MIZORAM PUBLIC SERVICE COMMISSION

TECHNICAL COMPETITIVE EXAMINATIONS FOR RECRUITMENT TO JUNIOR GRADE OF MIZORAM ENGINEERING SERVICE (CIVIL) CONTRACT UNDER DISASTER MANAGEMENT & REHABILITATION DEPARTMENT, JANUARY 2015.

CIVIL ENGINEERING
PAPER - I

Time Allowed : 2 hours Full Marks : 200

All questions carry equal marks of 2 each.

Attempt all questions.

1. A natural material of construction obtained from rocks by any suitable method is called
(a) Bricks (b) Stone
(c) Timber (d) Iron

2. Which of the following bricks is not affected by acidic or basic action?
(a) Chromite bricks (b) Sand-lime bricks
(c) Silica bricks (d) Magnesia bricks

3. The weight of common bricks varies from
(a) 1200 to 1400 kg/m^2 (b) 1400 to 1600 kg/m^2
(c) 1600 to 1920 kg/m^2 (d) 2000 to 2400 kg/m^2

4. The maximum percentage of water absorption of 1st class bricks in 24 hrs should be limited to
(a) 10% (b) 15%
(c) 20% (d) 24%

5. Plastics which become rigid when moulded at suitable pressure and temperature are
(a) Monomers (b) Thermo-plastics
(c) Heterogeneous plastics (d) Thermo-setting plastics

6. In the foundation of abutments or dams, most suitable cement is
(a) Ordinary portland cement (b) Rapid hardening cement
(c) High alumina cement (d) Low heat portland cement

7. The minimum water-cement ratio required for making concrete workable is
(a) 0.4 (b) 0.5
(c) 0.6 (d) 0.8

8. A load bearing partition wall is called
(a) Curtain wall (b) Separating wall
(c) Internal wall (d) Faced wall

9. Uniform seasoning of wood is done by
(a) Vapour seasoning (b) Water seasoning
(c) Electric seasoning (d) Kiln seasoning

10. The standard size of a masonry brick is

(a) 18 cm×8 cm×8 cm
(b) 19 cm×9 cm×9 cm
(c) 20 cm×10 cm×10 cm
(d) 21 cm×11 cm×11 cm

11. A timber board used to hold the common rafter forming verge is called

(a) Hip
(b) Barge
(c) Eaves
(d) Spars

12. For one cubic metre of brick masonry, number of bricks is

(a) 400
(b) 450
(c) 500
(d) 550

13. Which of the following is method of damp proofing in a building construction?

(a) Rendering
(b) Plastering
(c) Cavity wall
(d) Peeling

14. The worst fire resisting building material among the following is

(a) Stone
(b) Bricks
(c) Concrete
(d) Gypsum

15. Age of a tree can be ascertained by its

(a) Radius of its stem
(b) Circumference of its stem
(c) Number of branches
(d) Number of annual rings

16. Plywood has the advantage of

(a) Greater tensile strength in longer direction
(b) Greater tensile strength in shorter direction
(c) Same tensile strength in all directions
(d) None of these

17. Expansion joints in masonry walls are provided in wall lengths greater than

(a) 10 m
(b) 20 m
(c) 30 m
(d) 40 m

18. The type of roof suitable in plains where rainfall is meagre and temperature is high is

(a) Pitched and sloping roof
(b) Flat roof
(c) Shell roof
(d) None of these

19. Minimum width of landing in a building should be

(a) Equal to width of stairs
(b) Half the width of stairs
(c) Twice the width of stairs
(d) One fourth the width of stairs

20. Concept of Floor Area Ratio (FAR) is to control

(a) Number of building floors
(b) Total plinth area of a building
(c) Uneconomical use of plot area
(d) Over crowding in dewelling units

21. Which of the following affects grandeur and solemnity in a building?

(a) Flexibility
(b) Ceiling height
(c) Roominess
(d) Daylighting

22. The minimum number of holdfasts recommended on each side of a door frame and a window frame respectively are

(a) 2 and 1
(b) 3 and 2
(c) 2 and 2
(d) 2 and 3

23. Side face reinforcement shall be provided in the beam when depth of web in a beam exceeds
    (a) 50 cm
    (b) 75 cm
    (c) 100 cm
    (d) 120 cm

24. For RCC work on water retaining structure, the grade of concrete mix used is generally
    (a) 1:1.5:3
    (b) 1:3:6
    (c) 1:2:4
    (d) 1:3:4

25. Magnitude of minimum reinforcement recommended for reinforced concrete using mild steel in slabs/ columns are
    (a) 0.15%/0.60%
    (b) 0.25%/0.80%
    (c) 0.50%/1.00%
    (d) 0.15%/0.80%

26. The lateral ties in a reinforced concrete rectangular column under axial compression are used to
    (a) Avoid buckling of the longitudinal steel under compression
    (b) Provide adequate shear capacity
    (c) Provide adequate confinement to concrete
    (d) Reduce the axial deformation of the column

27. The RCC structure design philosophy which is based on elastic theory is
    (a) Classical elasticity method
    (b) Working stress method
    (c) Ultimate load method
    (d) Limit state method

28. Form works shall not be released until the concrete has achieved a strength of
    (a) One-half the stress to which it may be subjected to at the time of removal
    (b) Equal to the stress to which it may be subjected to at the time of removal
    (c) Twice to the stress to which it may be subjected to at the time of removal
    (d) None of these

29. As a general guidance, the maximum permissible free fall of concrete while placing may be taken as
    (a) 1.5 m
    (b) 2.0 m
    (c) 2.5 m
    (d) 2.8 m

30. Steel is preferred as reinforcing material in concrete because
    (a) It is easily available
    (b) It is the cheapest and good in strength
    (c) The co-efficient of thermal expansion of steel and concrete is almost same
    (d) It forms a good bond

31. When RCC beam is subjected to bending and the topmost layer elongates and the bottom one shortens, then that beam is called
    (a) Fixed beam
    (b) Simply supported beam
    (c) Doubly reinforced beam
    (d) Cantilever beam

32. As per I.S 456 recommendations, the thickness of footing edge on soils should not be less than
    (a) 10 cm
    (b) 12 cm
    (c) 15 cm
    (d) 20 cm

33. Counterfort RCC retaining wall is generally constructed when height of the earth to be retained exceeds

(a) 3 m
(b) 8 m
(c) 6 m
(d) 10 m

34. The minimum clear cover (in mm) to the main steel bars in RCC slab, beam, column and footing respectively are

(a) 0, 15, 20, 25
(b) 15, 25, 40, 75
(c) 20, 25, 30, 40
(d) 20, 35, 40, 75

35. For a slab to act as T-beam or L-beam, if the main re-inforcement of the slab is parallel to the beam, the minimum transverse re-inforcement required is

(a) 30% of the main re-inforcement at mid span of the slab
(b) 40% of the main re-inforcement at mid span of the slab
(c) 50% of the main re-inforcement at mid span of the slab
(d) 60% of the main re-inforcement at mid span of the slab

36. The maximum distance between bars in tension in slab is

(a) Three times the effective depth or 300 mm whichever is smaller
(b) Three times the effective depth or 300 mm whichever is greater
(c) Five times the effective depth or 450 mm whichever is smaller
(d) Five times the effective depth or 450 mm whichever is greater

37. With the usual meaning, the minimum tension re-inforcement in beams shall be

(a) 0.85 fy/bd
(b) 0.85 bd/fy
(c) 0.85 fy/b^2d
(d) 0.85 bd^2/fy

38. The type of weld used for joining two surfaces approximately at right angles to each other is known as

(a) Fillet weld
(b) U groove weld
(c) Double V groove weld
(d) Single J butt weld

39. The allowable shear stress in the web of mild steel beams decreases with

(a) Decrease in h/t ratio
(b) Increase in h/t ratio
(c) Decrease in thickness
(d) Increase in height

40. Bolts are used in place of rivets where

(a) The structure is not subjected to vibration
(b) The structural section is heavy
(c) The load is beyond the capacity of rivets
(d) The size of the rivet required is big

41. The effective length of fillet weld is equal to

(a) The overall length
(b) The overall length plus throat thickness
(c) The overall length minus throat thickness
(d) The overall length minus twice the weld size

42. A short angle section used at a joint to connect the outstanding leg of a member is

(a) Gusset (b) Lug

(c) Splice (d) Plate

43. In a built-up compression member, Lacing is generally preferred to batten where

(a) There is eccentric load (b) There is no eccentricity

(c) Greater strength is needed (d) Components are not far apart

44. Principal rafter of a roof truss is subjected to

(a) Compression and also shear and bending (b) Tension and also shear and bending

(c) Compression and shear (d) Tension and bending

45. The main reason for providing number of reinforcing bars at a support in a simply supported beam is to resist in that zone

(a) Compressive stress (b) Shear stress

(c) Bond stress (d) Tensile stress

46. Minimum pitch of the rivets shall not be less than

(a) 1.5d (b) 2.0d

(c) 2.5d (d) 3.0d

47. A steel column splice is used to increase

(a) Length of the column (b) Strength of the column

(c) Cross-sectional area of the column (d) None of these

48. The distance between c.g of compression and tension flanges of a plate girder is known as

(a) Overall depth (b) Clear depth

(c) Effective depth (d) None of these

49. A reinforced concrete slab is 75mm thick. The maximum size of reinforcement bar that can be used is

(a) 12 mm diameter (b) 10 mm diameter

(c) 8 mm diameter (d) 6 mm diameter

50. A doubly reinforced beam is considered less economical than a singly reinforced beam because

(a) Tensile steel required is more than that of a balanced section

(b) Shear reinforcement is more

(c) Concrete is not stressed to its full value

(d) Compressive steel is under-stressed

51. Coplanar forces are

(a) Forces whose lines of action lie on the same line

(b) Forces which meet at one point

(c) Forces whose lines of action lie on the same plane

(d) Forces which meet at one point and have line of action on the same plane

52. A particle which is acted upon by two forces will be in equilibrium if

(a) Two forces have the same magnitude (b) Two forces have the same line of action

(c) Two forces are opposite sense (d) All of these

53. Varignon's theorem makes it possible to determine
(a) Moment about a given point of the resultant of concurrent forces
(b) Resultant of several concurrent forces
(c) Resolution of several concurrent forces
(d) Sum of the resultant of the concurrent forces

54. If two forces of magnitude 3 kn and 4 kn act at right angles to each other, the resultant force will be
(a) 1 kn (b) 5 kn
(c) 7 kn (d) 9 kn

55. The work of a force acting perpendicular to displacement is
(a) Unity (b) Infinite
(c) Zero (d) None of these

56. Which of the following forces does no work?
(a) Friction force on a rough surface
(b) The reaction at a fixed end
(c) Most forces applied on a moving body
(d) Weight of a body when its C.G moves horizontally

57. The curvilinear trajectory of a projectile neglecting air resistance is
(a) Parabolic (b) Hyperbolic
(c) Elliptic (d) Arc of circle

58. In the concept of instantaneous centre
(a) Rotational motion should precede translational motion
(b) Translational motion should precede rotational motion
(c) Both rotational and translational motion simultaneously
(d) It does not matter which motion takes place first

59. The final momentum of a particle neglecting impulse of force equal to
(a) Zero (b) One half the initial momentum
(c) Initial momentum (d) Twice the initial momentum

60. In uniform rotation of a rigid body about a fixed axis
(a) Angular acceleration is constant
(b) Angular acceleration is variable
(c) Angular acceleration is zero
(d) Angular acceleration is maximum

61. A rigid jointed plane frame is stable and statically determinate if
(a) $(m + r) = 2j$ (b) $(m + r) = 3j$
(c) $(3m + r) = 3j$ (d) $(m + 3r) = 3j$

62. A fixed beam of span L is carrying a point load P at its midspan. If the moment of inertia of the middle half length is two times that of the remaining length, then the fixed end moments will be
(a) PL/32 (b) 5PL/48
(c) 3PL/32 (d) 5PL/32

63. The Castigliano's second theorem can be used to compute deflection
(a) In statically determinate structures only
(b) For any type of structures
(c) At the point under the load only
(d) For beams and frames only

64. The energy stored in a material within elastic limit when it is under strain is called
(a) Impact
(b) Shock resistance
(c) Resilience
(d) Elasticity

65. Modulus of rigidity is defined as the ratio of
(a) Longitudinal stress to longitudinal strain
(b) Shear stress to shear strain
(c) Volumetric stress to volumetric strain
(d) Stress to strain

66. Hooke's law is valid
(a) Only above elastic limit
(b) Only within elastic limit
(c) Till a substance breaks under load
(d) Only within plastic limit

67. A simply supported beam of length L, cross-section A carrying a uniformly distributed load of W will have maximum bending moment of
(a) WL/2
(b) WL/8
(c) WL/4
(d) WL/16

68. The point of contraflexure or point of inflection in a beam is the point where
(a) Shear force changes its sign
(b) Shear force is maximum
(c) Bending moment is maximum
(d) Bending moment changes sign

69. A long vertical member, subjected to an axial compressive load is called
(a) A column
(b) A strut
(c) A tie
(d) A stanchion

70. For a cantilever of length L carrying a concentrated load W at the extreme end, the maximum deflection will be
(a) WL^3/EI
(b) $WL^3/3EI$
(c) $WL^3/8EI$
(d) $WL^3/12EI$

71. A material having a value of Poissons' ratio equal to zero
(a) Would be perfectly incompressible
(b) Could be stretched in one direction without lateral contraction
(c) Would be perfectly compressible
(d) Could not be stretched in one direction without lateral contraction

72. If a closely coiled helical spring carries an axial pull of 100 N, producing a deflection of 10 mm. The strain energy stored is
(a) 500 Nmm
(b) 1000 Nmm
(c) 1500 Nmm
(d) 2000 Nmm

73. A cantilever beam of length L carrying uniformly distributed load of w, the bending moment at any section at a distance x from the free end is given by
(a) -wx/L
(b) wx/L
(c) $-\frac{1}{2} wL^2$
(d) $-\frac{1}{2} wx^2$

74. If the load curve of a beam is oblique straight line, the shear curve would have been
(a) Horizontal straight
(b) Parabola
(c) Cubic
(d) Hyperbola

75. The effective length of a column of length 'L' with two fixed ends is
(a) 2 L
(b) L
(c) 0.5 L
(d) 1.5 L

76. The maximum shearing stress occurs at
(a) The principal plane of stress
(b) The normal to the principal plane of stress
(c) 45° to the principal plane of stress
(d) 60° to the principal plane of stress

77. The strain rosette used to measured normal strains along X and Y axis and their bisector is referred to as a
(a) 30° rosette
(b) 45° rosette
(c) 60° rosette
(d) 90° rosette

78. The most suitable reason to adopt hollow circular section in place of solid circular shaft is
(a) Weight per unit length is less
(b) Easy to manufacture
(c) More strength for same weight/unit length
(d) Easy to transport

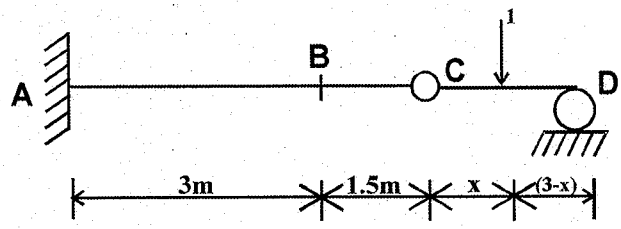
79. For the design of cast iron member, the most appropriate theory of failure is
(a) Mohr's theory
(b) Rankine's theory
(c) Maximum stress theory
(d) Maximum shear energy theory

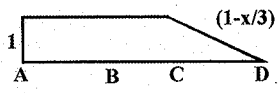
80. If the depth of a beam of rectangular section is reduced to half, strain energy stored in the beam becomes
(a) 1/4 times
(b) 1/8 times
(c) 4 times
(d) 8 times

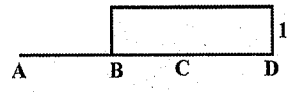
81. In which system of units Newton is the unit of force?
(a) F.P.S
(b) M.K.S
(c) S.I
(d) C.G.S

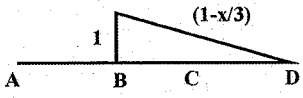
82. If NCA stands for member of constraints added and NCR stands for number of constraints removed. The structure is classified as unstable if
(a) NCR > NCA
(b) NCR < NCA
(c) NCR $\geq$ NCA
(d) NCR $\leq$ NCA

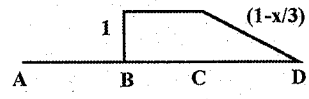
83. The influence line diagram for shear force at 'B' of a beam with loading at the following figure is



(a) 

(b) 

(c) 

(d) 

84. The moment at any point of the conjugate beam is equal to

(a) The slope at the corresponding real beam
(b) The shear at the corresponding real beam
(c) The deflection at the corresponding real beam
(d) The moment at the corresponding real beam

85. Where 'K' is the absolute stiffness of a member where far end is hinged in moment distribution method, the relative stiffness is therefore

(a) 1/2 K
(b) 2/3 K
(c) 3/4 K
(d) 4/3 K

86. At shear center

(a) Torsion = zero
(b) Torsion = Bending
(c) Bending = 0
(d) None of these

87. In unsymmetric bending of beams

(a) The neutral axis is parallel to plane of applied load
(b) The neutral axis is usually not perpendicular to plane of applied load
(c) The neutral axis is at the extreme fibre
(d) The neutral axis is at the plane of symmetry

88. The flexibility co-efficients are functions of

(a) Geometry and actual loading of primary structure
(b) Electric property and actual loading of primary structure
(c) Geometry and elastic property of primary structure
(d) Geometry, elastic property and actual loading of primary structure

89. If the second moment of area A about the x-axis is denoted by Ix then the radius of gyration is defined by

(a) $\sqrt{Ix}/A$
(b) $\sqrt{Ix}/\sqrt{A}$
(c) $\sqrt{A}/Ix$
(d) $\sqrt{A}/\sqrt{Ix}$

90. In column analogy method, for a beam having uniform flexural rigidity, the thickness of the analogous column and that of the load diagram may be taken as

(a) 1 (b) $1/\sqrt{2}$

(c) $\sqrt{2}$ (d) $\sqrt{2}/3$

91. Work may be defined as

(a) Force × distance (b) Force × velocity

(c) Force × acceleration (d) None of these

92. The centre of gravity of a homogeneous body is the point at which the whole

(a) Volume of the body is assumed to be concentrated

(b) Area of surface of the body is assumed to be concentrated

(c) Weight of the body is assumed to be concentrated

(d) All the above

93. If two forces P and Q (P>Q) act on the same straight line but in opposite direction, their resultant will be equal to

(a) P+Q (b) P/Q

(c) Q/P (d) P-Q

94. The dimension of force is

(a) $M^{-1} L^{-1} T^{-1}$ (b) MLT

(c) MLT^{-2} (d) $ML^{-2}T$

95. A satellite goes on moving along its orbit round the earth due to

(a) Gravitational force (b) Centrifugal force

(c) Centripetal force (d) None of these

96. Static friction is always

(a) Greater than dynamic friction (b) Less than dynamic friction

(c) Equal to the dynamic friction (d) None of these

97. Joule is the unit of

(a) Work (b) Force

(c) Power (d) Energy

98. The dimensionless quantity is

(a) Specific volume (b) Specific speed

(c) Specific gravity (d) All of these

99. The component of a force (P) at right angles to its direction will be

(a) Zero (b) Half

(c) Same (d) 1.414P

100. The motion of a bicycle wheel is

(a) Rotary as well as translatory (b) Translatory

(c) Rotary (d) Curvilinear

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