Signature of Invigilator

Paper - II

Applied Mechanics and Structural Engineering (22/33)

Roll. No.

_____

Maximum Marks: 50

No. Of Printed Pages: 8

Instruction for the Candidate:

1. This paper consists of **FIFTY (50)** multiple choice type questions. Each Question carries **ONE (1)** mark.
2. There is no Negative Marking for Wrong Answer.
3. A separate OMR Answer Sheet has been provided to answer questions. Your answers will be evaluated based on your response in the OMR Sheet only. No credit will be given for any answering made in question booklet.
4. Defective question booklet or OMR if noticed may immediately replace by the concerned invigilator.
5. Write roll number, subject code, booklet type, category and other information correctly in the OMR Sheet else your OMR Sheet will not be evaluated by machine.
6. Select most appropriate answer to the question and darken appropriate oval on the OMR answer sheet, with black / blue ball pen only. DO NOT USE PENCIL for darkening. In case of over writing on any answer, the same will be treated as invalid. Each question has exactly one correct answer and has four alternative responses (A), (B), (C) and (D). You have to darken the circle as indicated below on the correct response against each item.

   Example: Ⓐ ● Ⓒ Ⓓ where (B) is correct response.
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. Calculators, Log tables any other calculating devices, mobiles, slide rule, text manuals etc are NOT allowed in the examination hall. If any of above is seized from the candidates during examination time; he/ she will be immediately debarred from the examination and corresponding disciplinary action will be initiated by the Center Supervisor as deemed fit.
10. DO NOT FOLD or TEAR OMR Answer sheet as machine will not be able to recognize torn or folded OMR Answer sheet.
11. **You have to return the 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 on conclusion of examination.

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

01) According to law of transmissibility of forces, effect of force upon a body is
   A) Maximum when it acts at center of gravity of body
   B) Different at different points in its lines of action
   C) The same along its line of action
   D) Minimum when it acts at C.G. of the body

02) If the forces are in a same plane but not meeting or originating from the same point, the system is called
   A) Coplanar non concurrent
   B) Non coplanar concurrent
   C) Non concurrent
   D) Non coplanar

03) Truss members are assumed to be connected by
   A) Fixed connection
   B) Friction hinges
   C) Rollers
   D) Friction less hinges

04) Square root of moment of inertia divided by area of the section gives
   A) Mass moment of inertia
   B) Radius of gyration
   C) Area of the section
   D) Polar moment of inertia

05) Frictional force depends upon
   A) Contact area between two surfaces
   B) Roughness between two contact surfaces
   C) Dimension of the two bodies
   D) Inclination between two surfaces

06) Self-weight of a beam with uniform cross section area can be considered as
   A) Point load
   B) Uniformly distributed load
   C) Uniformly varying load
   D) Couple forces

07) Position of a resultant force can be evaluated by
   A) Lami's theorem
   B) Law of transmissibility
   C) Varignon's principle
   D) Parallel axis theorem

08) Uniformly distributed load of 20 kN/m over entire span having length 10 m of simply supported beam, maximum shear force is
   A) 150 kN
   B) 200 kN
   C) 50 kN
   D) 100 kN

09) For a cantilever beam subjected to transverse load
   A) Bending moment and shear force is always the maximum at the fixed end
   B) Bending moment and shear force is always the minimum at the fixed end
   C) Bending moment and shear force is always the maximum at the free end
   D) Bending moment and shear force is always the minimum at the free end

10) For a cantilever beam subjected to transverse load
   A) Deflection is maximum at fixed end and slope of the curvature is maximum at the free end
   B) Deflection and slope of the curvature is always maximum at the fixed end
   C) Deflection and slope of the curvature is always the maximum at the free end
   D) Deflection and slope of the curvature is always the minimum at the free end

11) Slenderness ratio of a 5 m long column hinged at both the ends and having a solid circular cross section with diameter 16 cm. is
   A) 31.25
   B) 61.25
   C) 100
   D) 125

12) Euler's formula can be applied to
   A) Only for long column
   B) Only for short column
   C) Only for medium column
   D) Any type of column

13) Web of I section used as a beam contributes mainly to resist
   A) Tensile stress
   B) Direct and bending stress
   C) Shear stress
   D) Bending stress

14) Proof Resilience is
   A) Maximum strain energy stored at elastic limit
   B) Maximum strain energy stored after elastic limit
   C) Maximum strain energy stored at failure
   D) Maximum strain energy stored during yielding

15) Most of the real-world civil engineering structures are _____.
   A) Statically Determinate
   B) Statically indeterminate
   C) Unstable
   D) Virtual

[P. T. O.]

