BRAINWARE UNIVERSITY
Term End Examination 2020 - 21
Programme – Diploma in Civil Engineering
Course Name – Mechanics of Structure
Course Code - DCE304
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) The dimension of strain is?

    a) LT-2   b) N/m2

    c) N   d) Dimensionless

(ii) Find the strain of a brass rod of length 250mm which is subjected to a tensile load of 50kN when the extension of rod is equal to 0.3mm?

    a) 0.025   b) 0.0012

    c) 0.0046   d) 0.0014

(iii) A tensile test was conducted on a mild steel bar. The diameter and the gauge length of bat was 3cm and 20cm respectively. The extension was 0.21mm. What is the value to strain?

    a) 0.001   b) 0.00105

    c) 0.0105   d) 0.005

(iv) A tensile test was conducted on a steel bar. The gauge length of the bar was 10cm and the extension was 2mm. What will be the percentage elongation?

    a) 0.002   b) 0.02

    c) 0.2   d) 2

(v) The unit of force in S.I. units is ?

a) Kilogram

b) Newton

c) Watt

d) Dyne

(vi) A solid cube is subjected to equal normal forces on all its faces. The volumetric strain will be x-times the linear strain in any of the three axes when?

a) X=1

b) X=2

c) X=3

d) X=4

(vii) Which law is also called as the elasticity law?

a) Bernoulli's law

b) Stress law

c) Hooke's law

d) Poisson's law

(viii) The materials which have the same elastic properties in all directions are called _____

a) Isotropic

b) Brittle

c) Homogenous

d) Hard

(ix) What kind of elastic materials are derived from a strain energy density function?

a) Cauchy elastic materials

b) Cauchy elastic materials

c) Hyper elastic materials

d) None of the mentioned

(x) The slope of the stress-strain curve in the elastic deformation region is _____

a) Elastic modulus

b) Plastic modulus

c) Poisson's ratio

d) None of the mentioned

(xi) Which point on the stress strain curve occurs after the proportionality limit?

a) Upper yield point

b) Lower yield point

c) Elastic limit

d) Ultimate point

(xii) Which point on the stress strain curve occurs after yield plateau?

    a) lower yield point   b) Upper yield point

    c) Ultimate point   d) Breaking point

(xiii) Elastic limit is the point _____

    a) up to which stress is proportional to strain   b) At which elongation takes place without application of additional load

    c) Up to which if the load is removed, original volume and shapes are regained   d) None of the mentioned

(xiv) The axis about which moment of area is taken is known as _____

    a) Axis of area   b) Axis of moment

    c) Axis of reference   d) Axis of rotation

(xv) What is MOI?

    a) ml2   b) mal

    c) ar2   d) None of the mentioned

(xvi) Example for cantilever beam is _____

    a) Portico slabs   b) Roof slab

    c) Bridges   d) Railway sleepers

(xvii) U.D.L stands for?

    a) Uniformly diluted length   b) Uniformly developed loads

    c) Uniaxial distributed load   d) Uniformly distributed loads

(xviii) Continuous beams are _____

    a) Statically determinate beams   b) Statically indeterminate beams

    c) Statically gravity beams   d) Framed beams

(xix) Shear force is unbalanced _____ to the left or right of the section.

a) Horizontal force

b) Vertical force

c) Inclined force

d) Conditional force

(xx) Shear force is diagram is _____ representation of shear force plotted as ordinate

a) Scalar

b) Aerial

c) Graphical

d) Statically

(xxi) SI units of Bending moment is _____

a) kN

b) kN2

c) kNm

d) km

(xxii) What is the strain energy stored in a body due to gradually applied load?

a) ?E/V

b) ?E2/V

c) ?V2/E

d) ?V2/2E

(xxiii) In a material of pure shear stress ?the strain energy stored per unit volume in the elastic, homogeneous isotropic material having elastic constants E and v will be:

a) ?2/E x (1+ v)

b) ?2/E x (1+ v)

c) ?2/2E x (1+ v)

d) ?2/E x (2+ v)

(xxiv) A rectangular block of size 400mm x 50mm x 50mm is subjected to a shear stress of 500kg/cm2. If the modulus of rigidity of the material is 1×106 kg/cm2, the strain energy will be _____

a) 125 kg-cm

b) 1000 kg-cm

c) 500 kg-cm

d) 100 kg-cm

(xxv) If forces P, P and P of a system are such that the force polygon does not close, then the system will _____

a) Be in equilibrium

b) Reduce to a resultant force

c) Reduce to a couple

d) Not be in equilibrium

(xxvi) A bar of cross-section A and length L is subjected to an axial load W. the strain energy stored in the bar would be _____

a) WL / AE

b) W2L / 4AE

c) W2L / 2AE

d) W2L / 2AE

(xxvii) What is the ratio of Youngs modulus E to shear modulus G in terms of Poissons ratio?

a) 2(1 + ?)

b) 2(1 – ?)

c) 1/2 (1 – ?)

d) 1/2 (1 + ?)

(xxviii) Youngs modulus of elasticity and Poissons ratio of a material are 1.25 x 102 MPa and 0.34 respectively. The modulus of rigidity of the material is

_____

a) 0.9469 MPa

b) 0.8375 MPa

c) 0.4664 MPa

d) 0.4025 MPa

(xxix) If a material had a modulus of elasticity of 2.1 kgf/cm2 and a modulus of rigidity of 0.8 kgf/cm2 then what will be the approximate value of the Poissons ratio?

a) 0.26

b) 0.31

c) 0.47

d) 0.43

(xxx) What is the relationship between the linear elastic properties Youngs modulus, bulk modulus and rigidity modulus?

a) 1/E = 9/k + 3/G

b) 9/E = 3/K + 1/G

c) 3/E = 9/K + 1/G

d) 9/E = 1/K + 3/G

(xxxi) What is the moment of inertia of a circular section?

a) ?D4/64

b) ?D3/32

c) ?D3/64

d) ?D4/32

(xxxii) What is the moment of inertia of a rectangular section about an horizontal axis passing through base?

    a) bd3/12   b) bd3/6

    c) bd3/3   d) bd2/3

(xxxiii) What is the moment of inertia of a triangular section about an axis passing through C.G. and parallel to the base?

    a) bh3/12   b) bh3/24

    c) bh3/36   d) bh3/6

(xxxiv) The slope is denoted by _____

    a) k   b) y

    c) i   d) c

(xxxv) In cantilever beams, the slope is _____ at fixed end.

    a) Maximum   b) Zero

    c) Minimum   d) Uniform

(xxxvi) At _____ the shearing stress in a beam are maximum.

    a) Extreme fibres   b) Modulus of section

    c) Neutral axis   d) Along the cross-sectional area

(xxxvii) The maximum shear stress is _____ times the average shear stress [For rectangular beams].

    a) 2.5   b) 3

    c) 1.2   d) 1.5

(xxxviii) Shear stress distribution over rectangular section will be _____

    a) parabolic   b) elliptical

    c) riangular   d) trapezoidal

(xxxix) Maximum shear stress in thin cylindrical shell be _____

    a) pr/2t   b) pr/3t

    c) pr/4t   d) pr/ 5t

(xl) A simple support offers only _____ reaction normal to the axis of the beam.

    a) Horizontal   b) Vertical

    c) Inclined   d) Moment

(xli) For a simply supported beam, the moment at the support is always _____

    a) Maximum   b) Zero

    c) Minimum   d) Cannot be determined

(xlii) Hinged supports offers vertical and _____ reaction.

    a) Horizontal   b) Moment

    c) Rotation   d) Couple

(xliii) The rate of change of shear force is equal to _____

    a) Direction of load   b) Change in BMD

    c) Intensity of loading   d) Maximum bending

(xliv) In SFD, vertical lines are for _____

    a) Point loads   b) UDL

    c) UVL   d) LDP

(xlv) A simply supported beam of span 1 m carries a point load "w" in centre determine the shear force in the half left of the beam.

    a) W/3   b) W/4

    c) W/2   d) W

(xlvi) Bending moment in a beam is maximum when the _____

    a) Shear force is minimum   b) Shear force is maximum

    c) Shear force is zero   d) Shear force is constant

(xlvii) A simply supported beam of span "x" meters carries a udl of "w" per unit length over the entire span, the maximum bending moment occurs at _____

    a) At point of contra flexure   b) Centre

    c) End supports   d) Anywhere on the beam

(xlviii) Bending moment can be denoted by _____

    a) K   b) M

    c) N   d) F

(xlix) Sagging, the bending moment occurs at the _____ of the beam.

    a) At supports   b) Mid span

    c) Point of contraflexure   d) Point of emergence

(l) The relation between slope and maximum bending moment is _____

    a) Directly proportion   b) Directly proportion

    c) Relative proportion   d) Mutual incidence

(li) If a beam is subjected to pure bending, then the deformation of the beam is_____

    a) Arc of circle   b) Triangular

    c) Trapezoidal   d) Rectangular

(lii) Curvature of the beam is _____ to bending moment.

    a) Equal   b) Directly proportion

    c) Inversely proportion   d) Coincides

(liii) _____ of column mainly depends upon end conditions.

a) Radius of gyration

b) Slenderness ratio

c) Factored load

d) Effective length

(liv) Long columns fail due to _____
a) Direct stress

b) Buckling stress

c) Lateral stress

d) Tensile stress

(lv) Which of the following is also known as the working load?
a) Safe load

b) Crippling load

c) Ultimate load

d) Buckling load

(lvi) The value of _____ is relatively high for short columns.
a) Safe load

b) Factored load

c) Working load

d) Buckling load

(lvii) For a given material length, end conditions and equal area the shape of the column which is most efficient as per Euler's is _____
a) Square

b) Circular

c) I section

d) Tubular

(lviii) A circular rod of dia 30 mm and length 200mm is extended to 0.09mm length and 0.0045 diameters through a tensile force. What will be its Poissons ratio?
a) 0.3

b) 0.31

c) 0.32

d) 0.33

(lix) What is the bulk modulus of elasticity?
a) The ratio of shear stress to shear strain

b) The ratio of direct stress to direct strain

c) The ratio of volumetric stress to volumetric strain

d) The ratio of direct stress to volumetric strain

(lx) Determine the Poissons ratio and bulk modulus of a material, for which Youngs modulus is 1.2 and modulus of rigidity is 4.8.

a) 7

b) 8

c) 9

d) 10