

PARUL UNIVERSITY
FACULTY OF AGRICULTURE
B.Tech. (Agriculture) Winter 2019 - 20 Examination

Semester: 2

Subject Code: 20103156

Subject Name: Engineering Mechanics and Strength of Materials

Date: 16/12/2019

Time: 10.30 am to 12.30 pm

Total Marks: 50

Instructions

1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

Q.1**A) Fill in the blanks (Each of 0.5 Mark)****(05)**

- 1 For simply supported beam B.M. is _____ at the support.
- 2 Stiffness factor for a beam fixed at one end and freely supported at the other is _____.
- 3 The CG of a solid circular cone divides the axis in the ratio _____.
- 4 The strength of welded joints equal to _____.
- 5 The slenderness ratio of long column is _____.
- 6 The value of Rankine's constant for mild steel is _____.
- 7 100 mm = _____ μm .
- 8 If three coplanar non-parallel forces are in equilibrium, then they must be _____.
- 9 Moving train is an example of _____ load.
- 10 In a riveted joint, when the number of rivets decreases from the innermost to the outer most rows, the joint is said to be _____.

B) Multiple Choice Questions (Each of 0.5 Mark)**(10)**

- 1 A long vertical member, subjected to an axial compressive load is called

(a) a column	(b) a strut
(c) a tie	(d) a stanchion
- 2 A column is said to be medium size if its slenderness ratio is between

(a) 20 and 32	(b) 32 and 120
(c) 120 and 160	(d) 180 and 200
- 3 Strain is defined as the ratio of

(a) change in volume to original volume	(b) change in length to original length
(c) change in cross-sectional area to original cross-sectional area	(d) any one of the above
- 4 If equal and opposite forces applied to a body tend to elongate it, the stress so produced is called

(a) internal resistance	(b) tensile stress
(c) transverse stress	(d) compressive stress
- 5 Which of the following has no unit

(a) kinematic viscosity	(b) surface tension
(c) bulk modulus	(d) strain

- 6 Unit of point load is
 (a) KN/m (b) KN. m
 (c) KN.m² (d) KN
- 7 Shear force for a cantilever carrying U.D.L over its length is
 (a) triangle (b) rectangle
 (c) parabola (d) cubic parabola
- 8 Struts are load carrying members of a frame structure which are subjected to
 (a) axial tension loads (b) axial tension loads
 (c) axial compressive loads (d) torsional loads
- 9 For structural analysis of forces, the method refers to
 (a) moment area method (b) three moment equation
 (c) Maxwell's reciprocal method (d) none of above
- 10 The number of point of contra flexure in a simple supported beam carrying uniformly distributed load is
 (a) 1 (b) 2
 (c) 3 (d) 0
- 11 The main types of butt joints is a double cover
 (a) Shear riveted joint (b) chain riveted joint
 (c) zig zag riveted joint (d) all of above
- 12 The gross diameter of a rivet is the diameter of
 (a) Cold rivet before driving (b) rivet after driving
 (c) rivet hole (d) none of above
- 13 Hooke's law holds good up to
 (a) yield point (b) limit of proportionality
 (c) breaking point (d) elastic limit
- 14 When one plate overlaps the other and both plates are riveted with two rows of rivets, the joint is known as
 (a) Single riveted lap joints (b) Double riveted lap joints
 (c) Double riveted single cover butt joints (d) Double riveted double cover butt joints
- 15 A riveted joint may fail due to
 (a) Shearing of rivets (b) Crushing of rivets
 (c) Tearing of the plates (d) All of these
- 16 The effective thickness of a fillet weld is
 (a) 0.5S (b) 0.6S
 (c) 0.7S (d) 0.8S
- 17 The strength of welded joint depends upon
 (a) The length of welds (b) Size of welds
 (c) Stress of weld (d) All of these
- 18 A column of length l is hinged at its both ends. Its equivalent length will be equal to
 (a) $2 \times l$ (b) l
 (c) $0.5 \times l$ (d) $0.707 \times l$
- 19 Fixing moment over a simply supported end is
 (a) Zero (b) Negative
 (c) Positive (d) infinity
- 20 Stiffness factor for beam simply supported at both end is
 (a) $3EI/l$ (b) $4EI/l$
 (c) EI/l (d) $6EI/l$

Q.2

A) Define the following (Any five out of seven questions) (05)

- (1) Find out the degree of indeterminacy of fixed beam and propped cantilever beam.
- (2) Define sway frame.
- (3) Define column.
- (4) Which method is more accurate to find out fixed end moment?
- (5) Enlist the various types of weld.
- (6) Define moment of inertia?
- (7) Enlist the various types of forces acting on masonry dam.

B) Answer the following (Any five out of seven questions) (05)

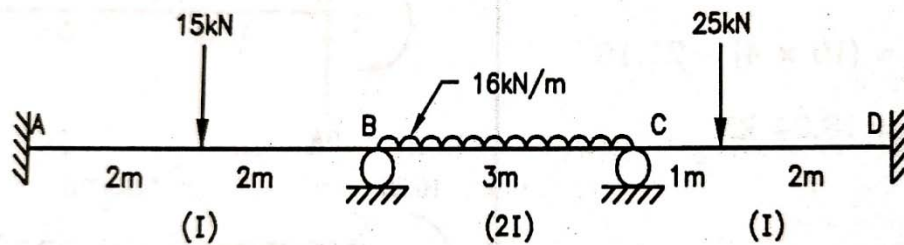
- (1) Define distribution factor.
- (2) What is Euler's formula?
- (3) Explain the term stiffness.
- (4) Define carry over moment.
- (5) Define strut.
- (6) Define fixed end moments.
- (7) Define the stability term.

Q.3 Write Short notes (Any five out of six questions) (10)

- (1) Explain the advantages and disadvantages of indeterminate structure.
- (2) Give the advantage and disadvantage of welded joints.
- (3) Write Short note of slenderness ratio.
- (4) Describe the common types of riveted joints.
- (5) Differentiate between long columns and short columns.
- (6) Differentiate between statically determinate structure and statically indeterminate structure.

Q.4 Long Questions (Any three out of four questions) (15)

- (1) Analyse the beam as shown in figure by moment distribution method and draw bending moment diagram.



- (2) Explain the design criteria of wall with opening.
- (3) A continuous beam ABC has span $AB = BC = 6$ m carries an U.D.L. of 12 kN/m over entire span AB, while span BC carries a central point load of 36 kN. Figure. Draw the Shear force and bending moment diagram by the three moment equation.
- (4) A simply supported beam having span of 9 m carries two point loads 210 kN & 125 kN at 2m & 6m from left supports. The self-weight of the beam is 26 kN/m. Determine maximum slope and deflection at the centre by using double integration techniques. Consider EI is constant.