BRAINWARE UNIVERSITY
Term End Examination 2020 - 21
Programme – Diploma in Mechanical Engineering
Course Name – Advanced Strength of Materials
Course Code - DME301
Semester / Year - Semester III

Time allotted : 75 Minutes Full Marks : 60

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A

(Multiple Choice Type Question) 1 x 60=60

1. *(Answer any Sixty)*

(i) Strain energy is the

a) energy stored in a body when strained within elastic limits
b) energy stored in a body when strained upto the breaking of a specimen
c) maximum strain energy which can be stored in a body
d) proof resilience per unit volume of a material

(ii) If P is the stress and E is the modulus of elasticity , resilence is equal to

a) P2/2E
b) P2/2E x volume
c) P2/E
d) none of these

(iii) In a strain materials , strain energy

a) 1/2x stress x strain x volume
b) 1/2x stress x strain
c) 1/3x stress x strain x volume
d) None of these

(iv) Modulus of resilinence the ratio of ________

a) Minimum stain energy and unit volume
b) Maximum stain energy and unit volume
c) Proof resilience unit volume
d) Proof resilience unit area

(v) Strain energy stored in uniform bar is given as ______________

a) ?E/2A
b) ?2AL/2E

c) ?/2A   d) ?/4A

(vi) What is the proof resilience of a square bar of 2500 mm2 and 200 mm long, when a load of150 kN is induced gradually? Take E = 150 x 103 Mpa)

a) 45 J   b) 8 J

c) 5.3 J   d) 6 J

(vii) The capacity of a strained body for doing work on the removal of the straining force, is called

a) Strain energy   b) Resilience

c) Proof resilience   d) Impact energy

(viii) Resilience is

a) Strain energy per unit length   b) Strain energy per unit area

c) Strain energy per unit volume   d) none of these

(ix) Equation of total strain energy is

a) (?2/2E) x area   b) ?2/2E) x volume

c) (?2/2E) x length   d) none of these

(x) Modulus of resilience is

a) Resilience   b) Proof residence

c) Toughness   d) none of these

(xi) The shape of area of the Strain energy up to the elastic limit is

a) Parabola   b) Rectangle

c) Square   d) none of these

(xii) The graphical method of Mohr's circle represents shear stress (?) on __

a) X-axis   b) Y-axis

c) Z-axis   d) none of these

(xiii) The maximum tangential stress ?t = (?x sin 2?)/2 is maximum if, ? is equal to _________

a) 45o b) 90o

c) 270o d) All of these

(xiv) A complementary shear stress is equal in magnitude and opposite in rotational tendency of an applied

a) Tensile stress b) Compressive stress

c) Shear stress d) none of these

(xv) Mohr' s circle is a graphical method to find

a) Bending stresses b) Bucking stresses

c) Maximum shear stresses d) none of these

(xvi) A steel bar of 5 mm is heated from 15° C to 40° C and it is free to expand. The bar Will induce

a) No stress b) shear stress

c) Tensile stress d) compressive stress

(xvii) Thermal stress is not a function of ______

a) change in temperature b) coefficient of linear expansion

c) modulus of elasticity d) none of these

(xviii) If the thickness of plate is negligible when compared to the diameter of the cylindrical, then it is called ___________

a) Thick cylinder b) Thin cylinder

c) Hoop cylinder d) Circumferential cylinder

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(xx) Oil tanks, steam boilers, gas pipes are examples of ______________

a) Thick shells b) Thin cylinders

c) Hoop cylinders d) Longitudinal cylinders

(xxi) The neutral axis of the cross-section a beam is that axis at which the bending stress is

a) zero b) minimum

c) maximum d) infinity

(xxii) If the coiled spring is cut into two halves ,defection of the spring will be

a) Half b) Double

c) The same as before d) quadruple

(xxiii) In a closed coiled helical spring , mature of stress set up is

a) Bending stress b) Tensile stress

c) Shear stress d) Compressive stress

(xxiv) Torsional strain energy in a close coiled helical spring is

a) F2\4G x V b) F2s\2G x V

c) 4Fs2\4G x V d) none of these

(xxv) Three coiled springs having stiffness k1 ,k2 and k3 are joined is parallel. K is their equivalent stiffness . then

a) K=K1+K2+K3 b) 1\K=K1+K2+K3

c) 1\K=1\K1+1\K2+1\K3 d) none of these

(xxvi) The shear stress set up in follow shaft due to torsion varies from

a) Zero at the inner surface to maximum at the outer surface

b) Zero at the centre to maximum at the outer surface.

c) Minimum at the inner surface to maximum at the outer surface.

d) none of these

(xxvii) For the same power transimitted

a) The weight of the solid shaft is less then that of the hollow shaft

b) The weight of the hollow shaft is less then of the solid shaft

c) The weight of the both shaft will be the same

d) none of these

(xxviii) Torsional rigidity of a shaft is

a) GD

b) G?

c) GJ

d) GT

(xxix) In shaft coupling, bolt used are subjected to

a) only shear stress

b) only crushing stress

c) both only shear stress and only crushing stress

d) none of these

(xxx) Shaft coupling is used transmit

a) Axial thrust from one shaft to another

b) Torque from one shaft to another co-axial ahaft

c) Power of one shaft to another co-axial shaft

d) Both Axial thrust from one shaft to another and Torque from one shaft to another co-axial ahaft

