MIZORAM PUBLIC SERVICE COMMISSION

Technical Competitive Examinations for Recruitment to the post of <u>Inspector of Legal Metrology</u> under Food, Civil Supplies & Consumer Affairs Department

Time Allowed : 2 hours
Full Marks : 150

<u>Civil Engineering Paper-I</u>

INVIGILATOR CENTRE SUPERINTENDENT

Date of Exam. : 26/03/2010

<u>Instructions to candidates:</u>

- Enter your Roll No. in the box provided on the front page.
- Attempt all the questions.
- Each question is followed by probable answers. Choose the appropriate answer and mark it by putting '✓' mark on the corresponding box.
- If more than one answer boxes are marked for a question, the answer will be treated as wrong.
- On completion, you are to submit the booklet to the Invigilator.

Code Number : .....
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Examiner Scrutiniser

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1. The rocks which were formed by gradual deposition are called

(a) sedimentary rocks ☐ (b) metamorphic rocks ☐

(c) igneous rocks ☐ (d) none of the above ☐

2. Geologically, marble is known as

(a) igneous rock ☐ (b) metamorphic rock ☐

(c) sedimentary rock ☐ (d) stratified rock ☐

3. Black marble is generally found in the district of

(a) Jodhpur ☐ (b) Jabalpur ☐

(c) Jaipur ☐ (d) Jaisalmer ☐

4. The specific gravity of marble is

(a) 2.50 ☐ (b) 2.60 ☐

(c) 2.62 ☐ (d) 2.72 ☐

5. The age of trees can be predicted by

(a) the thickness of bark ☐ (b) counting number of rings ☐

(c) length of modularly rays ☐ (d) measuring the diameter of pitch ☐

6. Seasoning of timber is required to

(a) soften the timber ☐ (b) harden the timber ☐

(c) straighten the timber ☐ (d) remove the sap from the timber ☐

7. Plywood is normally available in thickness of

(a) 1 mm ☐ (b) 2 mm ☐

(c) 2 to 3 mm ☐ (d) 3 to 4 mm ☐

8. The inner part of timber log surrounding the pitch is called

(a) sapwood ☐ (b) heart wood ☐

(c) cambium layer ☐ (d) none of the above ☐

9. Seasoning of timber is necessary to

(a) increase the fire resistance ☐ (b) increase the vermin resistance ☐

(c) reduce the microbial substances ☐ (d) expel the moisture in the timber ☐

10. The kiln which may work regularly throughout the year is

(a) Bull's kiln ☐ (b) Hoffman's kiln ☐

(c) Clamp ☐ (d) none of the above ☐

11. The percentage of maximum ingredient of good quality brick earth is

(a) magnesia ☐ (b) silica ☐

(c) alumina ☐ (d) lime ☐

12. A pug mill is used for

(a) softening brick earth ☐ (b) moulding brick earth ☐

(c) tempering brick earth ☐ (d) all the above ☐

13. The crushing strength of first class should be

(a) above 10 N/mm^2 ☐ (b) below 10 N/mm^2 ☐

(c) above 20 N/mm^2 ☐ (d) none of the above ☐

14. The basic material for manufacture of cast iron is

(a) pig iron ☐ (b) wrought iron ☐

(c) haematite ☐ (d) none of the above ☐

15. Brass is an alloy of

(a) steel ☐ (b) copper ☐

(c) aluminium ☐ (d) nickel ☐

16. The maximum range of the chemicals in cement is

(a) silica (SiO_2) ☐ (b) Alumina (Al_2O_3) ☐

(c) magnesia (MgO) ☐ (d) Lime (CaO) ☐

17. The period of storage of cement when stored in bags should not exceed more than

(a) 1 month ☐ (b) 2 months ☐

(c) 3 months ☐ (d) 4 months ☐

18. The crushing strength of good quality stone should be always greater than

(a) 100 N/mm^2 ☐ (b) 80 N/mm^2 ☐

(c) 60 N/mm^2 ☐ (d) 40 N/mm^2 ☐

19. Commonly used raw materials in manufacturing cement is

(a) slate ☐ (b) sand stone ☐

(c) lime stone ☐ (d) basalt ☐

20. Bulking of sand is caused due to

(a) surface moisture ☐ (b) viscosity ☐

(c) air voids ☐ (d) clay contents ☐

21. Most commonly used solvent in oil paints is

(a) spirit ☐ (b) petroleum ☐

(c) turpentine ☐ (d) coal tar ☐

22. The formula of quicklime is

(a) $CaCO_3$ ☐ (b) $Ca(OH)_3$ ☐

(c) CO_2CO_3 ☐ (d) none of the above ☐

23. A ferrous metal is

(a) steel ☐ (b) cast iron ☐

(c) wrought iron ☐ (d) all the above ☐

24. PVC stands for

(a) plastic very compact ☐ (b) polythene vinyl carbon ☐

(c) polythene vanadium carbide ☐ (d) polythene vinyl chloride ☐

25. For plastering of interior of a building, mixed proportions of cement : sand for better mortar is usually taken as

(a) 1:6 ☐ (b) 1:5 ☐

(c) 1:4 ☐ (d) 1:3 ☐

26. Which of the following mortars is most suitable for construction work in waterlogged areas?

(a) cement mortar ☐ (b) lime mortar ☐

(c) gauged mortar ☐ (d) mud mortar ☐

27. The ratio of shearing stress to shearing strain is called

(a) Young's modulus E ☐ (b) Poisson's ratio m ☐

(c) bulk modulus K ☐ (d) modulus of rigidity R ☐

28. Simple bending equation is

(a) $\frac{M}{I} = \frac{R}{E} = \frac{f}{y}$ ☐ (b) $\frac{I}{M} = \frac{E}{R} = \frac{y}{f}$ ☐

(c) $\frac{M}{I} = \frac{E}{R} = \frac{f}{y}$ ☐ (d) $\frac{M}{I} = \frac{R}{E} = \frac{y}{f}$ ☐

Where M is bending moment, E is young's modulus, I is moment of inertia, R is radius of gyration, f is bending stress and y is distance from neutral axis

29. Moment of inertia of a triangular section with base b and height h about centroidal axis parallel to the base is

(a) $\frac{bh^3}{3}$ ☐ (b) $\frac{bh^3}{8}$ ☐

(c) $\frac{bh^3}{12}$ ☐ (d) $\frac{bh^3}{36}$ ☐

30. The section modulus Z of a rectangular section of width b and depth d is given by

(a) $Z = \frac{bd^3}{24}$ ☐ (b) $Z = \frac{bd^3}{6}$ ☐

(c) $Z = \frac{bd^3}{12}$ ☐ (d) $Z = \frac{bd^3}{3}$ ☐

31. The ratio lateral strain to linear strain is called

(a) Poisson's ratio ☐ (b) Young's modulus ☐

(c) bulk modulus ☐ (d) none of above ☐

32. The angle which an inclined surface makes with horizontal when a body placed on it is on the point of moving down, is called

(a) angle of repose ☐ (b) angle of inclination ☐

(c) angle of friction ☐ (d) none of the above ☐

33. Equation of motion of a point in a straight line is

(a) $v = u + ft$ ☐ (b) $2fs = v^2 - u^2$ ☐

(c) $s = ut + \frac{1}{2}ft^2$ ☐ (d) all the above ☐

34. The maximum bending moment due to moving load on a simply supported beam occurs

(a) at the mid span ☐ (b) at supports ☐

(c) anywhere in the beam ☐ (d) under the load ☐

35. When elastic limit reaches in a rigid body, tensile strain

(a) increases more rapidly ☐ (b) decreases more rapidly ☐

(c) increases in proportion to the stress ☐ (d) decreases in proportion to stress ☐

36. The law which states that within elastic limits strain produced is proportional to the stress producing it, is known as

(a) Poisson's law ☐ (b) Bernoulli's law ☐

(c) stress law ☐ (d) Hooke's law ☐

37. The distance between the centres of adjacent rivets in the same row is called

(a) lap ☐ (b) gauge ☐

(c) staggered pitch ☐ (d) pitch ☐

38. A simply supported beam of span L carries a uniformly distributed load of w/unit length. The maximum bending moment is

