

- 1 When a train passes on curves which have no super-elevation it will give thrust on
  - (a) the inner rail
  - (b) the outer rail
  - (c) inner side of the inner rail
  - (d) inner side of the outer rail
  
- 2 A scissor crossover between two parallel railway tracks contains
  - (a) attriangle crossover
  - (b) a turn-table device
  - (c) a diamond crossover
  - (d) None of the above
  
- 3 Runway length required under standard conditions is 1500 m. The actual elevation of the site is 1100 m above M.S.L. Runway length corrected for altitude will be
  - (a) 1115 m
  - (b) 1678 m
  - (c) 1885 m
  - (d) 2050 m
  
- 4 Based on spot speed data which speed is used for geometric design of roads ?
  - (a) 15 percentile
  - (b) 50 percentile
  - (c) 85 percentile
  - (d) 98 percentile
  
- 5 The rate of rise/fall of the road surface along its length, is called
  - (a) Cant
  - (b) Super-elevation
  - (c) Banking
  - (d) Gradient
  
- 6 As per I.R.C., it is considered appropriate that roads in rural areas should be designed for
  - (a) 20 - 25 years
  - (b) 15 - 20 years
  - (c) 10 - 15 years
  - (d) 5 - 10 years
  
- 7 Relation between gradient ( $g$ ) and camber ( $c$ ) in case of roads, is
  - (a)  $g = c$
  - (b)  $g = \frac{c}{2}$
  - (c)  $c = \frac{3}{4}g$
  - (d)  $c = \frac{g}{2}$
  
- 8 Horizontal alignment in mountainous country is conditioned by
  - (a) Drainage structures
  - (b) Depth of cut and fill
  - (c) Cost of right of way
  - (d) Maximum grade criteria
  
- 9 The main function of fish plates is
  - (a) to join the two rails together.

- (b) to join rails with the sleeper.  
 (c) to allow rail to expand and contract freely.  
 (d). None of the above.
- 10 In railways, most severe gradient is  
 (a) Gradients of rack railways  
 (b) Pusher gradient  
 (c) Momentum gradient  
 (d) Exceptional gradient
- 11 The transition curve used in the horizontal alignment of highways as per IRC recommendation is  
 (a) Cubic spiral  
 (b) Lemniscate  
 (c) Cubic Parabola  
 (d) None of the above
- 12 For sandy soils the most common method of stabilization is  
 (a) soil-cement stabilization  
 (b) mechanical stabilization  
 (c) soil-lime stabilization  
 (d) soil-bitumen stabilization
- 13 The station which is selected closed to the main triangulation station, to avoid intervening obstruction, is known as  
 (a) satellite station  
 (b) false station  
 (c) supplementary station  
 (d) pivot station
- 14 A tape of length '  $l$  ' and weight '  $W$  ' kg/m, is suspended at its ends with a pull of '  $P$  ' kg., the sag correction is  
 (a)  $\frac{l^3 W^2}{24P^2}$   
 (b)  $\frac{l^2 W^3}{24P^2}$   
 (c)  $\frac{l^2 W^2}{24P^3}$   
 (d)  $\frac{lW^2}{24P}$
- 15  $\theta_1$  and  $\theta_2$  are the angles of elevation from '  $A$  ' to the top and bottom of a vertically held rod of length '  $S$  ' at B. The horizontal distance AB will be  
 (a)  $\frac{S}{\tan \theta_1 - \tan \theta_2}$   
 (b)  $\frac{S}{\tan \theta_1 + \tan \theta_2}$   
 (c)  $\frac{S}{\tan \theta_2 - \tan \theta_1}$   
 (d)  $S(\tan \theta_1 - \tan \theta_2)$
- 16 The radius of a simple circular curve is 300 m and length of its specified Chord is 39 m. The degree of the curve is  
 (a)  $5.73^\circ$

- (b)  $5.37^\circ$
- (c)  $3.57^\circ$
- (d)  $3.75^\circ$

17 Shift of a circular curve is given by

- (a)  $L^2/6R$
- (b)  $L^2/24R$
- (c)  $L/24R$
- (d)  $L/6R$

Where  $L$  = Length of transition curve

$R$  = Radius of circular curve

18 The multiplying constant of a tachometer is given by

- (a)  $\frac{f}{i}$
- (b)  $\frac{i}{f}$
- (c)  $f + d$
- (d)  $\frac{f+d}{i}$

where ' $f$ ' is focal length of the objective, ' $i$ ' is the stadia interval and ' $d$ ' is the distance between the objective and the vertical axis.

19 Tachometric formula for horizontal distances using inclined sights through  $\theta$  is obtained by multiplying

- (a) the constants by  $\sin^2 \theta$
- (b) the constants by  $\cos^2 \theta$
- (c) the constants by  $\cos \theta$
- (o) the multiplying constant by  $\cos^2 \theta$  and additive constant by  $\cos \theta$

20 In aerial vertical photography, the longitudinal overlap is normally kept as

- (a) 50%
- (b) 60%
- (c) 70%
- (d) 75%

21 The main plate of a theodolite is divided into 1440 equal divisions. 60 divisions of the vernier coincide exactly with 59 divisions of the main scale. The least count of the theodolite is

- (a)  $5''$
- (b)  $10''$
- (c)  $15''$
- (d)  $20''$

22 Perpendicular offset from a tangent to the junction of a transition curve and circular curve is equal to

- (a)  $s$
- (b)  $2 S$
- (c)  $3 S$
- (d)  $4 S$  where ' $S$ ' is shift.

- 23 In plane tabling the instrument used to measure horizontal and vertical distances directly is known as
- Simple alidade
  - Telescopic alidade
  - Tacheometer
  - Clinometer
- 24 With usual notations, the expression  $\frac{v^2}{gR}$  represents
- centrifugal force
  - centrifugal ratio
  - super-elevation
  - radial acceleration
- 25 If the length of chain is 20 m, the degree of curve is given by
- $1146/R$
  - $1546/R$
  - $1519/R$
  - $1119/R$
- where R is radius of circular curve.
- 26 If the image of a triangulation station of R.L. 500 m is 4 cm from the principal point of a vertical photo taken from an altitude of 2000 m above datum, the height of displacement will be
- 6 mm
  - 8 mm
  - 10 mm
  - 12 mm
- 27 As per IS, the length of one link in a 30 make chain should be
- 20 cm
  - 30 cm
  - 40 cm
  - 100 cm
- 28 In Plane tabling failure of fix occurs when
- The plane table is inside the great triangle.
  - The plane table is inside the great circle.
  - The plane table is outside the great circle.
  - The plane table is on the great circle.
- 29 In levelling, the correction due to refraction may be taken as.
- $\frac{1}{2}C_c$
  - $\frac{1}{3}C_c$
  - $\frac{1}{5}C_c$
  - $\frac{1}{7}C_c$
- where  $C_c$  = corr. due to curvature
- 30 The length of long chord in a circular curve is equal to :
- $R \sin \phi$

(b)  $R \cos \phi$

(g)  $2R \sin \frac{\phi}{2}$

(d)  $2R \cos \frac{\phi}{2}$

where '  $R$  ' is the radius of the curve, '  $\phi$  ' is the deflection angle.

- 31 The maximum rate of change of radial acceleration allowed on transition curves is.
- (a) 100 mm/sec<sup>3</sup>
  - (b) 300 mm/sec<sup>3</sup>
  - (c) 400 mm/sec<sup>3</sup>
  - (d) /500 mm/sec<sup>3</sup>
- 32 In a centered triang'le the equations of condition are
- (a) four angle conditions
  - (b) three angle conditions and one side condition.
  - (c) four angle conditions and one side, condition.
  - (d) three angle conditions and two side conditions only.
- 33 In case of gravity dam subjected to earthquake; the hydrodynamic pressure variation curve is taken to be
- (a). Parabolic
  - (b) Elliptical
  - (c) Triangular
  - (d) Elliptical cum parabolic
- 34 A hydraulic jump is formed when
- (a) a subcritical flow meets a supercritical flow.
  - (b) a subcritical flow meets a subcritical flow.
  - (c) a supercritical flow meets a supercritical flow.
  - (d) a supercritical flow meets a subcritical flow.
- 35 If the flood discharge flowing in a river is 3600 m<sup>3</sup>/s, its perimeter as per Lacey's theory is likely to be
- (a) 360 m
  - (b) 300 m
  - (c) 285 m
  - (d) 270 m
- 36 The hydraulic failure of an · earth dam includes the following:
- (a) over topping and wave erosion
  - (b) toe erosion and gullying
  - (c) piping and sloughing
  - (d) both (a) and (b)
- 37 Crest level is kept low with large gates in the following :
- (a) Sluice
  - (b) Escape
  - (c) Regulator
  - (d) Barrage

- 38 In an aqueduct, natural drainage is kept at the following of a canal
- at the same level
  - below
  - above
  - None of these
- 39 The uplift pressure on upstream floor of a hydraulic structure determined by Bligh's theory as compared to Khosla's theory is
- same
  - more
  - less
  - None of the above
- 40 The exit gradient determined by Khosla's theory in case of design of weir working under head 'H' with impervious floor length 'b' and depth of downstream sheet pile as  $d$  is :
- $\frac{H}{d} \frac{1}{\pi\sqrt{\lambda}}$
  - $\frac{d}{H} \frac{1}{\pi\sqrt{\lambda}}$
  - $\frac{H}{d} \frac{1}{\sqrt{\lambda}}$
  - $\frac{H}{d} \cos^{-1} \left( \frac{\lambda-1}{\lambda} \right)$
- where  $\lambda$  is a function of  $b$  and  $d$ .
- 41 Which of the following is a type of semi-modular outlet?
- Submerged pipe outlet
  - Open flume outlet
  - Both (a) and (b)
  - Kennedy's Gauge outlet
- 42 The ratio of head recovered to head put in an outlet is called
- proportionality
  - efficiency
  - flexibility
  - sensitivity
- 43 If the discharge in a canal equals to  $70 \text{ m}^3/\text{s}$  with its silt factor  $\sqrt{2}$ , the velocity of flow in canal as per Lacey's theory is
- 0.5 m/s
  - 0.75 m/s
  - 1.0 m/s
  - 1.25 m/s
- 44 In a Sarda type fall, the width 'B' of the trapezoidal crest is given by
- $B = 0.44\sqrt{H + d}$
  - $B = 0.44\sqrt{H - d}$
  - $B = 0.55\sqrt{H + d}$
  - $B = 0.55\sqrt{H - d}$
- where 'H' = depth of water  
'd' = drop in bed level

- 45 When the drain is over the canal, the structure provided is known as  
(a) aqueduct  
(b) canal syphon  
(c) super-passage  
(d) syphon aqueduct
- 46 For an annual flood series arranged in decreasing order of magnitude, the return period for a magnitude listed at position '  $m$  ' in a total of  $N$  entries is  
(a)  $m/N$   
(b)  $m/(N + 1)$   
(c)  $(x + 1)/m$   
(d)  $N/(m + 1)$
- 47 The total rainfall in a catchment area  $1200 \text{ km}^2$  during a 6 hours storm is 16 cm. While the surface run-off due to storm is  $1.2 \times 10^8 \text{ m}^3$ . The  $\phi$  index is  
(a)  $n^{0.1} \text{ cm/hr}$ .  
(b) 1.0 cm/hr.  
(c) 0.2 cm/hr.  
(d) cannot be estimated
- 48 Thickness of concrete lining is governed by  
(a) requirement of imperviousness.  
(b) requirement of imperviousness & structural strength.  
(c) Thumb rule for providing nominal thickness.  
(d) slope of bank.
- 49 Silt ejectors are provided as a silt control device on  
(a) upstream of a spillway  
(b) downstream of a spillway  
(c) upstream of a canal head regulator  
(d) downstream of a canal head regulator.
- 50 The uplift pressure on the roof of a siphon aqueduct is maximum when  
(a) canal is running at full supply level and drain is dry.  
(b) drain is running at high flood level and canal is dry.  
(c) canal is running dry.  
(d) drain is running dry.
- 51 Out of total liquid water on earth, the brackish water is  
(a) above 95 percent  
(b) around 75 percent  
(c) around 50 percent  
(d) estimates are not available
- 52 The suitable method for irrigating highly modulating land is  
(a) drip irrigation  
(b) furrow irrigation  
(c) sprinkler irrigation  
(d) None of the above
- 53 Water logging occurs when the water table is  
(a) upto root zone of crops

- (b) 3.0 m below G.L.
  - (c) 4.0 m below G.L.
  - (d) 4.5 m below G.L.
- 54 The Muskingham's method of flood routing through a river reach is primarily a
- (a) one parameter model
  - (b) two parameter model
  - (c) three parameter model
  - (d) model having no parameters
- 55 The ground water movement in alluvial soils is analyzed with the help of
- (a) Kennedy's equations and relationship
  - (b) Lacey's equations
  - (t) Darcy's equations
  - (d) Froude's criterion
- 56 The water utilizable by plants is available in soils mainly in the form of
- (a) gravity water
  - (b) capillary water
  - (c) hygroscopic water
  - (d) chemical water
- 57 The downstream curve of the ogee profile for an ogee shaped spillway crest is given by
- (a)  $\left(\frac{x}{H}\right)^{0.85} = 2\left(\frac{y}{x}\right)$
  - (b)  $x^{0.85} = 2H^{1.85}y$
  - (c)  $x^{1.85} = 2Hy^{0.85}$
  - (d)  $y^{1.85} = 2H^{0.85}x$
- where terms have usual meaning.
- 58 The indicator used in C.O.D. test is
- (a) starch
  - (b) phenolphthalein
  - (c) ferrous ammonium sulphate
  - (d) ferroin
- 59 The best sewer material to resist hydrogen sulphide corrosion is
- (a) R.C.C.
  - (b) brick masonry
  - (c) asbestos cement
  - (d) glazed stoneware
- 60 The bacteria's which may survive with or without free oxygen, are called
- (a) aerobic bacteria
  - (b) anaerobic bacteria
  - (c) facultative bacteria
  - (d) None of the above
- 61 The maximum depth of sedimentation tanks is limited to
- (a) 2 m
  - (b) 4 m



- (c) 5 m
  - (d) 6 m
- 62 GQD/BOD ratio of fresh water is
- (a) less than 1
  - (b) more than 1
  - (c) equal to 1
  - (d) None of these
- 63 The proportion of solids in sewage is about,
- (a) 2.5% or more
  - (b) 1% or more
  - (c) 0.1% or less
  - (d) zero
- 64 Disinfection of water results in
- (a) removal of turbidity
  - (b) removal of hardness
  - (c) killing of pathogenic bacteria
  - (d) removal of odour
- 65 On standard silica scale, the turbidity should be limited to
- (a) 30 ppm
  - (b) 20ppm
  - (c) 10ppm
  - (d) 50ppm
- 66 If the total hardness of water is greater than its alkalinity, the carbonate hardness will be equal to
- (a) non-carbonate hardness
  - (b) total hardness
  - (c) total hardness - total alkalinity
  - (d) Mot total alkalinity
- 67 The D.O. level in natural unpolluted water at normal temperature is found to be
- (a) 1mg/ litre
  - (b) 10mg/litre
  - (c) 100mg/ litre
  - (d) 1000mg/ litre
- 68 The length of rectangular sedimentation tank, of breadth  $B$ , should not be more than
- (a)  $B$
  - (b)  $2B$
  - (c)  $4 B$
  - (d)  $6B$
- 69 The colour in water is generally due to
- (a) suspended impurities
  - (b) dissolved impurities
  - (c) colloidal impurities
  - (d) None of the above

- 70 A rectangular tank  $15\text{ m} \times 6\text{ m} \times 3\text{ m}$  has to treat 2 million litres of water per day. The detention time of the tank should be
- (a) 3.24 hours
  - (b) 5.63 hours
  - (c) 12.0 hours
  - (d) 24 hours
- 71 Zero hardness of water is achieved by
- (a) using lime soda process
  - (b) excess lime treatment
  - (c) ion exchange method
  - (d) using excess alum dosage
- 72 In chlorination, due to rise in temperature of water, death rate of bacterial
- (a) Increases
  - (b) Decreases
  - (c) Remains unaffected
  - (d) None of the above
- 73 BOD of treated water should be
- (a) 10ppm
  - (b) 20ppm
  - (c) 30ppm
  - (d) Nil
- 74 Which of the following retards the self-purification of stream?
- (a) Higher temperature
  - (b) Sunlight
  - (c) Satisfying oxygen demand
  - (d) None of the above
- 75 Which of the following is not coagulant?
- (a) Alum
  - (b) Ferric chloride
  - (c) Gelatin
  - (d)  $\text{SO}_2$
- 76 The *ph* value of fresh solvage is usually
- (a)  $x$
  - (b) more than 7
  - (c) less than 7
  - (d) 9
- 77 For the COD test of sewage, organic matter is oxidized by Potassium dichromate ( $\text{K}_2\text{Cr}_2\text{O}_7$ ) in the presence of
- (a) Sulphuric Acid
  - (b) Nitric Acid
  - (c) Hydrochloric Acid
  - (d) Acetic Acid
- 78 After cleaning a slow sand filter, filtered water is not used for.
- (a) 6 to 12 h

- (b) 12 to 18 h
  - (c) 18 to 24 h
  - (d) 124 to 36 h
- 79 Most important source of water for public water supply is from
- (a) Lakes
  - (b) Ponds
  - (c) Streams
  - (d) Rivers
- 80 Water may not contain much impurities if its source is
- (a) reservoirs
  - (b) stream flowing in plains
  - (c) lake in lower regions
  - (d) spring along hill slopes
- 81 The most important water quality parameter for domestic use of water is
- (a) Carbonate hardness
  - (b) Non-carbonate hardness
  - (c) Coliform group of organisms
  - (d) Chlorides
- 82 Hardness of water is caused by
- (a) presence of soap lather
  - (b) presence of chlorides and sulphates of sodium and potassium
  - (c) presence of  $\text{CO}_3\text{SO}_4$  or chlorides of Calcium and Magnesium.
  - (d) Turbidity
- 83 A heavy stone is suitable for
- (a) Arches
  - (b) Rubble masonry
  - (c) Roads
  - (d) Retaining walls
- 84 Quantity of Gypsum in ordinary Portland cement is
- (a) 3%
  - (b) 4%
  - (c) 5%
  - (d) 6%
- 85 The minimum depth of foundation below ground level for a residential building according to IS : 1904 should be
- (a) 100 cm
  - (b) 80 cm
  - (c) 60 cm
  - (d) 50 cm
- 86 The minimum height of plinth of a building with respect to the level of the centre of the road passing at its front or back should be
- (a) 10 cm
  - (b) 15 cm

- (i) 30 cm  
(d) 60 cm
- 87 The function of cleats in a roof truss is:  
(i) To support purlins  
(ii) To support common rafter  
(iii) To prevent the purlins from tilting. The correct answer is  
(a) only (i)  
(b) only (iii)  
(c) both (ii) and (iii)  
(d) None of the above
- 88 Which of the following type of door can allow air circulation and privacy, even when it is closed?  
(a) Wire gauge  
(b) Louvered  
(c) Part paneled, part glazed  
(d) Flush door
- 89 Efflorescence in building is due to sulphates of  
(a) Calcium  
(b) Sodium  
(c) Iron  
(d) Both (a) and (b)
- 90 Quick setting cement is produced by adding  
(a) less amount of gypsum in powder form  
(b) more amount of gypsum in powder form  
(g) aluminum sulphate in powder form  
(d) pozzolana in powder form
- 91 Finer the cement, more is the  
(a) strength of the cement  
(b) workability  
(c) shrinkage cracking  
(d) All of the above
- 92 As per IS specification, the minimum compressive strength of 1<sup>st</sup> class bricks should be  
(a) 75 kg/cm<sup>2</sup>  
(b) 90 kg/cm<sup>2</sup>  
(c) 100 kg/cm<sup>2</sup>  
(d) 125 kg/cm<sup>2</sup>
- 93 If " D " is the duration, 'ES' and 'EF' are the earliest start and finish times, 'LS' and 'LF' are latest start and latest finish times, the following relationship holds good.  
(a)  $D = LF - EF$   
(b)  $AS = LF + D$   
(c)  $LF = LS - ES$   
(d)  $EF = ES + D$
- 94 Cant deficiency becomes an inevitable consideration on a main line and branch line moving in

- (a) same direction
  - (b) opposite direction
  - (c) cross direction
  - (d) None of the above
- 95 The value of super-elevation will be more when
- (a) speed is more
  - (b) radius of curvature is less
  - (c) both (a) & (b) of the above
  - (d) None of the above
- 96 A pavement is classified as flexible or rigid pavement based on
- (a) Wearing coat
  - (b) Base course
  - (c) Sub-base
  - (d) Sub-grade
- 97 In the absence of super-elevation, the formation of pot holes is generally found
- (a) on the outer edge of road
  - (b) in the inner edge of road
  - (c) in the middle of the road
  - (d) anywhere along the width of the road.
- 98 Vehicle damage factor (VDF) as given by I.R.C., is used in
- (a) Westergaard's analysis
  - (b) CBR method of pavement design
  - (c) design of drainage system
  - (d) design of dowel bars
- 99 Ballast is used in Railway section to serve as
- (a) an elastic bed
  - (b) / foundation of rail track
  - (g) both (a) and (b)
  - (d) protection from animals
- 100 In railways, the disc signals are provided for the purpose of
- (a) dead slow movement
  - (b) indicating busy platform
  - (c) possible danger ahead
  - (d) shunting