(xxxi) Moment of resistance of a beam

a) Is equal to safe maximum bending moment to which it can be subjected

b) Is equal to any bending moment to which it is subjected

c) Is equal to or less than maximum bending moment to which it is subjected

d) Is equal to or more than maximum bending moment to which it is subjected

(xxxii) In a strained materials shear stress is zero:

a) Along the principal planes
b) Along any oblique section of the body
c) Along normal to the oblique section
d) none of these

(xxxiii) Angle between the principal planes and plane of maximum shear stress is :

a) 90 degree
b) 45 degree
c) 12 degree
d) none of these

(xxxiv) Section modulus of a beam is always given by formula

a) ?d^3/32
b) bd^2/6
c) I/y(max)
d) I/y

(xxxv) A spring used to absorb shocks and vibrations is

a) Close-coil helical spring
b) Open coiled helical spring
c) Spiral spring
d) Leaf spring

(xxxvi) The laminated springs are given initial curvature

a) To have uniform strength
b) To make it more economical
c) So that plates may become flat, when subjected to design load
d) None of these

(xxxvii) The close-coiled helical springs ‘A’ and ‘B’ are of same material, same coil diameter, same wire diameter and subjected to same load. If the number of turns of spring ‘A’ is half that of spring ‘B’, the ratio of deflection of spring ‘A’ to spring ‘B’ is

a) 1
b) 5
c) 2
d) 4

(xxxviii) A close –coiled helical spring is cut into two equal parts. The stiffness of the resulting springs will be

a) same
b) double
c) half
d) One-fourth

(xxxix) The equivalent spring constant is

a) 20 N/mm
b) 30 N/mm
c) 45 N/mm
d) 90 N/mm

(xl) If a close-coiled helical spring absorbs 50 N-mm of energy while extending by 5 mm, its stiffness will be

a) 2 N/mm
b) 4 N/mm
c) 6 N/mm
d) 10 N/mm

(xli) In power transmission equation, P=2?NT/60×1000

a) P is in kw and T is maximum torque
b) P is in NM/sec and T is maximum torque
c) P is in NM/sec and T is mean torque
d) P is in kw and T is mean torque

(xlii) Two shafts in torsion will have equal strength if

a) Only diameter of the shafts is same
b) Only angle of twist of the shaft is same
c) Only material of the shaft is same
d) Only torque transmitting capacity of the shaft is same

(xliii) Which of the following is incorrect?

a) In torsion equation, we use mean torque
b) In torsion equation, we use maximum torque
c) Many shafts are designed under combined bending and torsion load
d) Shafts are also designed for torsional rigidity

(xliv) Where, T=Torque, ?=Angle of twist, Ip = Polar moment of inertia, C=Shearing modulus of elasticity/Column length

a) T/?
b) C?
c) CIp
d) ?

(xlv) For same length, same material, same length

a) Weight of solid shaft is less than weight of hollow shaft
b) Weight of solid shaft is more than weight of hollow shaft
c) Weight of hollow and solid shafts will be same
d) Sometime more sometime less

(xlvi) For two shafts in parallel or for two concentric shafts
a) T = T1 + T2
b) T = T1 = T2
c) T = T1 – T2
d) T = (T1.T2)^1/2

(xlvii) If depth of a beam is doubled then changes in its section modulus
a) Will remain same
b) Will decrease
c) Will be doubled
d) Will increase by 4 times

(xlviii) In a general two dimensional stress system, there are
a) Two principal planes
b) Only one plane
c) Three principal planes
d) No principal plane

(xlix) In a general two dimensional stress system, planes of maximum shear stress are inclined at ___ with principal planes.
a) 90 degree
b) 180 degree
c) 45 degree
d) 60 degree

(l) Angle of obliquity is defined as
a) Angle between the plane on which stresses are evaluated and one of the given planes
b) Angle between resultant stress and the plane of given normal stress
c) Angle between resultant stress and shear stress
d) Angle between resultant stress and normal stress

(li) Mohr's stress circle is named so because it has equation of the form
a) x^2 + y^2 = r^2
b) (x-a)^2 + y^2 = r^2
c) (x-a)^2 + (y-b)^2 = r^2
d) It was desired by German Engineer Otto

Mohr

(lii) In Mohr’s circle of strain, y-axis represents

a) Shear strain
b) Half of shear strain
c) Normal strain
d) Half of normal strain

(liii) Which of the following stresses can be determined using Mohr's circle method?

a) Torsional stress
b) Bending stress
c) Principal stress
d) All of these

(liv) The graphical method of Mohr's circle represents shear stress (?) on _______

a) X-axis
b) Y-axis
c) Z-axis
d) none of these

(lv) In Mohr's circle method, compressive direct stress is represented on _____

a) positive x-axis
b) positive y-axis
c) negative x-axis
d) negative y-axis

(lvi) What is the value of shear stress acting on a plane of circular bar which is subjected to axial tensile load of 100 kN? (Diameter of bar = 40 mm , ? = 42.3o)

a) 58.73 Mpa
b) 40.23 Mpa
c) 39.60 Mpa
d) Insufficient data

(lvii) Minor principal stress has minimum _________

a) value of shear stress acting on the plane
b) intensity of direct stress
c) both value of shear stress acting on the plane and intensity of direct stress
d) none of these

(lviii) In simply supported beams, the ______ stress distribution is not uniform.

a) Bending
b) Shearing
c) Tensile
d) Compressive

(lix) The curvature of a beam is equal to ______

a) EI/M
b) M/E
c) M/EI
d) E/MI

(lx) Skin stress is also called as _______

a) Shear stress
b) Bending stress
c) Lateral stress
d) Temperature stress