16) Degree of static indeterminacy for a propped cantilever beam subjected to only vertical loads is _____.
   A) 1
   B) 2
   C) 0
   D) 4

17) Minimum_____ reaction components needs to be removed to convert a fixed beam subjected to only vertical loads into a determinate structure.
   A) 1
   B) 2
   C) 3
   D) 4

18) Principle of superposition is applicable, if _____
   A) Deflections are linear function of applied forces
   B) Material obeys hook's law
   C) Applied forces produce only small deformations
   D) Structural geometry is symmetric

19) A cantilever beam subjected to a load 'P' at the free end produces vertical deflection 'x'. The same beam when subjected to load 'Q' produces a vertical deflection 'y'at the free end. Thus, the same beam, if subjected to load 'P + Q' will develop a vertical deflection of _____.
   A) x - y
   B) x + y
   C) 2x + y
   D) cannot calculate

20) The theorem of threemoments is applicable to continuous beam, only if ___.
   A) Beam is prismatic
   B) Supports having settlement
   C) Beams having internal hinges
   D) All spans are equal

21) In a statically determinate truss, the relation between number of members (M) and number joints (J) is _____.
   A) M = 2J+3
   B) M = 2J+1
   C) M = 2J-3
   D) M = 2J

22) A complete definition of building materials is _____.
   A) Substance which cannot be utilized in the construction of a structure
   B) Substance that is utilized in the construction of a structure
   C) Substance that is utilized in the manufacturing of construction material
   D) Substance used for protection of the structures

23) The process of adding water in lime to convert into hydrated lime is termed as _____.
   A) Watering
   B) Baking
   C) Hydration
   D) Slaking

24) The high strength steel tendons are used to prestressconcrete beamsin _____.
   A) Compression.zone
   B) Tension zone
   C) Mid span region
   D) End region.

25) The initial deflection in the structures is always due to _____.
   A) Self-weight
   B) Wind load
   C) Imposed load
   D) Yemperature load

26) A fliched beam is designed on the basis that _____ remain same for both materials.
   A) Stress
   B) Strain
   C) Section modulus
   D) Young's modulus

27) The usual admixtures added in wet concrete for ready mix concrete (RMC) is to _____.
   A) Increase strength
   B) Increase workability
   C) Get smooth surface
   D) Delay initial setting time of concrete.

28) In pert chart activity, the activity time distribution is_____.
   A) Normal
   B) Binomial
   C) Poisson
   D) Beta

29) In Limit State Method (LSM), the safety factors are applied to _____.
   A) Loads
   B) Material stress
   C) Loads and material stresses
   D) Section properties

30) The effective slenderness ratio for steel design of single angle strut is given by ____ .
   A) $\left[k_1 + k_2\lambda_{vv}^2 + k_3\lambda_\phi^2\right]^{1/2}$
   B) $k_1 + k_2\lambda_{vv} + k_3\lambda_\phi$
   C) $\left[\lambda_{vv}^2 + \lambda_\phi^2\right]^{1/2}$
   D) $k_1\lambda_\phi + k_2\lambda_{vv}$

31) In block shear failure, tension member fails due to
    _____ .
    A) Tension
    B) Shear
    C) Shear and tension
    D) Torsion

32) AS per IS800:2007, the effective length of a prismatic compression member having rotation restrained and translation free at both ends in terms of actual length L is
    A) 2L
    B) 1L
    C) 1.2L
    D) 0.85L

33) For a column subjected to axial compression and bending moment the preferred foundation type shall be
    A) Slab base
    B) Beam base
    C) Gusseted base
    D) Fixed base

34) According to Indian standard failure stress in shear is
    _____ .
    A) $s_y/2$
    B) $s_y/3$
    C) $s_y/$

45) Increasing the path of percolation, reducing the seepage, providing the graded filter, increasing the effective stress etc. are the methods of
   A) Preventing piping failure
   B) Reducing bearing pressure
   C) Increasing upward thrust of water
   D) Preventing failure due to sloughing

46) The stresses on a horizontal plane due to self-weight of over lying soil is called as
   A) Stress isobar
   B) Preconsolidation pressure
   C) Genuine vertical stress
   D) Geostatic stress

47) A soil which is subjected to greater pressure in the past compared to present pressure is known as
   A) Under consolidated soil
   B) Normally consolidated soil
   C) Over consolidated soil
   D) Dynamic soil

48) The curves indicating distribution of excess hydrostatic pressure on a section at a particular time is known as
   A) Pore pressure residuals
   B) Isochrones
   C) Consolidation trajectories
   D) Tortiosity

49) $^{\circ}$ is subjected to allround confining pressure of 100 kPa then value of major principal stress at failure would be
   A) 100 kPa
   B) 200 kPa
   C) 300 kPa
   D) 400 kPa

50) Mohr-Coulomb failure theory ignores the effect of
   A) Intermediate principal stress
   B) Neutral stress
   C) Shear stress
   D) Major principal stress

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Rough Work: