sections like circular
22		Shear stress distribution across various beams sections like triangular, I, T.
23		Shear stress distribution across various beams sections like angle sections
24	4	**Principal Stresses and Strains**: Introduction – Stresses on an inclined section of a bar under axial loading
25		compound stresses – Normal stresses on an inclined plane for biaxial stresses
26		tangential stresses on an inclined plane for biaxial stresses
27		Two perpendicular normal stresses accompanied by a state of simple shear
28		Mohr's circle of stresses

29		Principal stresses and strains – Analytical and graphical solutions.
30		Theories of Failure: Introduction – Various theories of failure
31		Maximum Principal Stress Theory,
32		Maximum Principal Strain Theory,
33		Strain Energy Theory
34		Shear Strain Energy Theory (Von Mises Theory
35	5	**Torsion of Circular Shafts** : Theory of pure torsion – Derivation of Torsion equations : T/J = q/r = Nθ/L –
36		Assumptions made in the theory of pure torsion –
37		Torsional moment of resistance
38		Polar section modulus
39		Power transmitted by shafts – Combined bending and torsion and end thrust.
40		– Design of shafts according to theories of failure
41		Thin Cylinders: Thin seamless cylindrical shells –
42		Derivation of formula for longitudinal and circumferential stresses
43		hoop, longitudinal and Volumetric strains –
44		changes in dia, and volume of thin cylinders–
45		Thin spherical shells

UNIT – I

Simple Stresses & Strains: Elasticity and plasticity – Types of stresses & strains–Hooke's law–stress – strain diagram for mild steel – Working stress – Factor of safety – Lateral strain, Poisson's ratio & volumetric strain – Elastic moduli & the relationship between them – Bars of varying section – composite bars – Temperature stresses. Strain energy – Resilience – Gradual, sudden, impact and shock loadings.

Learning objectives:

Student will be exposed:

- Mechanical properties of the materials
- Types of stresses and strains.
- Relationship between Constants of Moduli
- Stresses induced due to temperature
- Behavior of composite sections
- Behavior of compound bars
- Solve problems on simple stresses and strains.

Objective Questions

1. Every material obeys Hook's Law
   a) With in elastic limit
   b) Plastic limit
   c) Limit of proportionality
   d) None of the above

2. The material which have the same elastic properties in all the directions
   a) Isotropic
   b) Elastic
   c) anisotropic
   d) Brittle

3. The number of independent elastic constants for a linear elastic isotropic and homogeneous material is
   a) 4 b) 3[1] c) 2 d) 1

4. Poisson's ratio is defined as
   a) axial stress/lateral stress b) lateral stress/ axial stress c) axial strain/lateral strain d) lateral strain/axial strain

5. One Mpa is equal to
   a) 1 Newton per meter square b) 1 Newton per millimeter square c) 1 kilo-Newton per millimeter square d) 1 Newton –millimeter square

6. For a given material, If E,N and 1/m are Young's Modulus, Modulus of Rigidity and Poisson's ratio, then
   a) E = 2N (1+1/m) b) E = 2N (1-1/m)
   c) E = 2N /(1+1/m) d) E = 2N /(1-1/m)

7. For a given material, If E,K and 1/m are Young's Modulus, Bulk Modulus and Poisson's ratio, then
   a) K = E/3 (1+2/m) b) K = E/3 (1-2/m)
   c) K = E/3 (1+1/m) d) K = E/3 (1-2/m)

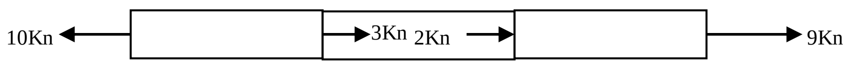
8. For a given material, If E,N,K and 1/m are Young's Modulus, Modulus of Rigidity Bulk Modulus and Poisson's ratio, then

a) E=9KN/3K+N b) 1/m = (3K-2N)/(6K+2N)
c) 1/m = (3K+2N)/(6K+2N) d) E=9KN/3K-N

9. If the value of the Poisson's ration is zero, then it means that
a) The material is rigid
b) The material is perfectly plastic
c) There is no longitudinal strain in the material
d) The longitudinal strain in the material is infinite

10. The values of the elastic Moduli are
a) E<N<K
b) N<K<E
c) K<N<E
d) K<E<

11. The total expansion of the bar loaded as shown in Fig is , A is cross sectional Area, E is Young's modulus and length of each bar is 30 cm.



a) 10X30/AE b) 26X30/AE c) 9X30/AE d) 30X22/AE

12. If a uniform bar is supported at one end in a vertical position and loaded only by Its own weight, the maximum stress occurs at
a) Bottom end b) Centre of bar c) at supported end

13. If a uniform bar is supported at one end in a vertical position and loaded at bottom end by a load equal to the weight of the bar, the elongation as compared to that of self weight will be
a) Same b) Twice c) 1.5 times d) Four times

14. If the radius of a wire stretched by a load is doubled then its modulus of elasticity will be
(a) Doubled (b) Halved (c) unaffected (d) Become four times

15. A copper bar is cooled to -50C ,it will develop
(a) Compressive stress (b) Tensile stress (c)Shear stress (d)Zero stress

16. A copper bar of circular cross section is heated and its expansion is constrained, it will develop
(a) Compressive stress (b) Tensile stress (c)Shear stress (d)Zero stress

17. Temperature stress is a function of
(a) modulus of elasticity (b) coefficient of linear expansion
(c) change in temperature (d) all the above

UNIT- II

Shear Force and Bending Moment : Definition of beam – Types of beams – Concept of All JNTU World shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, u.d.l., uniformly varying loads and combination of these loads – Point of contra flexure – Relation between S.F., B.M and rate of loading at a section of a beam

Learning objectives:

Student will be exposed:

- Internal forces developed due to transverse loads such as shear force and bending moment..
- Relationship between SF and BM and loading
- Draw SFD and BMD for cantilever beam with different loading cases
- Draw SFD and BMD for simply supported beam with different loading cases
- Draw SFD and BMD for overhanging beam with different loading cases
- Solve problems on determinate beams.

Objective Questions

1. A cantilever of span 'L' has a load 'P' acting at the free end. The bending moment at the free end will be
   a) 0 b) -PL
   c) PL d) PL/2

2. A cantilever of span 'L' has a load 'M' acting at the free end. The shear force at the free end will be
   a) 0 b) -ML
   c) ML d) M/L

3. A cantilever of span 'L' has a load 'M' acting at the free end. The shear force at the fixed end will be
   a) 0 b) -ML
   c) ML d) M/L

4. A simply supported beam of span 'L' carries a concentrated load 'W' at the centre, the B.M. at mid span will be
   a) WL/4 b) WL/2
   c) WL/8 d) WL

5. A simply supported beam of span 'L' is subjected to udl of w /m length, the maximum B.M at the centre will be
   a) $wl^2/8$ b) $wl^2/2$
   c) $wl^2/4$ d) $wl^2/6$

6. A simply supported beam carries two point loads of W each at L/4 from each support. Shear force at the mid-span will be.
   a) W b) W/2
   c) W/4 d) 0

7. A simply supported beam of span 'L' carries two point loads of W each at L/3 from each support, the bending moment at the mid span will be
   a) WL b) WL/2

c) WL/3 d) 0

8. Where the rate of loading is zero, the SF curve will be
   a) varying linearly b)constant ordinate
   c) varying as a parabolic curve.

9. If the intensity of loading is constant, the shear force will be
   a) varying linearly b)constant ordinate
   c) varying as a parabolic curve.

10. For the shear force to be uniform throughout the span of a simply supported Beam , it should carry
    a) concentrated load at mid-span b)u.d.l over its entire span
    c) two concentrated loads equally spaced d) a couple anywhere on its span

11. Area of the shear force diagram is equal to the
    a)B.M. at the point b) load at the point
    c) S.F. at the point d) maximum B.M. at the point.

12. The mid span moment for a simply supported beam of span 'L' subjected to uniformly varying load zero at the supports to maximum of w/m at the center of the span______________________________

13. The left half of a simply supported beam of span 'L' is loaded with UDL of w/m , the reaction at the right support will be ____________________________

14. The load on a cantilever of span 'L' varies from 0 at free end to 'w' at support, the maximum B.M. at support will be__________________________________

15. The B.M at a section is maximum where shearing force _____________________

16. A simply supported beam of length 3m carries a concentrated load of 12kN at a distance of 1m from left support. The maximum bending moment in the beam is______________________

17. The moment diagram for a cantilever subjected to bending moment at the free end is _____________________

18. Maximum bending moment in a simply supported beam carrying a point load "W" at a distance 'a' from one end of the span 'l' is _______________

19. A simply supported beam carries a couple at a point on its span, the shear force Is ______________________

20. Variation of bending moment in a cantilever carrying load , the intensity of which varies uniformly from zero at the free end to 'w' per unit run at the fixed end is ______________

UNIT – III

Flexural Stresses : Theory of simple bending – Assumptions – Derivation of bending equation: M/I = f/y = E/R Neutral axis – Determination bending stresses – section modulus of rectangular and circular sections (Solid and Hollow), I,T, Angle and Channel sections – Design of simple beam sections.

Shear Stresses: Derivation of formula – Shear stress distribution across various beams sections like rectangular, circular, triangular, I, T angle sections

Learning objectives:

Student will be exposed:

- Assumption made in theory of simple bending.
- Derive the equation of simple bending
- Variation of bending stress across the section of the beam
- Section modulus of the beam
- Design of section subjected to bending moment
- Solve the problems on bending stresses
- Equation for shear stress distribution across the section
- Pure shear / complementary shear stress
- Shear stress across various cross sections
- Solve problems on shear stress distribution

Objective Questions

1. The intensity of direct longitudinal stress in the cross –section at any point 'y' from the neutral axis for simple bending is proportional to
   a) 'y' b)1/y c)$1/y^2$ d)d/y

2. A cantilever beam is loaded transversely , the maximum tensile stress develops at
   a) top fiber b) neutral axis c) bottom fiber

3. Section modulus 'Z' of a hollow circular section with external diameter 'D' and internal diameter 'd' will be
   a) $Z = \pi (D^4-d^4) /32$ b) $Z = \pi (D^4-d^4) /32D$
   c) $Z = \pi (D^4-d^4) /32d$ d) $Z = \pi (D^3-d^3) /32$

4. Moment of inertia of triangular section with base as 'b' and height 'h' about base will be
   b) $bh^3/3$ b)$hb^3/3$ c)$bh^3/12$ d)$bh^3/36$.

5. Neutral axis of a beam is the axis at which
   c) The shear force is zero (b) the moment of inertia is zero (c) the bending stress is zero (d) the bending stress is maximum

6. The equation for simple bending, if 'M' is B.M. , 'p' is stress at a distance 'y' from N.A., 'I' is Moment of inertia and 'E' is Young's modulus
   a)M/I = E/R = p/y b) M/I = E/R = y/p c) M/I = R/E = p/y d) M/I = R/E =y/p

7. A rectangular beam of depth'd' and breadth 'b' is to be cut from a circular log of diameter 'D' . Find the ratio of depth to breadth for the straight section in bending.
   a)d/b = 2 b)d/b = $\sqrt{2}$ c) b/d = $\sqrt{2}$ d)d/b=1

8. for rectangular section, keeping depth 'd' constant the breadth 'b' for uniform strength beam will have relation with bending moment 'M' as
   a) $b \alpha \sqrt{M}$ b) $b \alpha M$ c) $b \alpha 1/\sqrt{M}$ d) $b \alpha 1/M$

10. In the simple bending of beams the stress in the beam varies

a) Linearly (b) as parabolic curve (c) hyperbolically (d) elliptically

11. Neutral axis of a beam is the axis at which

a) The shear force is zero (b) The moment of inertia is zero

(c) The bending stress is zero (d) The bending stress is maximum

12. In a rectangular section of depth 'd' and breadth 'b' the maximum shear stress 'τ' at N.A. , for shear force 'F' will be __________________

12. In a circular section of diameter 'd' the maximum shear stress 'τ' at N.A. , for shear force 'F' will be_______________________

13. A T- section is used as a simply supported beam with uniform loading. The maximum bending stresses for a given load will occur at ____________________

15 A T- section is used as a simply supported beam with uniform loading. The maximum shear stresses for a given load will occur at _________________________

16. The ratio of the flexural strengths of two beams of square cross-section, the first beam being placed with its top and bottom sides horizontally and the second beam being placed with one diagonal horizontally is ______________

17. The shear stress distribution over a rectangular cross –section of a beam follows ____________________________

18. In a beam of I section , the maximum shear stress is carried by ____________

19.Maximum shear stress in a rectangular beam occurs at ____________

UNIT –IV

Principal Stresses and Strains: Introduction – Stresses on an inclined section of a bar under axial loading – compound stresses – Normal and tangential stresses on an inclined plane for biaxial stresses – Two perpendicular normal stresses accompanied by a state of simple shear – Mohr's circle of stresses – Principal stresses and strains – Analytical and graphical solutions.

Theories of Failure: Introduction – Various theories of failure - Maximum Principal Stress Theory, Maximum Principal Strain Theory, Strain Energy and Shear Strain Energy Theory (Von Mises Theory).

Learning objectives:

Student will be exposed:

- Complex stresses
- Normal and tangential stresses on inclined plane for uni- axial stress
- Normal and tangential stresses on inclined plane for bi-axial stress
- Normal and tangential stresses on inclined plane for plane stress
- Principle stresses and Principle planes
- Mohr's stress circle
- Various theories of failures
- Design of sections according to theories of failures.

<u>Objective Questions</u>

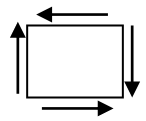
1) If σ is the normal stress due to a force on a normal cross –section the normal stresses on a plane inclined θ^o to the direction of the force will be
   a) $\sigma \cos^2\theta$ b) $\sigma \cos^2\theta/2$ c) $\sigma \sin\theta\cos\theta$ d) $\sigma \sin2\theta$

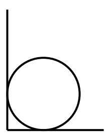
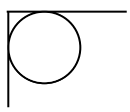
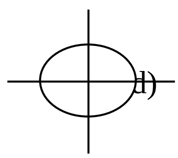
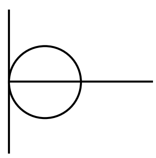
2) If σ is the normal stress due to a force on a normal cross –section the maximum shear stresses on a plane inclined 45^o to the direction of the force will be
   a) σ b) σ c) σ/2 d) σ sinθ

3) If block is subjected to pure shear τ , normal stress on an inclined plane making angle θ with the normal to the cross-section will be
   a) $\tau \sin^2 \theta$ b) $\tau \cos2\theta$ c) $\tau \sin2\theta$

4) Principal stresses at a point in a plane stresses element are $\sigma_x = \sigma_{y.} = 500kg/cm^2$, Normal stress on the plane inclined at 45^0 to x- axis will be
   a) 0 b) 500 kg/cm^2 c) 707 kg/cm^2 d)1000 kg/cm^2

5) State of stress in a plane element is shown in fig. which one of the following figures is the correct sketch of Mohr's circle of the state of stress.



a)  b)  c)  d) 

6) If a concrete cube submerged deep in still water in such a that the pressure exerted on all faces of the cube is 'P' , then the maximum shear stress developed inside the cube is.
   a) 0 b) p/2 c) p d) 2p.

7) The state of plane stress at a point is described by $\sigma_x = \sigma_{y.} = \sigma$ and $\tau_{xy} = 0$. The normal stress on the plane inclined as 45^0 to the x – plane will be

a) σ b) √2 σ c) √3 σ d) 2 σ

8) In a uni-dimensional stress system, the principle plane is defined as one on which the
1) shear stress is zero 2)normal stress is zero
3)shear stress is maximum 4)normal stress is maximum

a) 1 and 2 are correct b) 2 and 3 are correct
c)1 and 4 are correct d) 3 and 4 are correct

9) A Mohr's circle reduces to a point when the body is subjected to
a)pure shear b)uni-axial stress only
c)equal and opposite axial stress on two mutually perpendicular planes, the planes being free of shear
d)equal axial stresses on two mutually perpendicular planes, the planes being free of shear.

10) If the principal stresses corresponding to a two dimensional state of stresses are $\sigma_1 = \sigma_2$ and σ_1 is greater than σ_2 and both are tensile then which one of the following would be the correct criterion for failure by yielding according to the maximum shear stress theory.
a) $(\sigma_1 – \sigma_2) / 2 = \sigma_{yp} / 2$ b) $\sigma_1 / 2 = \sigma_{yp} / 2$ c) $\sigma_2 / 2 = \sigma_{yp} / 2$ d) $\sigma_1 = \sigma_{yp}$

11) Maximum principle stress theory is postulated by ____________________

12) Maximum strain energy theory is postulated by_______________________

13) Maximum shear stess theory is postulated by _______________________

14) The shear stress on the principal plane is ________________________

15) If a body is acted upon by pure shear stresses on two perpendicular planes, the planes inclined at 45^0 are subjected to no ________________stress.

16) In a Mohr's circle , the radius gives the value of _________________________

UNIT –V

Torsion of Circular Shafts : Theory of pure torsion – Derivation of Torsion equations : T/J = q/r = Nθ/L – Assumptions made in the theory of pure torsion – Torsional moment of resistance – Polar section modulus – Power transmitted by shafts – Combined bending and torsion and end thrust – Design of shafts according to theories of failure.

Thin Cylinders: Thin seamless cylindrical shells – Derivation of formula for longitudinal and circumferential stresses – hoop, longitudinal and Volumetric strains – changes in dia, and volume of thin cylinders– Thin spherical shells

Learning objectives:

Student will be exposed:

- Understand the assumptions made in pure torsion
- Derive the torisonal formula
- Power transmitted by the shaft
- Stress distribution across the cross section
- Torsional rigidity
- Design of sections subjected to torsion
- Types of springs , uses and their application
- Springs in series parallel
- Solve problems on torsion and springs.

Objective Questions

1) Magnitude of shear stress induced in a shaft due to applied torque varies from
   a) maximum at centre to zero at circumference
   b) maximum at centre o minimum (not zero) at circumference
   c) zero at centre to maximum at circumference
   d) minimum at centre to maximum at circumference

2) The variation of shear stress in a circular shaft subjected to torsion is
   a) Linear b) parabolic c) hyperbolic d) uniform

3) Torsional rigidity of a shaft is defined as
   a)G/J b) GJ c) TJ d)T/J

4) Torsional rigidity of shaft is given by
   a) GI/θ b) T θ c) Tl/ θ d) T/l

5) Angle of twist of circular shaft is given by
   a) GJ/TL b)TL/GJ c)TJ/GL d)TG/JL

6) Maximum shear stress of solid shaft is given by
   a) $16T/\pi d$ b) $16T/\pi d^2$ c) $16T/\pi d^3$ d) $16T/\pi d^4$

7) The ratio of maximum bending stress to maximum shear stress on the cross-section when a shaft is simultaneously subjected to a torque 'T' and bending moment M is
   a) T/M b)M/T c)2t/M d)2M/T

8) Maximum shear stress in a hollow shaft is subjected to a Torsional moment is at the
   a) middle of thickness b) at the inner surface of the shaft
   c) at the outer surface of the shaft d) none of the above

9) The ratio of the strength of a hollow shaft to that of a solid shaft subjected to torsion , if both are of the same material and of the same outer diameters , the inner diameter of hollow shaft being half the outer diameter is
   a)15/16 b) 16/15 c) 7/8 d) 8/7

10) The maximum twisting moment 'T' a shaft can resist is proportional to product of the permissible shear stress and
   a) Moment of Inertia b) Polar Moment of Inertia
   c) Modulus of rigidity.

11) The ratio of Torsional moment resisted by a solid shaft of diameter 'D' and hollow shaft of external diameter 'D' and internal diameter 'd' is equal to
   a) $D^4/(D^4-d^4)$ b) $D^3/(D^3-d^3)$ c) $(D^4-d^4)/ D^4$

12) If a solid shaft is subjected to a torque 'T' at its end such that maximum shear stress is not to exceed τ , the diameter of the shaft
   a) $16T / \pi (\tau)$ b) $\sqrt{}(16T / \pi (\tau)$ c) $^3\sqrt{}(16T / \pi (\tau)$

13) The deflection of closely coiled helical spring under an axial load is given by
   a) WR^3n/Gr^4 b) $2WR^3n/Gr^4$ c) $4WR^3n/Gr^4$ d) $8WR^3n/Gr^4$

14) Shear stress in a closed-coiled helical spring under an axial load is

a) $8WD/\pi d^3$ b) $4WD/\pi d^3$ c) $8WD/\pi d^2$ d) $16WD/\pi d^3$

15) The predominant effect of an axial tensile force on a helical spring is
a) bending b) tension c) compression d)twisting

16) The equivalent stiffness of two springs joined in series is
a) $S = S_1S_2/S_1+S_2$ b) $S = S_1/S_2/(S_1+S_2)$ c) $S = S_1 + S_2$ d) $S = S_1S_2$

17) The equivalent stiffness of two springs joined in parallel
a) $S = S_1S_2/S_1+S_2$ b) $S = S_1/S_2/(S_1+S_2)$ c) $S = S_1 + S_2$ d) $S = S_1S_2$

18) The angle of twist of a closely coiled helical spring under an axial torque is
a)$32TDn/Ed^4$ b)$64TDn/Ed^4$ c)$64Tdn/ED^4$ d)$32Tdn/ED^4$

19) Maximum stress in a flat spiral spring is given by
a)$12T/bt^3$ b)$12T/b^2t$ c)$12T/bt^2$ d)$T/12bt^2$

20) Widely used springs in the automobile industry are
a) flat spiral spring b) leaf spring
c) closely coiled helical spring d) open-coiled helical spring

21) Proof load in a leaf spring is
a) $8nbt^3Ey/3l^3$ b) $3nbtEy/3l^3$ c) $8nbt^2Ey/3l^2$ d) $3nbt^3Ey/8l$

22) The central deflection of a leaf spring is
a) $3Wl^2/8nbt^2E$ b) $8Wl^3/3nbt^3E$ c) $8Wl^2/3nbt^2E$ d) $3Wl^3/8nbt^3E$

23) Leaf spring are subjected to
a) tensile stress b)compressive stress c)shear stress d)bending stress.

Learning objectives:

Student will be exposed:

- Hoop and longitudinal stress in thin Cylinders
- Hoop and longitudinal stress in shell
- Volumetric Strain in thin cylinders
- Power transmitted by the shaft
- Various of hoop and radial stress in case of thick cylinders
- Derive Lame's equation
- Solve problems on thin and thick cylinders.

Objective Questions

1. For a thin pressure vessel the ratio of the wall thickness to the mean radius should be less than ______________________.

2. The hoop stress in a thin cylinder of mean radius R wall thicknes h under pressure p is given by _____________________.

3. The longitudinal stress in a thin cylinder of mean radius R , wall thickness h under pressure p is given by __________.

4. In a thin cylinder pressure vessel the ratio of hoop to longitudinal stress is __________________.

5. The maximum shear stress in a thin cylindrical pressure vessel of mean radius R and wall thickness h under pressure p is ____________________.

6. The volumetric strain in a cylindrical pressure vessel is________.

   (a)σΘ (5-2v) / E (b) σΘ (5-v) / E (c) σΘ (2.5-v) / E (d) σΘ (2.5-2v) / E

7. The hoop stress in athin spherical pressure vessel of mean radius R, wall thickness h under pressure p is given by__________.

   (a)pR / h (b) pR / 2h (c) pR /4 h (d) 4pR / h

8. The volumetric strain in a thin spherical pressure vessel is

   (a) 3σΘ (1-2v) / E (b) 3σΘ (1-v) / E (c) σΘ (1-2v) / 3E (d) σΘ (1-v) /2 E

9. When a thin cylinder is wound with a wire under tension the hoop stress in the cylinder shall be

   (a) Tensile in nature (b) compressive in nature

   (c) bending in nature (d) zero

10. The ratio of the hoop stresses in a thin spherical pressure vessel and a thin cylindrical pressure vessel of same mean radii , wall thickness and same internal pressure is

    (a)1 (b) 2 (c)1/2 (d) 14

11. For a thick pressure vessel the ratio of the wall thickness to mean radius should be

    (a) Less than 1/15 (b) equal to 1/15

(c) more than 1/15 (d) more than 1/20

12. The maximum hoop stress in a thick pressure vessel under internal pressure occurs

(a) At the outside surface (b) at mid thickness

(c) at the inside surface (d) at the root-mean square radius

13. Compound cylinders are used to

(a) Increase the wall thickness (b) Increase the strength of cylinder

(c) Increase its diameter (d) make the stress distribution more uniform

14. When a wire is wound over a thick cylinder the nature of the hoop stress in the cylinder is

(a) Tensile (b) shear (c) bending (d) compressive

15. In a force fitted shaft the radial and hoop stresses every where in the shaft are

(a) Zero (b) equal to each other (c) constant (d) unpredictable

16. The distribution of stresses in a thick spherical shell are

(a) Uniform in nature (b) linear in nature

(c) parabolic in nature (d) cubic in nature

17. Graphical method for thick cylinders was developed by ________________.

18. The variation of the radial stress in a thick cylindrical pressure vessel's path is_____________.

19. The variation of the hoop stress in a thick cylindrical pressure vessel's path is_________