

THE MAHARAJA SAYAJIRAO UNIVERSITY OF BARODA, VADODARA

Ph. D. ENTRANCE TEST (PET) – 27th January 2019

Signature of Invigilators

Applied Mechanics And
Structural Engineering
(19/33)

Roll. No.

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(in figures as in Hall Ticket)

Roll No. _____

(in words)

Maximum Marks: 50

No. Of Printed Pages : 8

Instruction for the Candidate:

1. Write your Roll Number in the space provided on the top of this page.
2. This paper consists of **FIFTY (50)** multiple choice type questions. Each Question carries **ONE (1)** mark.
3. At the commencement of examination, the question booklet will be given to you. In the first 5 minutes, you are requested to open the booklet and compulsorily examine it as below:
 - a. To have access to the Question Booklet, tear off the paper seal on the edge of this cover page, Do not accept a booklet without sticker seal and do not accept an open booklet.
 - b. Tally the number of pages and number of questions in the booklet with the information printed on the cover page. Faculty booklets due to pages/questions missing or duplicate or not in serial order or any other discrepancy should be got replaced immediately by a correct booklet from the invigilator within the period of 5 minutes. Afterwards, neither the Question Booklet will be replaced nor any extra time will be given.
 - c. After this verification is over, the Test Booklet Number should be entered on the OMR Answer Sheet and the OMR Answer Sheet Number should be entered on this Test Booklet.
4. Each item has four alternative responses marked (A), (B), (C) and (D). You have to darken the circle as indicated below on the correct response against each item.

Example: (A) ● (C) (D) where (B) is correct response.
5. Your responses to the items are to be indicated on the OMR Answer Sheet under Paper – II only. If you mark your response at any place other than in the circle in the OMR Answer Sheet, it will not be evaluated.
6. Read instructions given inside carefully.
7. Rough Work is to be done in the end of this booklet.
8. If you write your Name, Roll Number, Phone Number or put any mark on any part of the OMR Answer Sheet, except for the space allotted for the relevant entries, which may disclose your identity, or use abusive language or employ any other unfair means, such as change of response by scratching or using white fluid, you will render yourself liable to disqualification.
9. You have to return the original OMR Answer Sheet to the invigilator at the end of the examination compulsorily and must not carry it with you outside the Examination Hall. You are however, allowed to carry original question booklet and duplicate copy of OMR Answer Sheet on conclusion of examination
10. Use only Blue/ Black Ball point pen.
11. Use of any calculator or log table etc., is prohibited.
12. There shall be no negative marking.

Applied Mechanics And Structural Engineering
(19/33)

Note: This paper contains **FIFTY (50)** multiple-choice questions. Each Question carries **ONE (1)** mark.

- 01) The resultant of the coplaner-concurrent force system is calculated by the equation _____.
- A) $\sqrt{\sum Fx^2 + \sum Fy^2}$
B) $\sqrt{\sum Fx^2 - \sum Fy^2}$
C) $\sum Fx + \sum Fy$
D) None of the above
- 02) The direction of the resultant and equilibrant force for the coplaner concurrent force system is always _____.
- A) same
B) different
C) zero
D) opposite.
- 03) An inclined ladder having self weight (w) kg/mt which is contact with vertical wall and horizontal surface. The total number of reactions developed at contact points are _____.
- A) 1
B) 3
C) 0
D) 4
- 04) _____ is used for calculating forces in space truss structures.
- A) Tension compression method
B) Tension coefficient method
C) Tension section method
D) None of above all
- 05) The SI unit of force is _____.
- A) Pound
B) Newton
C) Dyne
D) Joule
- 06) The resultant of two forces P and Q which are acting along straight line in same direction is _____.
- A) $2P - Q$
B) $2P + 2Q$
C) $P + Q$
D) $P - Q$
- 07) The point at which the area of 2D plane is concentrated is known as _____.
- A) Centre of gravity
B) Centre of mass
C) Centre of weight
D) Centre of curvature
- 08) The forces which meets at one point and having their line of action are in different planes are called as _____.
- A) Coplaner non-concurrent forces.
B) Non coplanar concurrent forces
C) Coplaner concurrent forces
D) None of the above
- 09) Speed of moving body is _____ quantity.
- A) Vector
B) Scaler
C) Unitless
D) None of the above.
- 10) In case of Mild steel under tensile loading, the Hooke's law holds good upto _____.
- A) Elastic Limit
B) Plastic limit
C) Breaking point
D) Yield point.
- 11) The impact strength of material is an index of its _____.
- A) Toughness
B) Tensile strength
C) Poisson's ratio
D) Fatigue strength
- 12) The change in unit volume of the material under tension with increae in poisson's ratio will _____.
- A) Increased
B) Decreased
C) No change
D) Unpredictable
- 13) Diamond riveting can be adopted in case of _____.
- A) Butt joint
B) Lap joint
C) Double riveted lap joint
D) None of the above

