

MIZORAM PUBLIC SERVICE
COMMISSION

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

Time Allowed : 2 hours
Full Marks : 150

Civil Engineering Paper-II

INVIGILATOR

CENTRE SUPERINTENDENT

Date of Exam. : 26/03/2010

Instructions to candidates:

- 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 :
(For Official Use)

Marks Obtained :

Examiner

Scrutiniser

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1. The dimension of dynamic viscosity in M-L-T system is
- (a) $ML^{-1}T^{-1}$ (b) $M^{-1}L^{-1}T$
(c) $M^{-1}LT^{-1}$ (d) $ML^{-1}T^2$
2. The intensity of pressure developed by surface tension (σ) of 0.073575N/m in a droplet of 0.075mm diameter is
- (a) 39.24 N/m² (b) 392.4 N/m²
(c) 3924 N/m² (d) 39240 N/m²
3. The dynamic viscosity (μ) of a fluid is 0.5 Poise and specific gravity is 0.5. The kinematic viscosity (ν) of the fluid in Stoke is
- (a) 4 Stoke (b) 3 Stoke
(c) 2 Stoke (d) 1 Stoke
4. If 1 litre of liquid weighs 9N, its specific weight is
- (a) 900 N/m³ (b) 9000 N/m³
(c) 90 N/m³ (d) 9 N/m³
5. A certain liquid of volume 0.001 m³ was under a pressure of 70N/cm². The pressure in the liquid has been increased to 150N/cm² and volume becomes 0.0009 m³. The bulk modulus of elasticity or compression K of the liquid is
- (a) 8 N/cm² (b) 80 N/cm²
(c) 800 N/cm² (d) 8000 N/cm²
6. Falling drops of water becomes sphere due to
- (a) adhesion (b) cohesion
(c) surface tension (d) viscosity
7. An ideal fluid is one which
- (a) obeys Newton's law of viscosity (b) is frictionless having shear stress $\tau = 0$
(c) is very viscous (d) none of the above
8. Hydrostatic pressure on a dam depends on its
- (a) length (b) breadth
(c) depth (d) material
9. When pressure of fluid is measured with respect to atmospheric pressure as datum, it is called
- (a) absolute pressure (b) vacuum pressure
(c) gauge pressure (d) all the above

10. A simple manometer may be

- (a) piezometer (b) U-tube manometer
(c) single column manometer (d) all the above

11. A floating body has the stable equilibrium if the metacentre M of the body lies

- (a) much above the C.G of the body (b) much below the C.G of the body
(c) on the C.G of the body (d) all the above

12. When fluid parameters like velocity, density, pressure etc. do not change with respect to space at a given time, flow is called

- (a) laminar (b) steady
(c) turbulent (d) uniform

13. When the density ρ of the fluid flow changes from point to point, flow is called

- (a) rotational (b) irrotational
(c) compressible (d) incompressible

14. Euler's equation for motion of fluids is given by

- (a) $\frac{d\rho}{\rho} + gdZ + VdV = 0$ (b) $\frac{dp}{\rho} + gdZ + VdV = 0$
(c) $\frac{d\rho}{p} + gdZ + VdV = 0$ (d) $\rho dp + gdZ + VdV = 0$

Where Z is the datum head, p is the pressure intensity; V is the average velocity and ρ is the density of fluid.

15. Bernoulli's equation is obtained by integrating

- (a) Navier-Stokes equation (b) Reynolds equation
(c) Euler's equation (d) all the above

16. Practical use of Bernoulli's equation is applied to

- (a) venturimeter (b) orifice meter
(c) nozzle meter (d) all the above

17. Major loss that occurs in pipe flow is given by

- (a) Darcy's equation (b) Reynolds equation
(c) Euler's equation (d) Navier-Stokes equation

18. Hydraulic grade line (H.G.L.) in pipe flow represents

- (a) energy head (b) pressure head
(c) friction head loss (d) all the above

19. In order to have a continuous flow through a siphon, no portion of the pipe be higher than

- (a) 10 m (b) 10.33 m
(c) 5.5 m (d) 7.6 m

20. If H is the total head and h_f is the head lost due to friction in a pipe, the condition for transmitting maximum power through the pipe is

- (a) $H = \frac{h_f}{8}$ (b) $H = \frac{h_f}{6}$
(c) $H = \frac{h_f}{3}$ (d) $H = \frac{h_f}{2}$

21. If T is the time of valve closure in a long pipe of length L and C is the velocity of pressure wave, in water hammer situation, the closure of valve is sudden if

- (a) $T < \frac{2L}{C}$ (b) $T > \frac{2L}{C}$
(c) $T = \frac{2L}{C}$ (d) none of the above

22. Hardy-Cross method is used to the problems of

- (a) boundary layer problem (b) pipe network
(c) solution of water hammer problem (d) none of the above

23. If C_d , C_v and C_c are the coefficients of discharge, coefficient of velocity and coefficient of contraction of an orifice then

- (a) $C_d = C_v \cdot C_c$ (b) $C_v = C_d \cdot C_c$
(c) $C_c = C_v \cdot C_d$ (d) $C_d = \frac{C_v}{C_c}$

24. Discharge Q over rectangular weir of length L is given by

- (a) $\frac{3}{2} C_d \sqrt{2g} L H^{3/2}$ (b) $\frac{3}{4} C_d \sqrt{2g} L H^{3/2}$
(c) $\frac{2}{3} C_d \sqrt{2g} L H^{3/2}$ (d) $\frac{2}{3} C_d \sqrt{2g} L H^{5/2}$

25. In pipe flow, shear velocity V_* is related to friction factor f and average velocity V as

- (a) $\frac{V_*}{V} = \sqrt{\frac{8}{f}}$ (b) $\frac{V_*}{V} = \sqrt{\frac{f}{8}}$
(c) $\frac{V_*}{V} = \sqrt{\frac{8g}{f}}$ (d) $\frac{V_*}{V} = \sqrt{\frac{1}{f}}$

26. Blasius equation of friction factor f in turbulent flow is given by

- (a) $\frac{0,316}{R_e^{1/3}}$ (b) $\frac{64}{R_e}$
(c) $\frac{0,316}{R_e^{1/2}}$ (d) $\frac{0,316}{R_e^{1/4}}$

27. Pitot tube is an instrument to measure

- (a) pressure of flow (b) discharge of liquid
(c) velocity of flow (d) total energy of flowing liquid

28. When flow in open channel is critical state of flow, Froude's number F_r is given by

- (a) $F_r > 1$ (b) $F_r = 1$
(c) $F_r < 1$ (d) $F_r = -1$

29. Uniform or normal flow in open channel is a condition when

- (a) force causing the flow is larger than force of resistance
(b) force causing the flow is less than force of resistance
(c) force causing the flow is equal to force of resistance
(d) none of the above

30. In open channel flow

- (a) Hydraulic grade line (HGL) is above the free surface
(b) Hydraulic grade line (HGL) coincides with free surface
(c) Hydraulic grade line (HGL) and total energy line (TEL) are same
(d) Total energy line (TEL) is below hydraulic energy line (HGL)

31. Manning's equation is used in open channel to estimate

- (a) average velocity (b) average depth
(c) average slope (d) average discharge

32. A rectangular open channel of depth y and width B is economic or efficient if

- (a) $y = 2B$ (b) $B = 2y$
(c) $y = 1.5B$ (d) $B = 1.5y$

33. In open channel flow, when specific energy is minimum, flow condition is

- (a) super critical (b) sub critical
(c) transitional (d) critical

34. Hydraulic jump occurs when the channel bed slope changes from
- (a) subcritical to supercritical (b) super critical to subcritical
(c) critical to subcritical (d) none of the above
35. In gradually varied flow of open channel flow, a flow profiles occurs upstream of a weir is M_1 profile. The depth at any section of the profiles is
- (a) below normal depth y_n (b) above normal depth y_n
(c) below critical depth y_c (d) between y_n and y_c
36. In non-uniform steady gradually varied flow
- (a) velocity varies gradually (b) depth changes gradually
(c) discharge changes (d) pressure changes gradually
37. Hydraulic jump is an example of
- (a) steady gradually varied flow (b) unsteady gradually varied flow
(c) rapidly varied flow (d) uniform flow
38. Discharge over a broad crested weir is maximum when depth of flow h over the crest is related to the total head H by
- (a) $h = \frac{H}{3}$ (b) $h = \frac{2}{3}H$
(c) $h = \frac{H}{2}$ (d) $h = \frac{2}{5}H$
39. Pressure rise within the pipe due to water hammer depends on
- (a) velocity of flow
(b) time of valve closure
(c) elastic properties of fluid and pipe materials
(d) all the above
40. The Reynolds number R_e in pipe flow is less than 2000. The flow within the pipe is
- (a) laminar (b) viscous
(c) turbulent (d) (a) and (b)
41. The parameters (friction factor f , Reynolds number R_e , roughness number D/k) plot diagram is called
- (a) Moody's diagram (b) Stanton-Pannel diagram
(c) Reynolds diagram (d) (a) and (b)

42. In laminar boundary layer, thickness of boundary layer δ varies with longitudinal distance x from leading edge as

- (a) $x^{-1/2}$ (b) $x^{1/2}$
(c) x (d) x^2

43. If n is the total number of variables to describe a phenomenon, m is the number of fundamental quantities, then Buckingham π -theorem in dimensional analysis, expresses the resulting equation in terms of

- (a) repeating variables (b) n dimensionless parameters
(c) $(n-m)$ dimensionless parameters (d) none of the above

44. In compressible flow, Mach number is 1, and then flow is called

- (a) subsonic (b) supersonic
(c) sonic (d) none of the above

45. Stagnation point is the point in flowing fluid where

- (a) pressure is zero (b) where velocity is zero
(c) total energy is maximum (d) momentum of flow is zero

46. If F_D is the drag force, u_s is the free upstream velocity around a submerged body of projected area A and ρ is the density of the fluid then grad coefficient C_D is

- (a) $\frac{F_D}{\rho u_s^2 A}$ (b) $\frac{F_D}{\frac{1}{2} \rho u_s^2 A}$
(c) $\frac{F_D}{\frac{1}{2} \rho u_s^2 A^2}$ (d) none of the above

47. Model of river is

- (a) simple model (b) undistorted model
(c) distorted model (d) all the above

48. The idea of utilizing hydraulic energy to develop mechanical had been first mooted by

- (a) J.V.Poncelet (b) G.Coriolis
(c) J.B.Francis (d) L.A.Pelton and V.Kaplan

49. Low head turbine is

- (a) Kaplan turbine (b) Pelton wheel
(c) modern Francis turbine (d) all the above

50. Low specific speed turbine is

- (a) Francis turbine
- (b) Kaplan turbine
- (c) Pelton wheel
- (d) all the above

51. Figure 2.1 shows the part of a hydro-electric project.

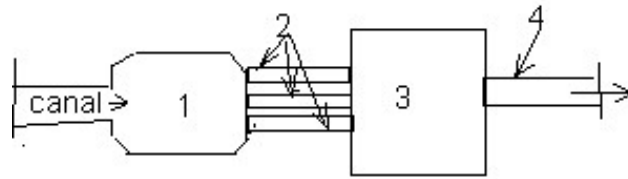


Figure 2.1

- (a) 1 indicates forebay or pondage
- (b) 2 indicates penstocks
- (c) 3 indicates power house
- (d) 4 indicates tail race
- (e) all the above are correct

52. Performance of turbine under unit head is expressed in

- (a) unit speed (N_u)
- (b) unit power (P_u)
- (c) unit discharge (Q_u)
- (d) all the above

53. Hydraulic machine in which the energy of large quantity of water falling through a small height is utilized to lift small quantity of water to a greater height without any external force is called

- (a) hydraulic ram
- (b) hydraulic press
- (c) hydraulic lift
- (d) hydraulic accumulator

54. In a centrifugal pump casing, flow of water leaving the impeller is

- (a) rectilinear
- (b) radial
- (c) free vortex motion
- (d) forced vortex motion

55. Air vessel is essential in

- (a) centrifugal pump
- (b) reciprocating pump
- (c) air lift pump
- (d) submersible pump

56. On the basis of the direction of flow of water through the runner, hydraulic turbines are classified as

- (a) tangential flow turbine (Pelton wheel)
- (b) radial flow turbine (Francis turbine)
- (c) axial flow turbine (Kaplan turbine)
- (d) mixed flow turbine (modern Francis turbine)

57. Choose the correct statement from the following

- (a) Rivers, oceans, lakes and springs get water from rain
- (b) Rain water is obtained by evaporation from lakes, oceans and lakes
- (c) Water remains in atmosphere as vapours and clouds
- (d) Hydrologic cycle is a continuous process of evaporation and precipitation of water in atmosphere
- (e) all the above

58. Precipitation that occurs due to conflict between two air masses is called

- (a) frontal precipitation
- (b) convective precipitation
- (c) orographic precipitation
- (d) cyclonic precipitation

59. Symon's rain gauge is

- (a) non-recording gauge
- (b) tipping bucket gauge
- (c) flat recording gauge
- (d) weighing type gauge

60. For determination of average precipitation in a catchment, best method is

- (a) arithmetical method
- (b) isohytel mean method
- (c) Thiessen polygon method
- (d) none of the above

61. To check the inconsistency and the incorrect rainfalls recorded at a station for few years, the curve devised by Kohler is called

- (a) hyetograph
- (b) frequency curve
- (c) double mass curve
- (d) intensity duration curve

62. ϕ -index, W-index, f_{av} index are some indices to measure

- (a) rainfall
- (b) infiltration
- (c) evaporation
- (d) transpiration

63. Hydrograph is a graphical representation of

- (a) surface runoff against time
- (b) ground water flow against time
- (c) rainfall against time
- (d) discharge of river against time

64. Unit hydrograph theory was enunciated by

- (a) L.K.Sherman
- (b) R.E.Horton
- (c) J.R.Philips
- (d) E.J.Gumbel

65. Synthetic unit hydrographs of Snyder based on parameters

- (a) Base time T (b) Peak discharge Q_p
(c) basin lag time t_p (d) all the above

66. A part of water from plants that goes in the sky to join the clouds is called

- (a) evaporation (b) transpiration
(c) interception (d) none of the above

67. Stream gauging is the method of measurement of

- (a) rainfall (b) runoff
(c) discharge (d) evapotranspiration

68. Determination of modification of flood wave parameters with time and distance is called

- (a) flood forecasting (b) flood routing
(c) flood frequency (d) all the above

69. Capacity of reservoir is usually determined by

- (a) mass curve of rainfall (b) mass curve of inflow
(c) depth-area duration curve (d) intensity duration frequency curve

70. Hydrologic routing is based on

- (a) storage continuity equation (b) momentum equation
(c) energy equation (d) none of the above

71. When the available data to make frequency analysis is not adequate, the method of flood analysis is done by

- (a) regional flood-frequency analysis (b) partial series analysis
(c) Stochastic method (d) Gumbel flood frequency analysis

72. The river which is in the process of building up its own bed and certain slope due to excess sediment is called

- (a) degrading river (b) aggrading river
(c) virgin river (d) stable river

73. The stages of river in flood plain is called

- (a) trough stage (b) delta stage
(c) sub-mountain stage (d) none of the above

74. Base flow is separated from hydro graph by

- (a) straight line method
- (b) fixed base method
- (c) variable slope method
- (d) all the above

75. The concept of instantaneous unit hydrograph (IUH) was introduced first by

- (a) C.O.Clark
- (b) J.E.Nash
- (c) L.K.Sherman
- (d) V.T.Chow

76. The earthen embankments constructed parallel to the river banks at suitable distance for flood control are called

- (a) flood walls
- (b) dikes
- (c) levees
- (d) both (b) and (c)

77. River training works are necessary to

- (a) direct the river flow in a desired path
- (b) minimize the problems of flood and erosion
- (c) control meandering and deposition
- (d) all the above

78. If a spur is constructed at about 60° to 80° inclined upstream, it is called

- (a) attracting spur
- (b) deflecting spur
- (c) repelling spur
- (b) permeable spur

79. Ground water occurs in different zones below ground level (GL). The zone just below the GL is

- (a) zone of aeration
- (b) capillary fringe
- (c) unconfined aquifer
- (d) pressure or confined aquifer

80. In deriving unsteady flow equations in groundwater flow, the assumptions are

- (a) aquifer is homogeneous, isotropic and of infinite extent
- (b) before pumping piezometric head is horizontal
- (c) rate of pumping is assumed to be zero
- (d) well diameter is small so storage in well is neglected
- (e) all the above

81. In groundwater, relation of volume of void V_v in soil mass to the total volume V_t is called

- (a) coefficient of permeability
- (b) porosity
- (c) coefficient of transmissibility
- (d) storage coefficient

82. The useful soil moisture for plant growth is

- (a) chemical water (b) hygroscopic water
(c) capillary water (d) gravity water

83. The field capacity of a soil depends upon

- (a) capillary tension in soil (b) porosity of soil
(c) both (a) and (b) (d) neither (a) nor (b)

84. According to Garde and Ranga-Raju incipient motion condition of sediment is based on

- (a) competent velocity approach (b) lift force approach
(c) critical tractive force (d) all the above

85. The most popular and widely used theory of sediment in channel and stream is

- (a) Brahm's and Aier's theory (b) Jaffrey's lift concept theory
(c) White's theory (d) Shields' tractive force theory

86. If the irrigation efficiency is 80%, conveyance losses is 20% and actual depth of watering is 16 cm, the depth of water to be supplied at the outlet is

- (a) 25 cm (b) 20 cm
(c) 30 cm (d) 35 cm

87. If D is the duty in ha/cumec, B is the base period of a crop in days, Δ is the depth of water in metre, the relationship among them are

- (a) $D = 8.64 \frac{\Delta}{B}$ (b) $D = 8.64 \frac{B}{\Delta}$
(c) $\Delta = 8.64 \frac{B}{D}$ (d) none of the above

88. For standing crops in undulating sandy fields, the best method of irrigation is

- (a) free flooding (b) check flooding
(c) furrow method (d) sprinkler irrigation

89. Best irrigation canal generally aligned along

- (a) valley line (b) contour line
(c) ridge line (d) straight line

90. If V , R and f are regime velocity, hydraulic radius and silt factor in Lacey's regime channel, then silt factor f is equal to

(a) $f = \frac{2 V^2}{5 R}$ (b) $f = \frac{5 V^2}{2 R}$

(c) $f = \frac{3 V^2}{5 R}$ (d) $f = \frac{4 V^2}{5 R}$

91. According to Kennedy's theory, the critical velocity in metres in an irrigation canal which keeps the channel free from silting and scouring, is

(a) $0.55mD^{0.64}$ (b) $0.84mD^{0.64}$

(c) $0.84mD^{0.54}$ (d) $0.55mD^{0.54}$

92. The canal fall which has gradual convex and concave surfaces, is called

(a) Inglis fall (b) ogee fall

(c) straight glacis fall (d) stepped fall

93. When canal bed level is higher than the natural drainage, then the canal is carried over a natural drainage. Such cross drainage work is called

(a) aqueduct (b) super passage

(c) siphon (d) level crossing

94. When the canal and the drainage meet each other at the same level and quality of water of both is almost the same, cross drainage work constructed is

(a) super passage (b) siphon

(c) level crossing (d) aqueduct

95. Main causes of water logging are

(a) excessive rainfall (b) inadequate surface drainage

(c) low permeability of soil (d) all the above

96. Lacey's regime equation of velocity for calculating flood discharge in river is

(a) $V = 10.8R^{2/3}S^{1/3}$ (b) $V = 10.8R^{1/2}S^{1/2}$

(c) $V = 10.8R^{1/3}S^{2/3}$ (d) $V = 10.8R^{2/3}S^{1/3}$

97. The scour depth of a river during flood may be calculated from the Lacey's equation with usual notations, is

(a) $D = 0.47\left(\frac{Q}{f}\right)^{1/2}$ (b) $D = 0.47\left(\frac{Q}{f}\right)^{1/3}$

(c) $D = 0.47\left(\frac{Q}{f}\right)^{2/3}$ (d) $D = 0.47\left(\frac{Q}{f}\right)^{1/4}$

98. Canal lining is provided to

- (a) reduce the seepage loss (b) increase the life of canal
(c) control growth of weeds (d) all the above

99. In the design of rigid boundary canals by method of economic section in a trapezoidal channel, following conditions are fulfilled

- (a) hydraulic radius R is one third of depth y
(b) side slope is inclined to the horizontal at 45° to the horizontal
(c) half of top width is equal to one slanting side
(d) none of the above

100. Out of the following sources of water, which one is not used for water supply as surface source?

- (a) Rivers and streams (b) Lakes and ponds
(c) Underground water storage (d) Storage reservoir

101. Yield of well is determined by the method

- (a) recuperation test (b) constant level test
(c) (a) and (b) (d) none of the above

102. The causes of solid waste pollution are

- (a) population increase (b) affluence
(c) growth of technology (d) all the above

103. Source of noise from domestic, loud speaker, construction, transport, crowded market, theaters, religious rituals, projection of satellites, atomic explosion etc. are classified as

- (a) industrial (b) non-industrial
(c) thermal (d) all the above

104. Cohesion less soil is

- (a) silt (b) sand
(c) clay (d) clay and silt

105. The father of soil mechanics is

- (a) Karl Terzaghi (b) Fellenius
(c) Kray (d) Henkel

106. Bearing capacity of a soil depends on

- (a) size of particles
- (b) shape of particles
- (c) cohesive properties of particles
- (d) internal frictional resistance of particles
- (e) all the above

107. Flow net is utilized for determination of

- (a) hydrostatic pressure
- (b) seepage
- (c) exit gradient
- (d) seepage pressure

108. Laplace equation in 3-Dimensional flow through soil with general notations is

- (a) $\frac{\delta^2 \phi}{\delta x^2} + \frac{\delta^2 \phi}{\delta y^2} + \frac{\delta^2 \phi}{\delta z^2} = 0$
- (b) $\frac{\delta^2 h}{\delta x^2} + \frac{\delta^2 h}{\delta y^2} + \frac{\delta^2 h}{\delta z^2} = 0$
- (c) $\frac{\delta u}{\delta x} + \frac{\delta v}{\delta y} + \frac{\delta w}{\delta z} = 0$
- (d) none of the above

109. For general engineering purposes, soils are classified as

- (a) particle size system
- (b) textural system
- (c) High Way Research Board system
- (d) unified soil classification system

110. The most common foundation that can be laid in an open excavation by allowing natural slopes on all sides, is

- (a) open or shallow foundation
- (b) grillage foundation
- (c) raft foundation
- (d) deep foundation

111. Triaxial shear test is preferred to direct shear test because

- (a) stress distribution on the failure plane is not uniform
- (b) it can be performed under all three drainage conditions with complete control
- (c) precise measurement of the pore pressure and change in volume during test, is not possible
- (d) none of the above

112. Rankine's theory of active earth pressure assumptions are

- (a) soil mass is homogenous, dry and cohesion less
- (b) ground surface may be horizontal or inclined
- (c) back of the wall is vertical and smooth
- (d) all the above

113. Curvature of earth is considered in:

- | | | | |
|---------------------------|--------------------------|--------------------------------|--------------------------|
| (a) plane surveying | <input type="checkbox"/> | (b) geodetic surveying | <input type="checkbox"/> |
| (c) compass survey | <input type="checkbox"/> | (d) survey in small area | <input type="checkbox"/> |

114. Plumb bob is used for

- | | | | |
|----------------------------|--------------------------|------------------------------|--------------------------|
| (a) levelling | <input type="checkbox"/> | (b) measuring distance | <input type="checkbox"/> |
| (c) measuring angles | <input type="checkbox"/> | (d) centering | <input type="checkbox"/> |

115. The survey instrument named optical square is used to measure

- | | | | |
|--------------------------------|--------------------------|------------------|--------------------------|
| (a) distance | <input type="checkbox"/> | (b) angles | <input type="checkbox"/> |
| (c) setting right angles | <input type="checkbox"/> | (d) area | <input type="checkbox"/> |

116. Difference FB and BB of a line without local attraction is

- | | | | |
|-----------------------|--------------------------|-----------------------|--------------------------|
| (a) 100° | <input type="checkbox"/> | (b) 270° | <input type="checkbox"/> |
| (c) 180° | <input type="checkbox"/> | (d) 200° | <input type="checkbox"/> |

117. Extensively used levelling instrument is

- | | | | |
|-------------------------|--------------------------|-----------------------|--------------------------|
| (a) tilting level | <input type="checkbox"/> | (b) wye level | <input type="checkbox"/> |
| (c) dumpy level | <input type="checkbox"/> | (d) bubble tube | <input type="checkbox"/> |

118. In hydroelectric project, contour map is used for

- | | | | |
|--------------------------------|--------------------------|--------------------------|--------------------------|
| (a) reservoir capacities | <input type="checkbox"/> | (b) reservoir area | <input type="checkbox"/> |
| (c) power house | <input type="checkbox"/> | (d) dam design | <input type="checkbox"/> |

119. Contour lines overlap in

- | | | | |
|--------------------------|--------------------------|--------------------------------|--------------------------|
| (a) vertical cliff | <input type="checkbox"/> | (b) steep slope | <input type="checkbox"/> |
| (c) hill | <input type="checkbox"/> | (d) all (a), (b) and (c) | <input type="checkbox"/> |

120. The process of keeping the plane table into a fixed direction so that a line representing a direction on the ground is

- | | | | |
|---------------------|--------------------------|-----------------------|--------------------------|
| (a) centering | <input type="checkbox"/> | (b) orientation | <input type="checkbox"/> |
| (c) levelling | <input type="checkbox"/> | (d) resection | <input type="checkbox"/> |

121. Two point problem compared to three point problem is

- | | | | |
|--------------------------|--------------------------|-------------------------|--------------------------|
| (a) more accurate | <input type="checkbox"/> | (b) quicker | <input type="checkbox"/> |
| (c) more laborious | <input type="checkbox"/> | (d) all the above | <input type="checkbox"/> |

122. The operation to make the vertical axis of the theodolite truly vertical is called.

- | | | | |
|---------------------------|--------------------------|---------------------|--------------------------|
| (a) Changing face | <input type="checkbox"/> | (b) Centering | <input type="checkbox"/> |
| (c) Double sighting | <input type="checkbox"/> | (d) Levelling | <input type="checkbox"/> |

123. The final setting of the plates of theodolite when taking a foresight is achieved by using the

- (a) upper clamps screw (b) upper tangent screw
(c) lower clamp screw (d) lower tangent screw

124. The values or signs of latitude and departure of a line are both negative, Reduced bearing θ of the line is

- (a) N θ W (b) S θ E
(c) S θ W (d) N θ W

125. The trapezoidal rule of volume V of an embankment divided into number of sections equidistant L , is given by

- (a) $V = L(\frac{A_1 + A_n}{2} + A_2 + A_3 + \dots + A_{n-1})$
(b) $V = \frac{L}{2}(\frac{A_1 + A_n}{4} + A_2 + A_3 + \dots + A_{n-1})$
(c) $V = \frac{L}{2}(A_1 + A_n + 2(A_2 + A_4 + \dots + A_{n-1}) + 4(A_3 + A_5 + \dots + A_{n-2}))$
(d) none of the above

126. If the degree of the curve (specified length 30m) is 153° , the radius of the curve is approximately

- (a) 573m (b) 382m
(c) 1910m (d) none of the above

127. If R is the radius of a simple curve and f is the angle of deflection, its tangent length is

- (a) $R \sin\left(\frac{\phi}{2}\right)$ (b) $R \cot\left(\frac{\phi}{2}\right)$
(c) $R \tan\left(\frac{\phi}{2}\right)$ (d) $R \cos\left(\frac{\phi}{2}\right)$

128. To avoid inconvenience to slow-moving vehicles, the maximum value of the centrifugal ratio on roads is generally taken as

- (a) $\frac{1}{2}$ (b) $\frac{1}{4}$
(c) $\frac{1}{8}$ (d) 1

129. Deflection angles for setting out a transition curve are calculated by the formula

- (a) $\alpha = \frac{1718.87\ell^2}{RL}$ (b) $\alpha = \frac{573\ell^2}{RL}$
(c) $\alpha = \frac{573\ell}{RL}$ (d) none of the above

- 130.** The shape of the vertical curve is generally a
- (a) Parabola (b) Circle
(c) Hyperbola (d) Spiral
- 131.** In scanty rainfall region, the camber provided is
- (a) flatter (b) steeper
(c) nil (d) none of the above
- 132.** Different electronic distance measurement (EDM) instruments are
- (a) Tellurometer (b) Geodimeter
(c) Distameter (d) Electro-optical Distance Meter
(e) all the above
- 133.** A well conditioned triangle in a triangulation system is
- (a) an isosceles triangle of base angles of $56^{\circ}14'$
(b) an isosceles triangle of base angles of $66^{\circ}14'$
(c) an isosceles triangle of base angles of $76^{\circ}14'$
(d) none of the above
- 134.** Remote sensing is the science of making inferences about objects from measurements, made at a distance, without coming into physical contact with the object under study, may be of the following types
- (a) active remote sensing (b) passive remote sensing
(c) both (a) and (b) (d) none of the above
- 135.** Global Positioning System (GPS) has become widely used aid to
- (a) navigation world wide and a useful tool for map making
(b) land surveying, off shore drilling
(c) pipe and power line survey
(d) navigation to civilian ships and air crafts
(e) all the above
- 136.** The first Indian railway was laid in
- (a) 1775 (b) 1804
(c) 1825 (d) 1853
- 137.** The road foundation for modern highways construction was developed by
- (a) Telford (b) Macadam
(c) Tresguet (d) Telford and Macadam simultaneously

138. California Bearing Ratio method of designing flexible pavements is more accurate as it involves

- (a) character of the road making materials
- (b) characteristics of soil
- (c) traffic intensities
- (d) none of the above

139. According to Railway Board, diamond crossing should be flatter than

- (a) 1 in 16 (b) 1 in 12
- (c) 1 in 8.5 (d) 1 in 6

140. For night landing, the thresholds are lighted

- (a) white (b) yellow
- (c) green (d) red

141. The convexity is provided to the carriage way between the crown and the edge of the pavement, is known as

- (a) camber (b) super-elevation
- (c) height of the pavement (d) none of the above

142. On the recommendation of Indian Road Congress, the ruling gradient in plains, is

- (a) 1 in 10 (b) 1 in 15
- (c) 1 in 20 (d) 1 in 30

143. If V is the speed of the moving vehicle, R is the radius of the curve, g is the acceleration due to gravity, W is the width of the carriageway, the super-elevation is

- (a) $\frac{WV^2}{Rg}$ (b) $\frac{W^2V}{Rg}$
- (c) $\frac{W^2V^2}{Rg}$ (d) $\frac{WV}{Rg}$

144. For the movement of vehicles at the intersection of two roads, without any interference, the type of grade separation generally provided is

- (a) delta (b) clover leaf
- (c) diamond interchange (d) trumpet

145. International Civil Aviation Organisation (ICAO) was set up in Montreal in

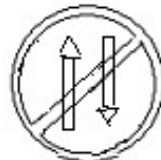
- (a) 1950 (b) 1947
- (c) 1939 (d) 1929

146. The length of a runway under standard atmospheric conditions is 1800 m. If the actual reduced level of the site is 1200 m, the required length of runway is

- (a) 2660 m
- (b) 2560 m
- (c) 2460 m
- (d) 2360 m

147. The following road sign indicates

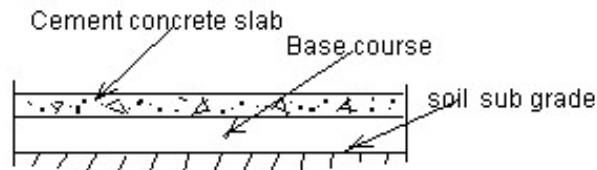
- (a) one-way sign
- (b) prohibited both ways
- (c) no entry
- (d) none of the above



Road sign

148. The following road pavement is called

- (a) Flexible pavement
- (b) Rigid pavement
- (c) Semi rigid pavement
- (d) Composite pavement



Road pavement

149. The following sectional view of road represents

- (a) national highway
- (b) major district road
- (c) other district road
- (d) village road

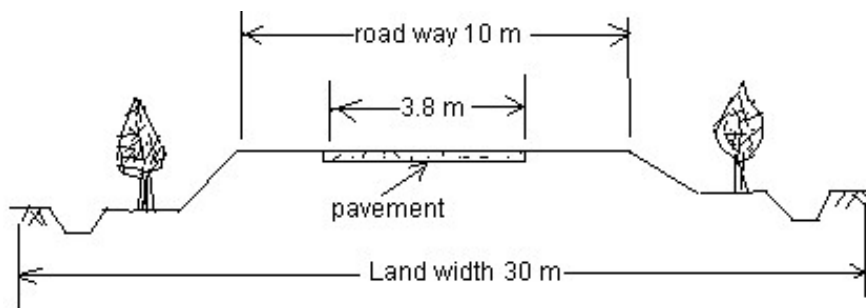


Figure 25.3 Sectional view of road

150. The main function of sleepers is

- (a) to hold rails at correct gauge
- (b) to support rails
- (c) to distribute load from rails to ballast.
- (d) all the above