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# UKPSC AE

**Previous Year Paper  
(Civil Engineering-II) 16  
Aug, 2023**



Civil Engineering – II

1. Methemoglobinemia or blue baby disease is caused due to  
(a) Chlorides (b) Mercury (c) Nitrates (d) Sulphides
2. The solid waste that settles at the bottom of the tank in the primary treatment of waste water is called  
(a) Sludge (b) Effluent (c) Scum (d) Humus
3. If the chosen diameters of a pipe, is less than the economical diameter, then  
(a) Cost of pipe will be less.  
(b) Head loss will be high.  
(c) Cost of pumping will be more than saving.  
(d) All of the above
4. A \_\_\_\_\_ is pipe through which liquid wastes carrying human excreta flows.  
(a) Soil pipe (b) Waste pipe (c) Both (a) and (b) (d) None of these
5. \_\_\_\_\_ is the pipe which extends water from the stop cock to the entrance of the storage tank.  
(a) Supply pipe (b) Distributary pipe (c) Both (a) and (b) (d) None of these
6. Stack is a general term used for any \_\_\_\_\_ line of drainage.  
(a) Horizontal (b) Vertical (c) Inclined (d) None of these
7. Ferrule is a \_\_\_\_\_ sleeve made up for connecting to water main pipe.  
(a) Right angled (b) Oblique angled (c) Both (a) and (b) (d) None of these
8. Bio-chemical oxygen demand in a waste water sample quantifies  
(a) Biodegradable inorganic matter  
(b) Non-biodegradable inorganic matter  
(c) Biodegradable organic matter  
(d) Non-biodegradable organic matter
9. Garret's diagrams has been drawn for  
(a) A semi-circular channel.  
(b) A trapezoidal channel with side slope  $\frac{1}{2} H : 1 V$ .  
(c) A trapezoidal channel with side slope  $1 H : \frac{1}{2} V$ .  
(d) Semielliptical channel.
10. In the moving boat method of stream flow measurement, the following measurements are required :  
(i) Velocity and direction of current meter.  
(ii) Speed of boat  
(iii) Depth and time interval between depth reading  
Correct answer is  
(a) (i) and (ii) (b) (i) and (iii) (c) only (i) (d) (i), (ii) and (iii) all
11. Non-Pathogenic bacterias cause the following water-borne disease :  
(a) Cholera (b) Typhoid (c) Infectious hepatitis (d) None of these



12. A bunch of plastic tubes 5 cm × 5 cm × 1 m long kept in an inclined position in a settling tank are called  
 (a) Coagulation discs (b) Sand filters  
 (c) Tube settlers (d) Trickling filters
13. The time by which an activity completion time can be delayed without affecting the start of succeeding activities is known as \_\_\_\_\_  
 (a) Free float (b) Duration (c) Total float (d) Interfering float
14. In chlorination process, trichloroamines are formed below pH value of  
 (a) 8.4 (b) 6.4 (c) 4.4 (d) 2.4
15. The gas produced from the landfill wastes is known as  
 (a) Liquefied petroleum gas (b) Natural gas  
 (c) Biogas (d) None of the above
16. Which of the following is not the landfilling method?  
 (a) Bangalore method (b) Area method  
 (c) Ramp method (d) Trench method
17. Which of the following can be used to treat wastes having simple organic matter with high water content?  
 (a) Vermi composting (b) Aerobic composting  
 (c) Incineration (d) Anaerobic digestion
18. Which of the following is called the secondary air pollutant?  
 (a) PANs (b) Ozone (c) Carbon monoxide (d) Nitrogen dioxide
19. Which type of waste are processed using physiochemical processes?  
 (i) Heavy metal  
 (ii) Waste containing rubbish  
 (iii) Highly toxic liquid  
 (a) (ii) and (iii) (b) (i) and (ii) (c) (i) and (iii) (d) None of these
20. An excessive growth of \_\_\_\_\_ causes Eutrophication.  
 (a) Algae (b) Plants (c) Either (a) or (b) (d) (a) and (b) both
21. The industrial water demand for producing per tonne of paper is  
 (a) 150 kilolitres/tonne (b) 200 kilolitres/tonne  
 (c) 250 kilolitres/tonne (d) 300 kilolitres/tonne
22. The instrument used to measure heavy metals in a water sample is  
 (a) AOX Analyser (b) Gas Chromatograph  
 (c) Atomic Absorption Spectroscope (d) Graphic Analyser
23. The phenomenon of formation of projections on the interior surface of the water pipe is called  
 (a) Corrosion (b) Rusting (c) Encastation (d) Tuberculation

24. If 'Q' is the total quantity of water in litres required by community per year having population 'P' then the per capita demand is given by  
 (a)  $D = \frac{Q}{P \times 365}$  (b)  $D = \frac{P}{Q \times 365}$  (c)  $D = \frac{P \times 365}{Q}$  (d)  $D = \frac{Q \times P}{365}$
25. Which one of the following employs starch indicator while testing?  
 (a) Chlorides (b) Hardness (c) Residual chlorine (d) Dissolved oxygen
26. Spray Tower can be used to control  
 (a) Gaseous pollutants only (b) Particulate pollutants only  
 (c) Both (a) and (b) (d) None of the above
27. Electrostatic precipitators are used as pollution control device for separation of  
 (a) SO<sub>2</sub> (b) NO<sub>2</sub> (c) Hydrocarbon (d) Particulate matter
28. Two samples of water A & B have pH values of 4.4 and 6.4 respectively. How many times more acidic sample A is than sample B?  
 (a) Zero (b) 50 (c) 100 (d) 200
29. The most common cause of acidity in water is  
 (a) CO<sub>2</sub> (b) O<sub>2</sub> (c) H<sub>2</sub> (d) N
30. A pressure conduit laid underground, may not be subjected to  
 (a) Internal pressure of water.  
 (b) Pressure due to external load.  
 (c) Longitudinal temperature stresses.  
 (d) Longitudinal stresses due to unbalanced pressure to bends.
31. A sewer that receives the discharge of a number of house sewers is called  
 (a) House Sewer (b) Lateral Sewer  
 (c) Intercepting Sewer (d) Submain Sewer
32. For a country like India, where rainfall is mainly confined to one season, the suitable sewerage system will be  
 (a) Separate system (b) Combined system  
 (c) Partially combined system (d) Partially separate system
33. Which of the following retards self-purification of stream?  
 (a) Highest temperature (b) Sunlight  
 (c) Satisfying oxygen demand (d) None of the above
34. The following is not a layer of the atmosphere:  
 (a) Atmosphere (b) Troposphere (c) Mesosphere (d) Exosphere
35. In slow sand filter, a layer of suspended matter, plankton and other organic matter is called  
 (a) Sloughing (b) Schmitzdecke (c) Straining (d) Sludge cake

36. The method generally used for the design of the sewer pipes is  
 (a) Manning's equation (b) Darcy Weisback equation  
 (c) Hardy cross method (d) Chezy's equation
37. The device used for disposal of biomedical waste is \_\_\_\_\_  
 (a) Incinerator (b) Extractor (c) Reactor (d) Precipitator
38. The design discharge for the separate sewer system shall be taken as  
 (a) equal to Dry Weather Flow (DWF) (b)  $2 \times$  DWF  
 (c)  $3 \times$  DWF (d)  $6 \times$  DWF
39. Which of the following compound is widely used for algae control ?  
 (a) Sodium sulphate (b) Copper sulphate  
 (c) Sodium chloride (d) Calcium chloride
40. Turbidity in water is caused due to presence of  
 (a) Suspended and colloidal matter (b) Colloidal matter  
 (c) Biological matter (d) None of the above
41. Which of the following waste can be decomposed by bacteria ?  
 (a) Radioactive substances (b) Ashes  
 (c) Food waste (d) Rubbish
42. Which of the following gases are called Greenhouse gases ?  
 (a) Methane (b) Nitrogen (c) Carbon dioxide (d) Both (a) and (c)
43. Purpose of drain pipe in water storage tank is  
 (a) To feed water to tank (b) Periodical cleaning of tank  
 (c) (a) and (b) both (d) None of the above
44. Characteristics of fresh and septic sewage respectively are  
 (a) Acidic and alkaline (b) Alkaline and acidic  
 (c) Both acidic (d) Both alkaline
45. The water carriage system of collection of waste products  
 (a) is cheaper in initial cost than dry conservancy system.  
 (b) requires treatment before disposal.  
 (c) creates hygienic problems.  
 (d) All the above
46. Percentage of solids in sewage is generally about  
 (a) 0.1% (b) 0.2% (c) 0.3% (d) None of these
47. The velocity of flow of sewage in a combined sewer should not be less than  
 (a) 0.45 m/s (b) 1.0 m/s (c) 0.75 m/s (d) 1.30 m/s

48. The time with which direct cost does not reduce with the increase in time is known as  
 (a) Optimistic time (b) Normal time (c) Crash time (d) Standard time
49. A linked bar chart is an improvement over a conventional bar charts because :  
 1. Resources of individual activities can be planned.  
 2. Floats will be available for utilization as needed.  
 3. Milestone events need not be specifically monitored.  
 Which of these is/are correct ?  
 (a) 1 only (b) 2 only (c) 3 only (d) 1, 2 and 3
50. What is the ratio of compressive strength of a cubical specimen of concrete to that of the cylindrical specimen of standard sizes ?  
 (a) 1.25 (b) 0.80 (c) 0.45 (d) 1.05
51. If T and R are tread and rise respectively of a stair then  
 (a)  $2R + T = 30$  (b)  $R + 2T = 30$  (c)  $2R + T = 60$  (d)  $R + 2T = 60$
52. Presence of spongy swollen mass on the surface of the bricks is known as  
 (a) Bloating (b) Lamination (c) Chuffs (d) Efflorescence
53. Oil varnish generally consists of  
 (a) Synthetic resin and spirit (b) Oil, wax and resin  
 (c) Resin, oil and turpentine (d) Spirit, oil and wax
54. The pressure acting on the stones in stone masonry construction should be  
 (a) at  $45^\circ$  to the direction of bedding plane.  
 (b) at  $60^\circ$  to the direction of bedding plane.  
 (c) along the direction of bedding plane.  
 (d) perpendicular to the direction of bedding plane.
55. While preparing estimates for masonry work, no deduction is made for openings each upto  
 (a)  $0.1 \text{ m}^2$  (b)  $0.5 \text{ m}^2$  (c)  $1.0 \text{ m}^2$  (d)  $1.5 \text{ m}^2$
56. What is the quantity of cement (in kg) required for preparing  $2.0 \text{ m}^3$  of wet cement mortar of 1 : 4 proportion ?  
 (a) 500 kg (b) 615.6 kg (c) 714.3 kg (d) 809.3 kg
57. Which of the following does/do not represent an activity ?  
 1. Plastering done.  
 2. Foundation is being dug.  
 3. Concreting in column going on.  
 4. Tenders are being invited.  
 (a) 1 only (b) 1 & 3 only (c) 1 & 4 only (d) 2, 3 and 4 only
58. In PERT analysis, the time estimates the activities and the probability of their occurrence follow :  
 (a) Poisson's distribution curve (b) Normal distribution curve  
 (c) Gamma distribution curve (d) Beta distribution curve

$$\frac{\text{cube}}{r} = 1.25$$

$$\frac{1}{5} \times 2$$

$$0.4 \times 1.39$$

(52)

59. The slenderness ratio for masonry walls should not be more than  
 (a) 10 (b) 20 (c) 30 (d) 40
60. Types of Flushed Doors are  
 (a) Solid core or laminated core (b) Hollow and cellular core  
 (c) Both (a) and (b) (d) None of the above
61. Crushing strength of a first class brick should not be less than  
 (a) 10.5 N/mm<sup>2</sup> (b) 7.0 N/mm<sup>2</sup> (c) 3.5 N/mm<sup>2</sup> (d) 1.5 N/mm<sup>2</sup>
62. A vertical window provided on the slopping roof is called  
 (a) Lantern window (b) Corner window (c) Dormer window (d) Sloping window
63. The pointing done by pressing the mortar back from the edges by 5 mm or more is called  
 (a) Recessed pointing (b) Flush pointing  
 (c) Tuck pointing (d) V-pointing
64. In painting works, dull patches are formed on finished polished surface are called  
 (a) Sagging (b) Blistering (c) Bloom (d) All of the above
65. As per National Building Code, what will be the maximum permissible built-up area for a plot area for 200 m<sup>2</sup> to 500 m<sup>2</sup>?  
 (a) 33.33% of the plot area (b) 50% of the plot area  
 (c) 40% of the plot area (d) None of the above
66. Low Heat Cement is used for  
 (a) thick structure (b) thin structure  
 (c) reinforcement free structure (d) underground structure
67. \_\_\_\_\_ type of joints is provided in arches, gables, copings etc. to prevent possible movements of stones.  
 (a) Cramped (b) Tongued (c) Rebated (d) Tabled
68. Pigment volume concentration number for semi-glass paint should be in the range of  
 (a) 15 to 30 (b) 35 to 45 (c) 50 to 65 (d) 65 to 80
69. Acceptable indoor noise level for court rooms and class rooms is  
 (a) 25 to 30 dB (b) 40 to 45 dB (c) 35 to 40 dB (d) 30 to 35 dB
70. Which of the following pairs of trees yield soft woods?  
 (a) Deodar and Shisham (b) Chir and Sal  
 (c) Sal and Teak (d) Chir and Deodar
71. Gypsum consist of  
 (a) H<sub>2</sub>S and CO<sub>2</sub> (b) CaSO<sub>4</sub> and H<sub>2</sub>O (c) Lime and H<sub>2</sub>O (d) CO<sub>2</sub> and Calcium
72. Recommendations for dimensions and workmanship for natural building stones for masonry works is given in following IS code :  
 (a) IS : 6250 - 1981 (b) IS : 3316 - 1974  
 (c) IS : 1127 - 1970 (d) None of the above

73. Moulding provided under the nosing to improve the elevation of step and to provide strength to nosing is called  
 (a) Soffit (b) Baluster (c) Balustrade (d) Scotia
74. The vertical wall face of an opening which supports the door/window frame is called  
 (a) Mullion (b) Transom (c) Jamb (d) Rebate
75. The depth of ballast used for B.G. Railway track is  
 (a) 150 mm (b) 200 mm to 250 mm  
 (c) 150 mm to 200 mm (d) None of the above
76. Find out the number of sleepers for rails of 12.8 m length with sleeper density as  $(n + 3)$ .  
 (a) 15 (b) 20 (c) 16 (d) 18
77. For double headed and bull headed rails to hold them in position following is used :  
 (a) Sleepers (b) Bolts (c) Fish plates (d) Chairs
78. Minimum depth of ballast cushion for a broad gauge wooden sleeper of size  $275 \times 25 \times 13$  cms with 75 cm sleeper spacing is  
 (a) 15 cm (b) 20 cm (c) 25 cm (d) 30 cm
79. In Railways, the main purpose of Marshalling yards is  
 (a) to isolate goods wagons (b) to park public vehicles  
 (c) both (a) and (b) (d) None of the above
80. In Railways, the simplest combination of Joints and Crossing is known as  
 (a) Joint (b) Key (c) Turnouts (d) None of these
81. In Railways, Detonating signals are used during  
 (a) General purpose work (b) Foggy and cloudy weather  
 (c) Hot summer day (d) Winter night
82. The road signs, violation of which is a legal offence, are classified as  
 (a) Warning signs (b) Information signs (c) Cautionary signs (d) Prohibitory signs
83. The weight of the train is 1200 tonnes. The train moves on a rising gradient of 1 in 200. The resistance due to gradient would be  
 (a) 6 tonnes (b) 1 tonne (c) 0.60 tonne (d) 60 tonnes
84. A semaphore signal is operated at an angle of 45 degrees upward. The colour displayed during the night would be  
 (a) Red (b) Yellow (c) Green (d) White
85. Smith's test is performed on stones for  
 (a) Durability (b) Water absorption  
 (c) Hardness (d) Soluble and clayey matter
86. Which compound of the clinker is weak against sulphate attack ?  
 (a)  $C_3S$  (b)  $C_2S$  (c)  $C_3A$  (d)  $C_4AF$
87. The shrinkage of wood from green to overdry condition will be maximum in  
 (a) Longitudinal direction (b) Tangential direction  
 (c) Radial direction (d) Wood exposed to moisture

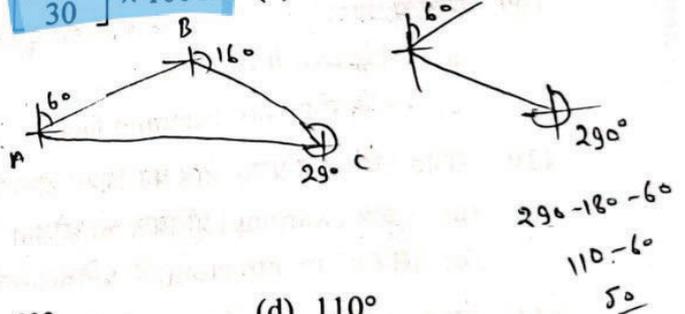
88. Wagons are pushed to the summit with the help of a locomotive and then slides down under the effect of gravity. The type of yard is  
 (a) Flat yard (b) Gravitational yard (c) Hump yard (d) None of these
89. An arrangement provided in a terminal yard for changing the direction of an engine, subjective enough land is available, is  
 (a) Triangle (b) Turntable (c) Gathering line (d) Double junction
90. Los Angeles testing machine is used to conduct  
 (a) Impact test (b) Abrasion test (c) Crushing test (d) Attrition test
91. Two, two lane roads cross each other. Traffic moves in single direction on both the roads. The number of possible conflict points at this intersection would be  
 (a) 24 (b) 11 (c) 8 (d) 6
92. The relationship between traffic stream speed ( $U$ ) and traffic density ( $K$ ) is given by  $U = 75 - 0.75 K$   
 The values of jam density would be  
 (a) 56.25 veh/km/lane (b) 75.0 veh/km/lane  
 (c) 100.0 veh/km/lane (d) 62.5 veh/km/lane
93. The technical body that was established to publish codes and guidelines in the area of road and transport, is  
 (a) IRC (b) CRRI (c) IAHE (d) NHAI
94. Jam density of a traffic lane is 100 veh/km and free flow speed (FFS) is 80 km/h. The maximum traffic flow on this lane would be  
 (a) 8000 veh/hr. (b) 4000 veh/hr. (c) 2000 veh/hr. (d) 1000 veh/hr.
95. The standard design axle load adopted in India as per IRC for the design of flexible pavement is  
 (a) 6.5 tonnes (b) 8.16 tonnes (c) 10.2 tonnes (d) 9.1 tonnes
96. Three cars cover 1 km long road section in 1 minute, 2 minutes and 3 minutes respectively. The space mean speed (SMS) on this road would be  
 (a) 30 km/hr. (b) 36.7 km/hr. (c) 14.17 km/hr. (d) 10 km/hr.
97. The minimum height of platform on an important B.G. main line station catering to passenger traffic should be  
 (a) 0.84 m (b) 0.76 m (c) 0.45 m (d) 0.30 m
98. Two tracks of same gauge crosses each other creating two acute crossing and two obtuse crossings. The type of the crossing would be  
 (a) Double turnout (b) Diamond crossing  
 (c) Symmetrical split (d) Three throw switch
99. The weight of a train is 1200 tonnes. The train is running at a speed of 80 km/h. The resistance due to wave action would be  
 (a) 7.68 tonnes (b) 1.632 tonnes (c) 0.768 tonne (d) 76.8 tonnes

100. Speed regulations on roads decided on the basis of  
 (a) 60 percentile cumulative frequency (b) 75 percentile cumulative frequency  
 (c) 80 percentile cumulative frequency (d) 85 percentile cumulative frequency
101. Bitumen viscosity should be measured at temperature \_\_\_\_\_ and \_\_\_\_\_.  
 (a) 20 °C, 50 °C and 120 °C (b) 25 °C, 60 °C and 135 °C  
 (c) 30 °C, 60 °C and 90 °C (d) 35 °C, 90 °C and 150 °C
102. Maximum practical capacity which a rotary can handle efficiently together from all approaching legs is \_\_\_\_\_.  
 (a) 500 veh/hr. (b) 1500 veh/hr. (c) 3000 veh/hr. (d) 5000 veh/hr.
103. A continuous yellow line marked in the centre of the pavement in the direction of travel denotes.  
 (a) Invitation (b) Attraction (c) Restriction (d) Prohibition
104. A grade separated intersection is justified if total traffic in PCUs per hour of all arms is more than \_\_\_\_\_.  
 (a) 5000 (b) 10000 (c) 15000 (d) 20000
105. For a tachometer, the additive and multiplying constants are \_\_\_\_\_ respectively.  
 (a) 0 and 100 (b) 100 and 0 (c) 0 and 0 (d) 100 and 100
106. The limiting minimum declination of a circumpolar star having latitude 40° N is \_\_\_\_\_.  
 (a) 40° (b) 50° (c) 90° (d) 0°
107. To plot small scale topographic maps, the value of Representative Fraction (R.F.) can be \_\_\_\_\_.  
 (a) 1/1000 (b) 1/5000 (c) 1/25000 (d) 1/50000
108. The type of error in chaining which can be positive or negative is \_\_\_\_\_.  
 (a) tape not stretched horizontally (b) sag in tape or chain  
 (c) tape not stretched tightly (d) temperature effect
109. 'Gauge' in railways is distance between \_\_\_\_\_.  
 (a) centre to centre of rails (b) outer face of rails  
 (c) running faces of rails (d) None of the above
110. The function of an expansion joint in Rigid Pavement is to \_\_\_\_\_.  
 (a) Relieve warping stresses (b) Relieve shrinkage stresses  
 (c) Resist stresses due to contraction (d) Allow free expansion
111. Longitudinal pavement lines marked broken in white paint. \_\_\_\_\_.  
 (a) are not for the guidance of drivers.  
 (b) may be crossed over at the discretion of the driver.  
 (c) are not to be crossed over.  
 (d) All of the above

112. The combined correction for curvature and refraction if two points are 1 km apart, is  
 (a) 0.094 m (b) 0.06728 m (c) 0.013 m (d) 0.016 m
113. "Ranging Rod not of standard length" can be classified under principal source of error in levelling measurement as \_\_\_\_\_  
 (a) Instrumental (b) Natural (c) Personal (d) Atmospheric
114. The errors which arise from inattention, inexperience and carelessness in the mind of the observer are called  
 (a) Systematic errors (b) Accidental errors  
 (c) Mistakes (d) Normal errors
115. The checks applied in a closed traverse by included angles with 'N' sides is  
 (a) Sum of included angles =  $(N - 4) \times 90^\circ$   
 (b) Sum of included angles =  $(2N - 4) \times 90^\circ$   
 (c) Sum of included angles =  $(2N - 4) \times 45^\circ$   
 (d) Sum of included angles =  $(3N - 5) \times 90^\circ$
116. An angle which a survey line makes with the prolongation of the proceeding line is called  
 (a) Deflection Angle (b) Included Angle  
 (c) Parallel Angle (d) Right Angle
117. A transition curve is a curve of \_\_\_\_\_  
 (a) Uniform radius (b) Infinite radius  
 (c) Large radius (d) Varying radius
118. A chain 66 feet long and having 100 links is called  
 (a) Gunter's chain (b) Hunter's chain (c) Revenue chain (d) Steel chain
119. If the error in the length of a 30 m long chain is 10 cm, then the area recorded as 100 m<sup>2</sup> would be  
 (a) 100 m<sup>2</sup> (b)  $\left[\frac{30}{30.1}\right]^2 \times 100 \text{ m}^2$  (c)  $\left[\frac{30.10}{30}\right]^2 \times 100 \text{ m}^2$  (d) None of the above

120. Following whole circle bearings are observed

Line	Fore Bearing
AB	60°
BC	160°
CA	290°



The value of interior angle 'A' would be

- (a) 30° (b) 50° (c) 60° (d) 110°

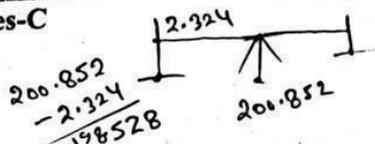
121. Consider the information given below :

Elevation of Bench Mark (BM) = 200.852 m

For a point 'B', Back Sight (BS) and Fore Sight (FS) are 2.324 m and 1.562 m respectively.

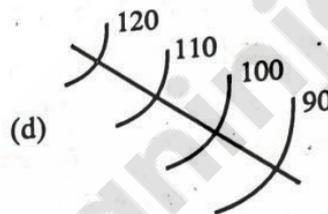
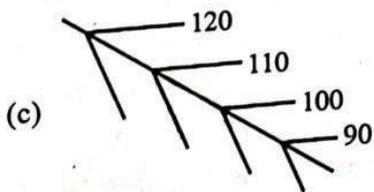
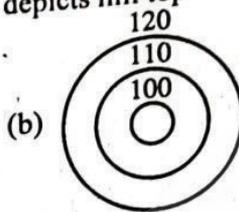
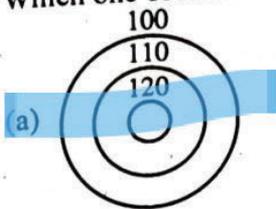
The elevation of point 'B' would be \_\_\_\_\_

- (a) 203.176 m (b) 202.414 m (c) 201.614 m (d) 198.528 m



122. Type of surveying requiring least office work is  
 (a) Plane Table Surveying (b) Tachometry Surveying  
 (c) Theodolite Surveying (d) Trigonometrical Levelling
123. Different grades are joined together by  
 (a) Reverse curve (b) Compound curve (c) Transition curve (d) Vertical curve
124. If the quadrilateral bearing of a line is  $N 20^\circ W$ , then the whole circle bearing of a line is  
 (a)  $110^\circ$  (b)  $340^\circ$  (c)  $70^\circ$  (d)  $200^\circ$

125. Which one of the following contour pattern depicts hill top ?



126. If an upgrade of 1.5% is followed by a down grade of 0.5% and ratio of change of grade is 0.2% per 20 m chain, then the length of vertical curve is  
 (a) 100 m (b) 200 m (c) 300 m (d) 400 m
127. The angle between the observer's meridian and the vertical circle passing through the body is called as  
 (a) Azimuth (b) Hour Angle (c) Right Ascension (d) Declination
128. Setting out of simple curve by two theodolite method does not require  
 (a) Angular measurements (b) Linear measurements  
 (c) Angular and linear measurements (d) None of these
129. Total angle of deflection of transition curve is  
 (a) Spiral angle/2 (b) Spiral angle/ $2\pi$  (c) Spiral angle/3 (d) Spiral angle/ $3\pi$
130. Perpendicular offset from the junction of transition curve and circular curve to the tangent is equal to  
 (a) Shift (b)  $2 \times$  shift (c)  $3 \times$  shift (d)  $4 \times$  shift
131. Indirect Ranging is done when both ends of a survey line are  
 (a) Not visible (b) Not intervisible (c) Visible (d) Intervisible
132. The slopes of a survey line can be measured by  
 (a) Clinometer (b) Hydrometer (c) Speedometer (d) Pedometer
133. In a well proportional triangle, no angle should be less than  
 (a)  $15^\circ$  (b)  $30^\circ$  (c)  $45^\circ$  (d)  $60^\circ$

134. Sensitivity of a bubble tube can be increased by  
 (a) increasing diameter of tube. (b) decreasing length of bubble.  
 (c) increasing viscosity of liquid. (d) decreasing radius of curvature of tube.
135. A 70% Index of wetness means  
 (a) rain excess of 30% (b) rain deficiency of 30%  
 (c) rain deficiency of 70% (d) None of these
136. When surface of transpiration is submerged under water then potential evapotranspiration is  
 (a) much more than evapotranspiration. (b) much less than evapotranspiration.  
 (c) equal to evapotranspiration. (d) equal to or less than evapotranspiration.
137. The area between the Isohyets 45 cm and 55 cm is 100 sq.km. and between 55 cm and 65 cm is 150 sq.km. The average depth of annual precipitation over the above basin of 250 sq.km. will be  
 (a) 50 cm (b) 55 cm (c) 56 cm (d) 60 cm
138. If two 4 hours unit hydrograph are staggered by 4 hours and added graphically, the resulting hydrograph will be  
 (a) 4 hours unit hydrograph (b) 4 hours unit hydrograph with 20 mm runoff  
 (c) 12 hours unit hydrograph (d) 8 hours unit hydrograph with 2 cm runoff
139. Rainfall on five successive days were measured as 100 mm, 80 mm, 60 mm, 40 mm and 20 mm respectively. If the infiltration index or storm loss rate for catchment area is earlier estimated as 50 mm/day, the total surface runoff will be  
 (a) 50 mm (b) 60 mm (c) 90 mm (d) 140 mm
140. According to Dicken's formula for estimating floods, the peak discharge is proportional to  
 (a) A (b)  $\sqrt{A}$   
 (c)  $A^{2/3}$  (d)  $A^{3/4}$   
 where A is catchment area in sq.km.
141. The stream which does not have any base flow contribution is called  
 (a) Perennial stream (b) Intermittent stream  
 (c) Ephemeral stream (d) None of these
142. The shape of recession limb of a hydrograph depends upon  
 (a) Basin characteristics only (b) Storm characteristics only  
 (c) Both (a) and (b) (d) None of these
143. The flow mass curve is a graphical representation of  
 (a) Cumulative discharge and time.  
 (b) Discharge and percentage probability of flow being equalled or exceeded.  
 (c) Cumulative discharge; volume and time in chronological order.  
 (d) Discharge and time in chronological order.
144. If the length of transition curve is 'L' and 'R' is the radius of circular curve; then shift of curve is directly proportional to  
 (a)  $R$  and  $\frac{1}{L^2}$  (b)  $\frac{1}{R}$  and  $L^2$  (c)  $\frac{1}{R^2}$  and  $L$  (d)  $R^2$  and  $\frac{1}{L}$
145. In an internal focusing type of telescope, the lens provided is  
 (a) Concave (b) Convex (c) Planoconvex (d) Planoconcave
146. The angle of intersection of the two plane mirrors of an optical square is  
 (a)  $30^\circ$  (b)  $45^\circ$  (c)  $60^\circ$  (d)  $90^\circ$

147. A land is known as water logged
- when the permanent wilting point is reached.
  - when gravity drainage has ceased.
  - capillary fringes reaches the root zone of plant.
  - None of the above
148. Length and width of a meander are proportional to
- Discharge
  - $(\text{Discharge})^{1/2}$
  - $(\text{Discharge})^{2/3}$
  - $(\text{Discharge})^2$
149. Unit of  $\phi$  index for measurement of infiltration in MKS system is
- cm/hr
  - cm
  - hr
  - None of these
150. What is the time interval between the sowing and harvesting of crops ?
- Base period
  - Kor period
  - Crop period
  - Season period
151. The first water before sowing the crop is \_\_\_\_\_.
- Paleo
  - Kor
  - Delta
  - Flooding
152. Given that a particular crop requires about 20.0 cm depth of water at an interval of 40 days and the base period is 400 days. Find the delta for the crop. Now using this delta, find the duty of water for the crop.
- 150 cm, 1150 hectares/cumec.
  - 180 cm, 1825 hectares/cumec.
  - 200 cm, 1728 hectares/cumec.
  - 195 cm, 1920 hectares/cumec.
153. How can we improve the duty of water ?
- Lining of canals
  - Construction of weir
  - Construction of dam
  - Construction of check dams
154. Heavy retentive soil is favourable for which type of crop ?
- Sugarcane and rice
  - Maize
  - Gram and fodder crops
  - Cotton
155. Which one of the following combination is incorrect ?
- Kharif crops – Rice, Maize
  - Rabi crops – Wheat, Mustard
  - Zaid crops – Cotton, Sugarcane
  - Cash crops – Jute, Tobacco
156. A 6 hours storm had 4 cm rainfall and the resulting runoff was 2 cm. If  $\phi$  index remains at the same value; the runoff due to 10 cm of rainfall in 12 hrs in the catchment is
- 4 cm
  - 6 cm
  - 7.5 cm
  - 9.0 cm
157. Variability of rainfall is
- Largest in the areas of high rainfall.
  - Largest in coastal areas.
  - Largest in regions of scanty rainfall.
- The correct answer is
- only (i)
  - (i) and (ii)
  - only (iii)
  - (ii) and (iii)
158. For an annual flood series arranged in descending order of magnitude, the return for a magnitude listed at position 'm' in a total of 'N' is
- $N/(m + 1)$
  - $m/(N + 1)$
  - $m/N$
  - $(N + 1)/m$

159. In a chute spillway, the flow is usually  
 (a) Uniform (b) Subcritical (c) Critical (d) Supercritical
160. A watershed canal is \_\_\_\_\_  
 (a) irrigates only one side.  
 (b) most suitable in hilly areas.  
 (c) avoids the cross-drainage works.  
 (d) generally aligned parallel to the contours of the area.
161. As per Indian Standards, the obliquity of flow to the river axis should not be more than  
 (a)  $45^\circ$  (b)  $40^\circ$  (c)  $35^\circ$  (d)  $30^\circ$
162. As per Indian Standards, the ratio of upstream (u/s) and downstream (d/s) part of guide bank for discharge upto 20,000 cumecs should be  
 (a) 5 (b) 4 (c) 3 (d) 2
163. The minimum size of stone that will remain at rest in a channel of longitudinal slope 'S' and hydraulic mean radius 'R' is given by \_\_\_\_\_  
 (a) 4 RS (b) 11 RS (c) 7 RS (d) 15 RS
164. The ratio of average values of shear stress produced at the bed and the banks of the channel due to flowing water is  
 (a)  $< 1$  (b)  $= 1$  (c)  $> 1$  (d)  $= 0$
165. According to Lacey's theory, silt supporting eddies are generated from  
 (a) Bottom of channel only (b) Sides of channel only  
 (c) Both (a) and (b) (d) None of the above
166. The ratio of rate of change of discharge of an outlet to the ratio of change of the discharge of the distributary channel is called  
 (a) Proportionality (b) Flexibility (c) Setting (d) Sensitivity
167. Which of the following methods is used to estimate flood discharge based on high water marks left over in the past?  
 (a) Slope - Area method (b) Area - Velocity method  
 (c) Moving boat method (d) Ultrasonic method
168. As per Lacey's theory, the silt factor is \_\_\_\_\_  
 (a) Directly proportional to average particle size.  
 (b) Inversely proportional to average particle size.  
 (c) Directly proportional to square root of average particles size.  
 (d) Not related to average particle size.
169. The time required by rain water to reach the outlet of drainage basin is generally called  
 (a) Time of concentration (b) Time of over-land flow  
 (c) Concentration time of over-land flow (d) Duration of the rainfall

170. Seepage through foundation of an earthen dam is controlled by providing  
 (a) Rock toe (b) Horizontal blanket  
 (c) Impervious cutoff (d) Chimney drain
171. In case of non-availability of space due to topography, the most suitable spillway is  
 (a) Straight drop spillway (b) Shaft spillway  
 (c) Chute spillway (d) Ogee spillway
172. Value of sodium absorption ratio for high sodium water lies between  
 (a) 0 - 10 (b) 10 - 18 (c) 18 - 26 (d) 26 - 36
173. Which of the following spillway is least suitable for an earthen dam?  
 (a) Ogee spillway (b) Chute spillway  
 (c) Side channel spillway (d) Shaft spillway
174. Tortuosity of a meandering river is always  
 (a) equal to 1 (b) less than 1  
 (c) greater than 1 (d) less than or equal to 1
175. The Dupuit formula is based on  
 (a) one observation well (b) two observation wells  
 (c) three observation wells (d) no observation well
176. In a field area for Kharif crop is 56 hectare and area for Rabi crop is 96 hectare. Find out the crop ratio.  
 (a) 12/5 (b) 12/7 (c) 7/12 (d) None of these
177. Seepage failure of earth filled dam is due to \_\_\_\_\_  
 (a) Sloughing (b) Wave erosion (c) Gullying (d) Toe erosion
178. Wetted perimeter of regime channel for discharge of 64 cumecs as per Lacey's theory will be  
 (a) 76 m (b) 19 m (c) 38 m (d) 57 m
179. When the reservoir is full, the maximum compressive force in a gravity dam is produced  
 (a) at the toe (b) at the heel  
 (c) within the middle third of base (d) at centre of base
180. Neglecting uplift pressure, the base width of an elementary profile of a gravity dam shall be taken as :  
 where  $H$  = depth of water  
 $G$  = specific gravity of material  
 $\mu$  = coefficient of friction  
 (a)  $\frac{H}{\sqrt{G}}$  (b)  $\frac{H}{\mu G}$   
 (c) Lesser of  $\frac{H}{\sqrt{G}}$  and  $\frac{H}{\mu G}$  (d) Greater of  $\frac{H}{\sqrt{G}}$  and  $\frac{H}{\mu G}$