- 14) The rivets are manufactured from _____ material.
- Tough
 - Hard
 - Resilient
 - Ductile
- 15) The value of poisson's ratio for mild steel is _____
- 0.01 – 0.1
 - 0.23 -0.27
 - 0.25 – 0.33
 - 0.4 to 0.6
- 16) Deformation per unit length volume in the direction of the forces is known as _____.
- Strain
 - Lateral Strain
 - Linear Strain.
 - Unit strain
- 17) The material is having different elastic properties in all orthogonal direction are called as _____.
- Homogeneous
 - Isotropic
 - Anisotropic
 - Orthotropic
- 18) The distance between the centre of rivets in adjacent rows of zig-zag riveted joint is known as _____.
- Pitch
 - Back pitch
 - Diagonal pitch
 - Lap.
- 19) A cantilever beam is subjected to M_0 anticlockwise at free end which having _____ displacement.
- Downward
 - Upward
 - Zero
 - None of the above.
- 20) An intersection of two tangents drawn on deflection pattern for simply supported beam gives us point of _____ deflection
- Zero
 - Minimum
 - Maximum
 - Upward.
- 21) _____ is used to calculate slope at free end of 2D cantilever bent.
- Portal method
 - Cantilever method
 - Unit load method
 - Moment Area method.
- 22) The influence line diagram for vertical members is pratt trussed bridge can be evaluated by using _____ aspect.
- Bending
 - Shear
 - Torsion
 - Axial
- 23) The angle β with respect to x-x axis in unsymmetrical bending theory gives value of _____.
- Neutral axis
 - Principal axis
 - Zero shear axis
 - Zero moment axis.
- 24) The crane hook which is subjected to lifting load in gravity direction having _____ stresses at inner surface.
- Tensile
 - Compressive
 - Shear
 - Torsional
- 25) The two span continuous beam can be analysed by using _____ method.
- Moment area.
 - Portal method.
 - Clayereon's three moment
 - Conjugate beam.
- 26) The generalized deflection pattern for the fixed beam loaded with downward is having _____ points of contraflexures on deflection pattern.
- 3
 - 0
 - 2
 - 1