(a) $\frac{wL^2}{4}$ ☐ (b) $\frac{wL^2}{8}$ ☐

(c) $\frac{wL^2}{12}$ ☐ (d) $\frac{wL^2}{16}$ ☐

39. The strain energy stored in a spring when subjected to greatest load without being permanently distorted, is called

(a) proof stress ☐ (b) proof load ☐

(c) proof resilience ☐ (d) stiffness ☐

40. The bending moment is the maximum on a section where shear force is

(a) is equal ☐ (b) is maximum ☐

(c) is minimum ☐ (d) changes sign ☐

41. Statistically determinate structures are those in which

(a) stresses are developed due to temperature variation ☐

(b) stresses are developed due to lack of fit. ☐

(c) conditions of equilibrium are not sufficient to fully analyse the structures ☐

(d) none of the above ☐

42. Portal frame, a statically indeterminate structure can be analysed by

(a) the strain energy method ☐ (b) moment distribution method ☐

(c) slope deflection method ☐ (d) all the above methods ☐

43. $P = \frac{4\pi^2 EI}{L^2}$ is the equation of Euler's crippling load if

(a) both ends are hinged ☐

(b) one end is fixed and other end is free ☐

(c) both ends are fixed ☐

(d) one end is fixed and other end is hinged ☐

44. The energy stored in beam of length L, subjected to a constant bending moment M is

(a) $\frac{M^2L}{2EI}$ ..... ☐ (b) $\frac{ML^2}{2EI}$ ..... ☐

(c) $\frac{M^2L}{EI}$ ..... ☐ (d) $\frac{ML^2}{EI}$ ..... ☐

45. When load is transferred through one surface to another surface in contact, stress is called

(a) Shearing stress ..... ☐ (b) working stress ..... ☐

(c) Tensile stress ..... ☐ (d) compressive stress ..... ☐

46. The deflection due to couple M at free end of a cantilever of length L is

(a) $\frac{ML}{EI}$ ..... ☐ (b) $\frac{ML^2}{2EI}$ ..... ☐

(c) $\frac{2ML}{EI}$ ..... ☐ (d) $\frac{M^2L}{2EI}$ ..... ☐

47. A solid shaft of diameter d is subjected to torque T. The maximum normal stress induced in the shaft is

(a) $\frac{16T}{\pi d^3}$ ..... ☐ (b) $\frac{32T}{\pi d^3}$ ..... ☐

(c) zero ..... ☐ (d) none of the above ..... ☐

48. According to Rankine's formula of earth pressure on a retaining wall of h and with other usual notations, is

(a) $\frac{1}{2}wh^2\frac{(1+\sin\phi)}{(1-\sin\phi)}$ ..... ☐ (b) $\frac{1}{3}wh^2\frac{(1-\sin\phi)}{(1+\sin\phi)}$ ..... ☐

(c) $\frac{1}{4}wh^2\frac{(1+\sin\phi)}{(1-\sin\phi)}$ ..... ☐ (d) $\frac{1}{2}wh^2\frac{(1-\sin\phi)}{(1+\sin\phi)}$ ..... ☐

49. Beams of uniform strength are preferred to those of uniform section, because these are economical for

(a) heavy weights ..... ☐ (b) light weights ..... ☐

(c) large span ..... ☐ (d) short spans ..... ☐

50. Maximum permissible slenderness ratio of compressive members which carry dead and superimposed load, is

(a) 80 ..... ☐ (b) 180 ..... ☐

(c) 280 ..... ☐ (d) 380 ..... ☐

51. The stress in the wall of a cylinder in a direction normal to its longitudinal axis, due to a force acting along the circumference, is

(a) yield stress ..... ☐ (b) longitudinal stress ..... ☐

(c) circumferential stress ..... ☐ (d) hoop stress ..... ☐

52. The Indian Standard (IS) code which deals with steel structures is

(a) IS: 875 ..... ☐ (b) IS: 456 ..... ☐

(c) IS: 800 ..... ☐ (d) IS: 1893 ..... ☐

53. If p is the internal stress in a thin cylinder of diameter d and thickness t, hoop stress developed is

(a) $\frac{pd}{t}$ ..... ☐ (b) $\frac{pd}{2t}$ ..... ☐

(c) $\frac{pd}{4t}$ ..... ☐ (d) $\frac{pd}{3t}$ ..... ☐

54. A cylinder is said to be thin if the ratio of its thickness and diameter is less than

(a) $\frac{1}{10}$ ..... ☐ (b) $\frac{1}{20}$ ..... ☐

(c) $\frac{1}{30}$ ..... ☐ (d) $\frac{1}{40}$ ..... ☐

55. In rolled steel beams, shear force is mostly resisted by

(a) web only ..... ☐ (b) flange only ..... ☐

(c) web and flange together ..... ☐ (d) none of the above ..... ☐

56. The stiffness factor for prismatic beam of length L and moment of inertia I, is

(a) $\frac{2EI}{L}$ ..... ☐ (b) $\frac{3EI}{L}$ ..... ☐

(c) $\frac{4EI}{L}$ ..... ☐ (d) $\frac{EI}{L}$ ..... ☐

57. An arch with three hinges is a structure which is

(a) statically determinate ..... ☐ (b) statically indeterminate ..... ☐

(c) geometrically unstable ..... ☐ (d) structurally sound but indeterminate .. ☐

58. Shear stress at any section of a shaft is maximum at

(a) the centre of the section ..... ☐ (b) at a distance r/2 from the centre ..... ☐

(c) the top of the surface ..... ☐ (d) a distance 3/4r from the centre ..... ☐

59. Reaction at the supports of a structure can be determined by equating the algebraic sum of

(a) horizontal forces to zero ..... ☐ (b) vertical forces to zero ..... ☐

(c) moments about any point is zero ..... ☐ (d) all the above ..... ☐

60. Stress in members of statically determinate simple frames can be determined by

(a) method of joints ..... ☐ (b) method of section ..... ☐

(c) graphical method ..... ☐ (d) all the above ..... ☐

61. The maximum twisting moment a shaft can resist, is a product of the permissible shear stress and

(a) moment of inertia ..... ☐ (b) polar moment of inertia ..... ☐

(c) polar modulus ..... ☐ (d) modulus of rigidity ..... ☐

62. If a shaft is simultaneously subjected to a torque T and bending moment M, the ratio of maximum bending stress is

(a) $\frac{M}{T}$ ..... ☐ (b) $\frac{2M}{T}$ ..... ☐

(c) $\frac{T}{M}$ ..... ☐ (d) $\frac{2T}{M}$ ..... ☐

63. A member which does not regain its original shape after removal of load producing deformation is said to be

(a) plastic ..... ☐ (b) elastic ..... ☐

(c) rigid ..... ☐ (d) none of the above ..... ☐

64. The average shear stress of rolled steel beam section is

(a) 8290 N/cm^2 ..... ☐ (b) 9270 N/cm^2 ..... ☐

(c) 14715 N/cm^2 ..... ☐ (d) 10055 N/cm^2 ..... ☐

65. In a grillage footing, the maximum shear force occurs at

(a) centre of grillage beam ..... ☐ (b) edge of grillage beam ..... ☐

(c) centre of base plate ..... ☐ (d) none of the above ..... ☐

66. As per ISI, rolled steel beam section are classified into

(a) two series ..... ☐ (b) three series ..... ☐

(c) four series ..... ☐ (d) five series ..... ☐

67. According to Unwin's formula, if t is the thickness of the plate in mm, nominal diameter of the rivet is

(a) d =1.91t ..... ☐ (b) d =1.91t^2 ..... ☐

(c) d =1.91 $\sqrt{t}$ ..... ☐ (d) d =2.91 $\sqrt{t}$ ..... ☐

68. Stiffeners are used in a plate girder to

(a) reduce the compressive stress ..... ☐ (b) reduce shear stress ..... ☐

(c) avoid buckling of the web plate ..... ☐ (b) take the bearing stress ..... ☐

69. A major beam in a building structure is known as

(a) a main beam ..... ☐ (b) a girder ..... ☐

(c) a floor beam ..... ☐ (d) all the above ..... ☐

70. On steel structures, dead load is the weight of

(a) steel work ..... ☐ (b) material supported permanently ..... ☐

(c) material fastened to steel work ..... ☐ (d) all the above ..... ☐

71. The spans are considered approximately equal if the longest span does not exceed the shortest span by more than

(a) 15% ..... ☐ (b) 10% ..... ☐

(c) 20% ..... ☐ (d) 5% ..... ☐

72. In factory buildings, the horizontal beams spanning between the wall columns supporting a wall covering, are called

(a) stringers ..... ☐ (b) girts ..... ☐

(c) trimmers ..... ☐ (d) lintels ..... ☐

73. In plastic analysis, the shape factor for rectangular section is

(a) 1.7 ..... ☐ (b) 1.6 ..... ☐

(c) 1.5 ..... ☐ (d) 1.4 ..... ☐

74. In plastic analysis shape factor for circular section is

(a) 1.75 ..... ☐ (b) 1.7 ..... ☐

(c) 1.6 ..... ☐ (d) 1.5 ..... ☐

75. The method of design of steel framework for greatest rigidity and economy in weight, is known as

(a) simple design ..... ☐ (b) fully rigid design ..... ☐

(c) semi-rigid design ..... ☐ (d) none of the above ..... ☐

76. With a percentage increase of carbon in steel, it decreases its

(a) strength ..... ☐ (b) hardness ..... ☐

(c) ductility ..... ☐ (d) brittleness ..... ☐

77. When a load is transferred through one surface to another surface in contact, the stress is known as

(a) tensile stress ..... ☐ (b) compressive stress ..... ☐

(c) working stress ..... ☐ (d) shearing stress ..... ☐

78. If the pitch is 6 cm and rivet value is 4 tonnes, the number of rivets required for a riveted connection carrying an eccentric load of 15 tonnes at a distance of 30 cm from the centre line, is

(a) 6 ..... ☐ (b) 8 ..... ☐

(c) 10 ..... ☐ (d) 12 ..... ☐

79. The maximum axial load which is just sufficient to keep a column in a small defected shape, is called

(a) crippling load ..... ☐ (b) buckling load ..... ☐

(c) critical load ..... ☐ (d) all the above ..... ☐

80. Effective length of a column of length L effectively held in position and restrained in directions at both ends, is

(a) L ..... ☐ (b) $2\,L$ ..... ☐

(c) $0.67\,L$ ..... ☐ (d) $1.5\,L$ ..... ☐

81. The most economical section for a column, is

(a) rectangular ..... ☐ (b) solid round ..... ☐

(c) hexagonal ..... ☐ (d) tubular ..... ☐

82. A compression member consisting of angle sections may be

(a) continuous member ..... ☐ (b) discontinuous single angle strut ..... ☐

(c) discontinuous double angle strut ..... ☐ (d) all the above ..... ☐

83. When plates of thickness t are exposed to weather, tacking rivets are provided at a pitch in line not exceeding

(a) $8\,t$ ..... ☐ (b) $16\,t$ ..... ☐

(c) $24\,t$ ..... ☐ (d) $32\,t$ ..... ☐

84. The most commonly used sections in lateral system to carry shear force in built up columns, are

(a) rolled steel flats ..... ☐ (b) rolled angles ..... ☐

(c) rolled channels ..... ☐ (d) all the above ..... ☐

85. A column slice is used to increase

(a) length of the column ..... ☐ (b) strength of the column ..... ☐

(c) cross sectional area of column ..... ☐ (d) none of the above ..... ☐

86. The allowable stress in axial tension is generally kept less if thickness of the member is more than

(a) 10 mm ..... ☐ (b) 12 mm ..... ☐

(c) 15 mm ..... ☐ (d) 20 mm ..... ☐

87. A beam is defined as a structural member subjected to

(a) axial loading ..... ☐ (b) transverse loading ..... ☐

(c) axial and transverse loading ..... ☐ (d) none of the above ..... ☐

88. On steel structures, dead load is the weight of

(a) steel work ..... ☐ (b) material supported permanently ..... ☐

(c) material fastened to steel work ..... ☐ (d) All the above ..... ☐

89. Web crippling generally occurs at a point where

(a) bending moment is maximum ..... ☐ (b) shearing force is minimum ..... ☐

(c) concentrated load acts ..... ☐ (d) deflection is maximum ..... ☐

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

(a) overall depth ..... ☐ (b) clear depth ..... ☐

(c) effective depth ..... ☐ (d) none of these ..... ☐

91. The central deflection of a simply supported steel beam of length L with concentrated load W at the centre, is

(a) $\frac{WL^3}{3EI}$ ..... ☐ (b) $\frac{WL^3}{12EI}$ ..... ☐

(c) $\frac{WL^3}{24EI}$ ..... ☐ (d) $\frac{WL^3}{48EI}$ ..... ☐

92. The minimum pitch of rivet holes of diameter d should not be less than

(a) 1.25 d ..... ☐ (b) 1.5 d ..... ☐

(c) 2.0 d ..... ☐ (d) 2.5 d ..... ☐

93. In a singly reinforced beam, effective depth is measured from its compression edge to

(a) neutral axis of the beam ..... ☐ (b) longitudinal central axis ..... ☐

(c) tensile reinforcement ..... ☐ (d) tensile edge ..... ☐

94. p_H value of water to be used in concrete shall generally be

(a) not less than 5 ..... ☐ (b) not less than 6 ..... ☐

(c) not less than 7 ..... ☐ (d) equal to 7 ..... ☐

95. In a singly reinforced beam, if the permissible stress in concrete reaches earlier than the permissible stress in steel, beam section is called

(a) under reinforced section ..... ☐ (b) over reinforced section ..... ☐

(c) critical section ..... ☐ (d) economic section ..... ☐

96. M 20 grade concrete means its compressive strength of 15 cm cube is 30 N/mm^2 after

(a) 7 days ..... ☐ (b) 14 days ..... ☐

(c) 21 days ..... ☐ (d) 28 days ..... ☐

97. As the percentage of steel increases

(a) depth of neutral axis increases ..... ☐ (b) depth of neutral axis decreases ..... ☐

(c) lever arm increases ..... ☐ (d) lever arm decreases ..... ☐

98. The grade of concrete not used in reinforced concrete is

(a) M 10 ..... ☐ (b) M 15 ..... ☐

(c) M 20 ..... ☐ (d) M 40 ..... ☐

99. The maximum shear stress in a rectangular beam is

(a) 2 times the average ..... ☐ (b) 1.75 times the average ..... ☐

(c) 1.5 times the average ..... ☐ (d) 1.25 times the average ..... ☐

100. Moist curing of the exposed surfaces of concrete is done for at least

(a) 7 days ..... ☐ (b) 10 days ..... ☐

(c) 12 days ..... ☐ (d) 14 days ..... ☐

101. Spacing of stirrups in a rectangular beam, is

(a) increased at the ends ..... ☐

(b) increased at the centre of the beam ..... ☐

(c) kept constant throughout the bar ..... ☐

(d) deceased towards the centre of the beam ..... ☐

102. The test strength of the sample of concrete is taken as average of the strength of

(a) 2 specimens ..... ☐ (b) 3 specimens ..... ☐

(c) 4 specimens ..... ☐ (d) 5 specimens ..... ☐

103. Distribution of shear intensity over a rectangular section, follows

(a) a straight line ..... ☐ (b) a circular curve ..... ☐

(c) an elliptical curve ..... ☐ (d) a parabolic curve ..... ☐

104. The diameter of bar of the column should not be less than

(a) 12 mm ..... ☐ (b) 10 mm ..... ☐

(c) 8 mm ..... ☐ (d) 6 mm ..... ☐

105. In limit state method, the design bond stress of M 30 grade concrete for plain bars in tension is

(a) 1.0 N/mm^2 ☐ (b) 1.2 N/mm^2 ☐

(c) 1.4 N/mm^2 ☐ (d) 1.5 N/mm^2 ☐

106. According to I S : 456 speculations, the safe diagonal tensile stress for M 150 grade concrete, is

(a) 50 N/cm^2 ☐ (b) 100 N/cm^2 ☐

(c) 150 N/cm^2 ☐ (d) 200 N/cm^2 ☐

107. If D is the overall thickness of the slab, the diameter of the reinforcing bars should not exceed

(a) $\frac{1}{4}D$ ☐ (b) $\frac{1}{5}D$ ☐

(c) $\frac{1}{6}D$ ☐ (d) $\frac{1}{8}D$ ☐

108. Minimum diameter of the lateral ties should not be less than

(a) 10 mm ☐ (b) 6 mm ☐

(c) 5 mm ☐ (d) 4 mm ☐

109. The minimum thickness of the cover at the end of reinforcing bar should not be less than twice the diameter of the bar subject to a minimum of

(a) 10 mm ☐ (b) 15 mm ☐

(c) 20 mm ☐ (d) 25 mm ☐

110. The slenderness effect of a wall is considered if the effective height of the wall exceeds the thickness

(a) 16 times ☐ (b) 12 times ☐

(c) 10 times ☐ (d) 8 times ☐

111. The neutral axis of T-beam exists

(a) within the flange ☐ (b) at the bottom edge of the slab ☐

(c) below the slab ☐ (d) all the above ☐

112. A column is regarded as long column if the ratio of its effected length and lateral dimension, exceeds

(a) 25 ☐ (b) 20 ☐

(c) 15 ☐ (d) 10 ☐

113. Design of two-way slab simply supported on edges and having no provision to prevent the corners from lifting, is made by

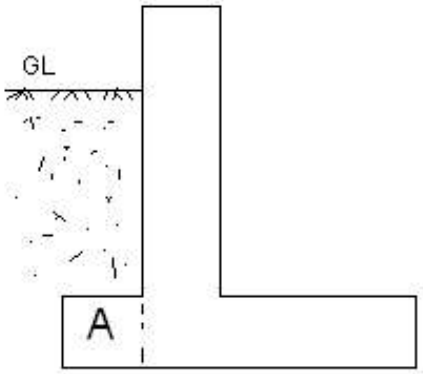
(a) Marcus formula ☐ (b) Rankine formula ☐

(c) Grashoff formula ☐ (d) Rankine Grashoff formula ☐

114. The portion A of the reinforced concrete retaining wall shown below is called

(a) stem ☐ (b) heel slab ☐

(c) toe slab ☐ (d) none of the ☐



Retaining wall

115. It T and R are respectively tread and rise of a stair, then

(a) 2R+T=60 ☐ (b) R+2T=60 ☐

(c) 2R+T=30 ☐ (d) R+2T=30 ☐

116. Equipments for compaction are used for

(a) rolling ☐ (b) kneading ☐

(c) vibrations ☐ (d) All the above ☐

117. The horizontal portion of a step in a staircase, is known as

(a) tread ☐ (b) rise ☐

(c) flight ☐ (d) winder ☐

118. A pre-stressed concrete member

(a) is made of concrete ☐ (b) is stressed after casting ☐

(c) possesses internal stresses ☐ (d) is made reinforced concrete ☐

119. Vibrator used in concrete

(a) improves consolidation ☐ (b) makes concrete stronger and durable ☐

(c) removes voids in concrete ☐ (d) all the above ☐

120. A foundation is called shallow if its depth, is

(a) one fourth of its width ☐ (b) equal to its width ☐

(c) half of its width ☐ (d) three-fourth of its width ☐

121. A foundation rests on

(a) base of the foundation ☐ (b) sub grade ☐

(c) foundation soil ☐ (d) both (b) and (c) ☐

122. The section of a reinforced beam where the most distant concrete fibre in compression and tension in steel attains a permissible stresses simultaneously, is called

(a) balanced section ☐ (b) economic section ☐

(c) critical section ☐ (d) all the above ☐

123. P is the pre-stressed force applied to the tendon of rectangular pre-stressed beam whose area of cross-section is A and sectional modulus is Z. The maximum stress f in the beam, subjected to a maximum bending moment M, is

(a) $f = \frac{P}{A} + \frac{M}{Z}$ ☐ (b) $f = \frac{P}{A} + \frac{Z}{M}$ ☐

(c) $f = \frac{A}{P} + \frac{M}{Z}$ ☐ (d) $f = \frac{A}{P} + \frac{M}{6Z}$ ☐

124. Modular co-ordination of construction means

(a) planning ☐ (b) designing ☐

(c) execution ☐ (d) all the above ☐

125. A construction team means

(a) an owner ☐ (b) an engineer ☐

(c) an architect ☐ (d) a contractor ☐

(e) all the above ☐

126. The first test of construction is

(a) initiation of proposal ☐ (b) survey of the site ☐

(c) preparation of estimate ☐ (d) preparation of tender ☐

127. Time and progress chart of a construction is also known as

(a) Bar Chart ☐ (b) Gantt chart ☐

(c) Critical path method chart ☐ (d) all the above ☐

128. The most popular type of organization used in civil engineering construction is

(a) line of organization ☐ (b) line and staff organization ☐

(c) functional organization ☐ (d) effective organization ☐

129. Construction schedule is prepared after collecting

(a) number of operations ☐ (b) output of labour ☐

(c) output of machinery ☐ (d) all the above ☐

130. The lifting equipment used for heavy materials is

(a) pulley ..... ☐ (b) chain hoist ..... ☐

(c) winches ..... ☐ (d) crane ..... ☐

131. Rollers are used for

(a) excavation ..... ☐ (b) compaction ..... ☐

(c) removing excavated earth ..... ☐ (d) none of the above ..... ☐

132. Hoe is used for

(a) rolling ..... ☐ (b) compaction ..... ☐

(c) excavation ..... ☐ (d) none of the above ..... ☐

133. The most versatile, labour-saving hauling equipment is

(a) truck ..... ☐ (b) dump trucks ..... ☐

(c) dumper ..... ☐ (d) trailer ..... ☐

134. Trailers are used

(a) as hauling equipments ..... ☐ (b) to trail the excavation ..... ☐

(c) as compaction equipments ..... ☐ (d) all the above ..... ☐

135. Common pumps used in building, building constructions are

(a) centrifugal ..... ☐ (b) Submersible ..... ☐

(c) air jet ..... ☐ (d) all the above

136. Roller which consists of a steel cylindrical drum with steel projection extending in radial direction outward from the surface of the cylinder, is called

(a) smooth wheel roller ..... ☐ (b) sheep's foot roller ..... ☐

(c) pneumatic type roller ..... ☐ (d) simple roller ..... ☐

137. Scraper is self sufficient machine used for

(a) digging ..... ☐ (b) loading ..... ☐

(c) hauling ..... ☐ (d) all the above ..... ☐

138. Tractor that moves on endless chain is called

(a) pneumatic type tractor ..... ☐ (b) track type tractor ..... ☐

(c) wheel type tractor ..... ☐ (d) none of the above ..... ☐

139. In angle dozer, blades are attached to the front side of the tractor usually at an angle of

(a) 90º ..... ☐ (b) 60º ..... ☐

(c) 30º ..... ☐ (d) 180º ..... ☐

140. The most powerful hoisting equipment used in modern structures is

(a) pulleys and sheaves ..... ☐ (b) hoist winch ..... ☐

(c) chain hoists ..... ☐ (d) cranes ..... ☐

141. Henry Gantt developed Bar Charts for planning and scheduling of projects in

(a) 1940 ..... ☐ (b) 1920 ..... ☐

(c) 1900 ..... ☐ (d) 1880 ..... ☐

142. The various activities of project are shown in bar charts by

(a) vertical lines ..... ☐ (b) horizontal lines ..... ☐

(c) crosses ..... ☐ (d) dots ..... ☐

143. PERT analysis is based on

(a) optimistic time ..... ☐ (b) Pessimistic time ..... ☐

(c) most likely time ..... ☐ (d) all the above ..... ☐

144. The performance of specific task in CPM is known as

(a) dummy ..... ☐ (b) event ..... ☐

(c) activity ..... ☐ (d) contract ..... ☐

145. The estimated time required to perform an activity, is known as

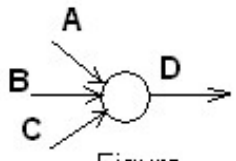
(a) event ..... ☐ (b) dummy ..... ☐

(c) duration ..... ☐ (d) float ..... ☐

146. The figure shown below indicates

(a) a merge ..... ☐ (b) an event ..... ☐

(c) an activity ..... ☐ (d) a burst ..... ☐



Figure

147. A CPM family includes

(a) CPS (Critical Path Scheduling) ..... ☐ (b) CPP (Critical path Plotted) ..... ☐

(c) CPA (Critical Path Analysis) ..... ☐ (d) all the above ..... ☐

148. CPM is

(a) used for repetitive works ..... ☐ (b) based on time estimated ..... ☐

(c) synthesizing concepts ..... ☐ (d) all the above ..... ☐

149. Time of completion of project in bar charts is shown by

(a) vertical lines ..... ☐ (b) horizontal lines ..... ☐

(c) crosses ..... ☐ (d) none of the above ..... ☐

150. The critical path line moves along activities having total

(a) positive ..... ☐ (b) negative ..... ☐

(c) zero ..... ☐ (d) same ..... ☐

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