- 27) The propped cantilever beam which is subjected to uniformly distributed loading (q) kN/m can be analysed by using _____.
- A) Castigliano's second theorem
 B) Unit load method
 C) Portal method
 D) Moment area method.
- 28) The lateral stiffness of cantilever beam, which is _____ simply supported beam.
- A) Higher than
 B) Equals to
 C) Less than
 D) None of them above.
- 29) The rotational stiffness of beams are inversely proportional to _____.
- A) EI
 B) Rotation
 C) Loading
 D) Span
- 30) The carry over moment for simply supported beam is equals to _____.
- A) Double the acting moment
 B) Half of acting moment
 C) Zero
 D) None of them above.
- 31) The moment distribution method is based on ____.
- A) Iterative approach
 B) Double integration
 C) Finite Difference method
 D) None of the above
- 32) The pulley system of the cable stayed bridge for supporting anchor cable is having equal tension in the main cable on both side of supporting pier.
- A) True
 B) False
 C) Both of the above
 D) None of the above
- 33) The $(3\delta/L)$ component in slope deflection equation for continuous beam contributes ____ components.
- A) Moment
 B) Shear
 C) Rotation
 D) Support settlement
- 34) In the flexibility method, the structure should be made _____.
- A) Stable and determinate
 B) Unstable and indeterminate
 C) Stable and determinate
 D) Unstable and determinate
- 35) The joint in space truss having _____ displacements.
- A) 1
 B) 2
 C) 3
 D) None of them above
- 36) The forces acting on Web splices in plate girder is of _____ in nature.
- A) Axial
 B) Shear and Axial
 C) Shear and Bending
 D) None of them above.
- 37) _____ Rolled sections are preferably used at places where larger torsion induced.
- A) Angle
 B) Channel
 C) Box
 D) All of the above.
- 38) The allowable shear stresses in the web of mild steel beam decreases with _____.
- A) Decreases h/t ratio
 B) Increases h/t ratio
 C) Decreases thickness t
 D) Increases height h .
- 39) The cold driven rivets are ranging from _____.
- A) 6mm to 10mm in diameter
 B) 10mm to 16mm in diameter
 C) 12mm to 22mm in diameter
 D) 22mm to 32mm in diameter.
- 40) 40. The maximum area of tension reinforcement in RCC beam shall not exceed _____.
- A) 0.15%
 B) 1.5 %
 C) 4 %
 D) 1%

- 41) The intensity of active earth pressure at a depth of 10 metres in dry cohesionless sand with an angle of internal friction of 30° and with a weight of 1.8 t/m^3 , is _____.
- A) 4 t/m^2
 B) 5 t/m^2
 C) 6 t/m^2
 D) 7 t/m^2
- 42) The soil moisture driven off by heat, is called as _____.
- A) Free water
 B) Hygroscopic water
 C) Gravity water
 D) None of these
- 43) Plasticity index is defined as the range of water content between _____.
- A) Liquid and plastic limit
 B) Plastic limit and semi solid limit
 C) Semi-solid limit and liquid limit
 D) Liquid limit and solid limit
- 44) Bishop's _____ method of stability analysis _____.
- A) Is more conservative
 B) Neglects the effect of forces acting on the sides of the slices
 C) Assumes the slip surface as an arc of a circle
 D) All of the above
- 45) You are given a sample of soil containing coarse grains to determine its water content, you will use _____.
- A) Pycnometer
 B) Oven-drying method
 C) Calcium carbide method
 D) Alcohol method
- 46) The angle between the directions of the failure and the major principal plane, is equal to _____.
- A) $90^\circ +$ effective angle of shearing resistance
 B) $90^\circ +$ half of the angle of shearing resistance
 C) $45^\circ -$ half of the angle of shearing resistance
 D) $45^\circ +$ half of the angle of shearing resistance
- 47) In active state of plastic equilibrium in a non-cohesive soil with horizontal ground surface _____.
- A) Major principal stress is horizontal
 B) Minor principal stress is vertical
 C) Major principal stress is vertical
 D) Minor and major principal stresses are equally inclined to horizontal
- 48) Residual soils are formed by _____.
- A) Glaciers
 B) Wind
 C) Water
 D) None of the above
- 49) A soil not fully consolidated under the existing over-burden pressure, is called _____.
- A) Pre-consolidated
 B) Normally consolidated
 C) Over-consolidated
 D) None of these
- 50) Pick up the correct statement from the _____.
- A) Illite bond is weaker than Kaolinite bond
 B) Illite bond is stronger than montmorillonite bond
 C) Illite does not swell when wet
 D) All the above
- *****

Rough Work:

