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COMBINED COMPETITIVE (PRELIMINARY) EXAMINATION, 2011

Serial No. 000080

CIVIL ENGG.  
Code No. 05

D

Time Allowed : Two Hours

Maximum Marks : 300

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SEAL

1. The height of a water column equivalent to a pressure of 0.15 MPa is :  
(A) 15.3 m (B) 25.3 m  
(C) 35.3 m (D) 45.3 m
2. The metacentric height is the distance between the :  
(A) Centre of gravity of the floating body and the centre of buoyancy  
(B) Centre of gravity of the floating body and the metacentre  
(C) Metacentre and centre of buoyancy  
(D) Original centre of buoyancy and new centre of buoyancy
3. Venturimeter is used to :  
(A) Measure the velocity of a flowing liquid  
(B) Measure the pressure of a flowing liquid  
(C) Measure the discharge of liquid flowing in a pipe  
(D) Measure the pressure difference of liquid flowing between two points in a pipe line
4. An error of 1% in measuring head over the crest of the notch (H) results in an error of discharge measurement over a triangular notch of :  
(A) 1% (B) 1.5%  
(C) 2% (D) 2.5%
5. An air vessel is provided at the summit in a siphon to :  
(A) Avoid interruption in the flow (B) Increase discharge  
(C) Increase velocity (D) Maintain pressure difference
6. The most economical section of a rectangular channel is one which has hydraulic radius equal to :  
(A) Half the depth (B) Half the breadth  
(C) Twice the depth (D) Twice the breadth
7. The point of contraflexure is a point where :  
(A) Shear force changes sign (B) Bending moment changes sign  
(C) Shear force is maximum (D) Bending moment is maximum
8. One poise is equal to :  
(A) 0.1 N-s/m<sup>2</sup> (B) 1 N-s/m<sup>2</sup>  
(C) 10 N-s/m<sup>2</sup> (D) 100 N-s/m<sup>2</sup>

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9. Whenever a plate is held immersed at some angle with the direction of flow of the liquid, the plate is subjected to some force. Component of this force, in the direction of flow of the liquid, is known as :
- (A) Lift (B) Drag  
(C) Stagnation pressure (D) Bulk modulus
10. Select the correct statement :
- (A) Weber's number is the ratio of inertia force to elastic force  
(B) Weber's number is the ratio of gravity force to surface tension force  
(C) Weber's number is the ratio of viscous force to pressure force  
(D) Weber's number is the ratio of inertia force to surface tension force
11. Which of the following is not a sustaining slope ?
- (A) Mild slope (B) Critical slope  
(C) Steep slope (D) Adverse slope
12. When the depth of water in an open channel is greater than the critical depth, the flow is :
- (A) Critical flow (B) Turbulent flow  
(C) Tranquil flow (D) Torrential flow
13. Two reservoirs are connected by a pipe line consisting of two pipes A and B of identical friction factor and length, and connected in series. If the diameter of pipe A is 20% larger than that of B, the ratio of the head loss in A to that in B is :
- (A) 0.833 (B) 0.600  
(C) 0.529 (D) 0.402
14. The presence of hydrogen sulphide in water causes :
- (A) Softening (B) Alkalinity  
(C) Acidity (D) Bad taste
15. Biological action is used in :
- (A) Screens (B) Sedimentation tanks  
(C) Trickling filters (D) Trash rack

16. The friction  $f$  in a laminar pipe flow was found to be 0.04. The Reynolds number of the flow was :
- (A) 2000 (B) 1000  
(C) 800 (D) 1600
17. In a turbulent pipe flow, inside the laminar boundary layer the velocity distribution is :
- (A) Parabolic (B) Linear  
(C) Logarithmic (D) Exponential
18. To measure a horizontal angle as accurately as possible :
- (A) Method of repetition is used (B) Method of reiteration is used  
(C) Method of deflection angles is used (D) Method of double observations is used
19. A fluid of viscosity  $0.7 \text{ NS/m}^2$  and specific gravity 1.3 is flowing through a circular pipe of diameter 100mm. The maximum shear stress at the pipe wall is given as  $196.2 \text{ N/m}^2$ , the pressure gradient is :
- (A)  $7849 \text{ N/m}^2 \text{ per m}$  (B)  $-7848 \text{ N/m}^2 \text{ per m}$   
(C)  $7643 \text{ N/m}^2 \text{ per m}$  (D)  $0 \text{ N/m}^2 \text{ per m}$
20. A circular cylinder 1 m long and 0.05 m diameter is submerged in flowing water of velocity  $0.5 \text{ m/sec}$ . The coefficient of total drag is 2.15 and coefficient of shear drag is 0.15, then the pressure drag exerted on the cylinder will be :
- (A) 25N (B) 125N  
(C) 12.5N (D) 250N
21. Suitable method for forecasting population for a young and a rapidly developing city is :
- (A) Arithmetic mean method (B) Geometric mean method  
(C) Graphical method (D) Logarithmic method
22. Imhoff cone is used to determine :
- (A) Settleable solids (B) Suspended solids  
(C) Dissolved solids (D) Organic matter
23. The total count of bacteria per cubic centimeter for domestic purposes varies from :
- (A) 0 to 100 (B) 200 to 250  
(C) 450 to 500 (D) 500 to 750

24. 'M' is a simply supported beam of length  $l$  and carries a central point load  $W$ . Beam 'N' is loaded with a uniformly distributed load such that the total load on the beam is  $W$ . The ratio of maximum deflections in both cases is :
- (A)  $5/8$  (B)  $8/5$   
(C)  $5/4$  (D)  $4/5$
25. The percentage of domestic use of water amounts to \_\_\_\_\_ of the total water requirement per capita per day :
- (A) 12 (B) 33  
(C) 75 (D) 50
26. Which of the following is used to express turbidity of water ?
- (A) silica scale (B) decibels  
(C) pH value (D) platinum cobalt scale
27. The maximum permissible fluorine content in water for domestic supplies is :
- (A) 0.015 ppm (B) 1.5 ppm  
(C) 15 ppm (D) 1.50 ppb
28. Copper sulphate is used for controlling :
- (A) BOD (B) algae  
(C) COD (D) pH
29. In the process of screening, the angle of placing screens is :
- (A)  $5^\circ$  to  $12^\circ$  (B)  $23^\circ$  to  $27^\circ$   
(C)  $45^\circ$  to  $60^\circ$  (D)  $90^\circ$
30. Time of detention in a plain sedimentation tank is :
- (A) 12 hours (B) 24 hours  
(C) 6 to 8 hours (D) 30 minutes
31. The time of contact for chlorination should be at least :
- (A) 5 hours (B) 20 minutes  
(C) 1 hour (D) 2 hours
32. To remove temporary hardness due to calcium bicarbonates \_\_\_\_\_ is used.
- (A) boiling (B) hot lime process  
(C) lime-soda process (D) RO process

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33. The other name of reflux valve is :
- (A) Bib cock (B) CI valve  
(C) Air lock valve (D) Check valve
34. The minimum size of fire hydrant is :
- (A) 50 cm (B) 100 cm  
(C) 15 cm (D) 200 cm
35. Usually adopted pipe joint in pumping stations is :
- (A) in-out joint (B) flanged joint  
(C) lap joint (D) spigot joint
36. When the length of chain used in measuring distance is longer than the standard length, the error in measured distance will be :
- (A) Positive error (B) Negative error  
(C) Compensating error (D) Cumulative error
37. A line joining some fixed points on the main survey lines, is called a :
- (A) Check line (B) Tie line  
(C) Base line (D) Shrada
38. Compensating errors that occur in chain survey are proportional to :
- (A)  $L$  (B)  $\sqrt{L}$   
(C)  $1/L$  (D)  $1/\sqrt{L}$   
where  $L$  = Length of the chain
39. The geographical meridians through the various stations :
- (A) Are parallel  
(B) Converge to the poles  
(C) Converge from north pole to south pole  
(D) Converge from equator to north pole
40. At the equator, the amount of dip is :
- (A)  $0^\circ$  (B)  $45^\circ$   
(C)  $60^\circ$  (D)  $90^\circ$

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41. When the magnetic bearing of the sun at noon is  $185^{\circ}20'$ , the magnetic declination will be :

- (A)  $5^{\circ}20'$  east (B)  $5^{\circ}20'$  west  
(C)  $5^{\circ}20'$  north (D)  $5^{\circ}20'$  south

42. pH value is a symbol for \_\_\_\_\_ concentration.

- (A) Hydride (B) Hydrogen  
(C) Hydroxil (D) Sodium

43. The dose of coagulant in dry feeding, is controlled by :

- (A) Scrapers (B) Worm wheel  
(C) Paddles (D) Aerator

44. The super-elevation in the case of pavements is :

- (A) Directly proportional to the square of velocity of vehicles  
(B) Inversely proportional to the square of velocity of vehicles  
(C) Directly proportional to the width of pavement  
(D) Inversely proportional to the width of pavement

45. Contour lines cross ridge or valley lines at :

- (A)  $30^{\circ}$  (B)  $45^{\circ}$   
(C)  $60^{\circ}$  (D)  $90^{\circ}$

46. In route surveys, the most suitable method of contouring is :

- (A) By squares (B) By radial lines  
(C) By cross-sections (D) By tachometer

47. The method of plane tabling commonly used for establishing the instrument stations only, is a :

- (A) Method of radiation (B) Method of intersection  
(C) Method of traversing (D) Method of resection

48. A reverse curve consists of :

- (A) A single curve of a circle connecting two straights  
(B) Two arcs of different radii bending in the same direction  
(C) Two arcs of equal radii bending in the same direction  
(D) Two arcs of equal or different radii bending in the opposite direction

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49. A simple circular curve is designated by the :

- (A) Radius of the curve  
(B) Curvature of the curve  
(C) Angle subtended at the centre by a chord of any length  
(D) Angle subtended at the centre by a chord of particular length

50. A deflection angle is :

- (A) Less than  $90^{\circ}$   
(B) More than  $90^{\circ}$  but less than  $180^{\circ}$   
(C) Equal to the difference between the angle of intersection and  $180^{\circ}$   
(D) Equal to the difference between the angle of intersection and  $360^{\circ}$

51. The shift of a curve is equal to :

- (A)  $L/6R$  (B)  $L/24R$   
(C)  $L^2/6R$  (D)  $L^2/24R$

where L = length of transition curve, R = Radius of the circular curve

52. The multiplying constant for the tachometer is :

- (A)  $fi$  (B)  $if$   
(C)  $fd$  (D)  $f + d$

$f$  = Focal length of the objective

$i$  = Interval between the stadia lines or hairs, and

$d$  = Horizontal distance from the optical centre to the vertical axis of the tachometer

53. Of the following \_\_\_\_\_ is used for cleaning of rapid sand filters.

- (A) Scraping the top layer of filter media (B) Back washing  
(C) Providing new sand layers (D) Vacuum cleaning

54. Bitumen grade 80/100 indicates that under the standard test condition, penetration value of bitumen would vary from :

- (A) 0.8mm to 1mm (B) 8mm to 10mm  
(C) 8cm to 10cm (D) 0.08mm to 0.1mm

55. The brightness of the image \_\_\_\_\_ the magnifying power.

- (A) Is directly proportional to  
(B) Is inversely proportional to  
(C) Varies directly as the square of  
(D) Varies inversely as the square of

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56. The shape of STOP Sign according to IRC : 67-2001 is :  
(A) Circular (B) Triangular  
(C) Octogonal (D) Rectangular
57. Bleaching powder is :  
(A) Slaked lime (B) Chloride of lime  
(C) Hypo-chloride of lime (D) Hypo-chlorite of lime
58. Reflection cracking is observed in :  
(A) Flexible pavement  
(B) Rigid pavement  
(C) Bituminous overlay over cement concrete suffice  
(D) Rigid overlay over flexible pavement
59. Assuming the safe stopping sight distance to be 80m on a flat highway section and with a set back distance of 10m, the radius of negotiable horizontal curve is :  
(A) 80 m (B) 70 m  
(C) 160 m (D) 800 m
60. The Indian Roads Congress (IRC) was set up in :  
(A) 1930 (B) 1934  
(C) 1948 (D) 1956
61. If a body is subjected to three mutually perpendicular stresses, of equal intensity, the ratio of direct stress to the corresponding volumetric strain is known as :  
(A) Young's modulus (B) Modulus of rigidity  
(C) Bulk modulus (D) Poisson's ratio
62. Find the incorrect statement of the following :  
(A) A force acting in the opposite direction to the motion of the body is called force of friction  
(B) The ratio of the limiting friction to the normal reaction is called coefficient of friction  
(C) A machine whose efficiency is 100% is known as an ideal machine  
(D) The velocity ratio of a machine is the ratio of load lifted to the effort applied
63. When a rubber ball is dropped from a height of 2m and if there is no surrounding friction, on rebounding the ball will rise to a height of :  
(A) 1m (B) 2 m  
(C) 3 m (D) 4 m

64. Discharge is maximum in a broad-crested weir, if the head of water on the downstream side of weir is ..... the head of water on the upstream side of weir :  
(A) Equal to (B) One-third  
(C) Two-third (D) Three-fourth
65. The unit of modulus of elasticity is same as those of :  
(A) Stress, strain and pressure (B) Stress, force and modulus of rigidity  
(C) Strain, force and pressure (D) Stress, pressure and modulus of rigidity
66. The strain energy stored in a spring, when subjected to maximum load, without allowing permanent distortion is :  
(A) Impact energy (B) Proof resilience  
(C) Proof stress (D) Modulus of resilience
67. When a load on the free end of a cantilever beam is increased, failure will occur :  
(A) At the free end (B) At the fixed end  
(C) In the middle of the beam (D) At a distance  $2/3$  of the span from free end
68. If the assembly in which a rod is enclosed centrally in a tube and is tightened by rigid washers, is subjected to a compressive load, then :  
(A) Rod is under compression  
(B) Tube is under compression  
(C) Both rod and tube are under compression  
(D) Tube is under tension and rod is under compression
69. The Young's modulus (E) of a material is 125 GPa and Poissons ratio is 0.25. The modulus of rigidity of the material is :  
(A) 30GPa (B) 50GPa  
(C) 80GPa (D) 100GPa
70. Two pipes are said to be equivalent, if :  
(A) Length of both the pipes is same  
(B) Diameter of both the pipes is same  
(C) Loss of head and discharge of both the pipes are same  
(D) Loss of head and velocity of flow in both the pipes are same

71. Shape of bending moment diagram for a simply supported beam loaded in its centre is :  
(A) A right angled triangle (B) An isoscles triangle  
(C) A trapezium (D) A rectangle
72. It is found that a body is subjected to a tensile stress of 1200MPa on one plane and another tensile stress of 600MPa on a plane at right angles to the former and shear stress of 400 MPa on these planes. The maximum normal stress will be :  
(A) 400 MPa (B) 500 MPa  
(C) 900 MPa (D) 1400 MPa
73. If a load on the free end of a cantilever beam is increased, failure occurs :  
(A) At the free end (B) At the fixed end  
(C) In the middle of the beam (D) At a distance 2/3 of span from free end
74. The maximum stress produced in a bar of tapering section is at :  
(A) Smaller end (B) Larger end  
(C) Middle (D) Anywhere
75. When a circular shaft is subjected to torsion, the shear stress at the centre is :  
(A) Zero (B) Minimum  
(C) Maximum (D) Infinity
76. 'M' and 'N' are two closely coiled helical springs and are equal in all respects but the diameter of wire of spring 'M' is double that of spring 'N'. The stiffness of spring 'N' will be \_\_\_ that of spring 'M'.  
(A) One-sixteenth (B) One-eighth  
(C) One-fourth (D) One-half
77. Find the correct statement :  
(A) The size of hole drilled in riveting plates is less than the actual size of rivet  
(B) The centre to centre distance between two consecutive rivets in a row is called margin  
(C) Rivets are generally specified by its shank diameter  
(D) Tearing of plates can be avoided by taking the pitch of rivets equal to 1.5 times the diameter of rivet hole

78. Strain energy is defined as the :  
(A) Energy stored in a body when strained within elastic limits  
(B) Energy stored in a body when strained upto the breaking of a specimen  
(C) Maximum energy which can be stored in a body  
(D) Proofresilience per unit volume of a material
79. According to Euler's column theory, the crippling load for a column with one end fixed and the other end hinged is (with usual notation) :  
(A)  $\frac{\pi^2 EI}{l^2}$  (B)  $\frac{\pi^2 EI}{4l^2}$   
(C)  $\frac{2\pi^2 EI}{l^2}$  (D)  $\frac{4\pi^2 EI}{l^2}$
80. For a column with maximum equivalent length, it has :  
(A) Both ends hinged (B) Both ends fixed  
(C) One end fixed and the other end hinged (D) One end fixed and the other end free
81. The modular ratio is the ratio of :  
(A) Young's modulus of steel to the Young's modulus of concrete  
(B) Young's modulus of concrete to the Young's modulus of steel  
(C) Load carried by mild steel to the load carried by tor steel  
(D) Load carried by concrete to the load carried by steel
82. In a beam section, if the steel reinforcement is of such a magnitude that the permissible stresses in concrete and steel are developed simultaneously, the section is known as :  
(A) balanced section (B) concrete balanced section  
(C) steel balanced section (D) optimal section
83. For a singly over reinforced rectangular concrete section :  
(A) The lever arm will be less than that for a balanced section  
(B) The maximum stress developed by steel will be equal to the allowable stress in steel  
(C) The maximum stress developed by concrete will be equal to allowable stress in concrete  
(D) The minimum stress developed by concrete will be equal to allowable stress in concrete

84. The effective depth of a singly reinforced rectangular beam is 300mm. The section is over reinforced and the neutral axis is 120mm below the top. If the maximum stress attained by concrete is  $5\text{N/mm}^2$  and the modular ratio is 18, then the stress developed in the steel will be :
- (A)  $130\text{N/mm}^2$  (B)  $135\text{N/mm}^2$   
(C)  $160\text{N/mm}^2$  (D)  $180\text{N/mm}^2$
85. When there is a sudden increase or decrease in shear force diagram between any two points, it indicates that there is a :
- (A) Point load at the two points  
(B) No loading between the two points  
(C) Uniformly distributed load between the two points  
(D) Uniformly varying load between the two points
86. The maximum permissible shear stress given in IS : 456-1978 is based on :
- (A) Diagonal tension failure (B) Diagonal compression failure  
(C) Flexural tension failure (D) Uniaxial compression
87. In a reinforced concrete beam, the shear stress distribution above the neutral axis follows a :
- (A) Straight line (B) Circular curve  
(C) Parabolic curve (D) Logarithmic
88. The measurement of anchorage lengths of inclined bars, used to act as shear reinforcement is taken in :
- (A) Tension zone from the end of the sloping portion of the bar  
(B) Compression zone from bottom of the beam  
(C) Tension zone from the mid-depth of the beam  
(D) Compression zone from the end of the sloping portion of the bar
89. Of the following, which represents a proper sequence ?
- (A) Proportional limit, elastic limit, yielding, failure  
(B) Elastic limit, proportional limit, yielding, failure  
(C) Yielding, proportional limit, elastic limit, failure  
(D) Elastic limit, yielding, proportional limit, failure

90. The effective depth of a T-beam is the distance between the :
- (A) Centre of the flange and the top of the tensile reinforcement  
(B) Top of the flange and the centre of the tensile reinforcement  
(C) Bottom of the flange and the centre of the tensile reinforcement  
(D) Centre of the flange and the bottom of the tensile reinforcement
91. In designing reinforced concrete piles as a column, it is considered as :
- (A) Fixed at both ends  
(B) Hinged at both ends  
(C) Fixed at one end and hinged at the other end  
(D) Free at both ends
92. If the load, warping and frictional stresses in a cement concrete slab are  $210\text{N/mm}^2$ ,  $290\text{N/mm}^2$ , and  $10\text{N/mm}^2$  respectively, the critical combination of stresses during summer midday is :
- (A)  $290\text{N/mm}^2$  (B)  $390\text{N/mm}^2$   
(C)  $490\text{N/mm}^2$  (D)  $590\text{N/mm}^2$
93. Minimum grade of concrete to be used in reinforced concrete is :
- (A)  $M_{15}$  (B)  $M_{20}$   
(C)  $M_{10}$  (D)  $M_{25}$
94. When shear stress exceeds the permissible limit in a slab, then it is reduced by :
- (A) Increasing the depth (B) Using high strength steel  
(C) Providing shear reinforcement (D) Using larger number of thin bars
95. Plastic section modulus for a solid circular section of diameter 'd' is :
- (A)  $d^3/3$  (B)  $d^3/4$   
(C)  $d^3/6$  (D)  $d^3/8$
96. Bentonite clay contains predominantly the clay mineral :
- (A) Montmorillonite (B) Kaolinite  
(C) Halloysite (D) Illite

97. Match list I with II and select the correct answer :

List-I (Type of soil)	List-II (Mode of transpiration and deposition)
A. Lacustrine soils	1. Transportation by wind
B. Alluvial soils	2. Transportation by running water
C. Aeolian soils	3. Deposited at the bottom of lakes
D. Marine soils	4. Deposited in sea water

Answer	A	B	C	D
(A)	1	2	3	4
(B)	3	2	1	4
(C)	3	2	4	1
(D)	1	3	2	4

98. A sample of saturated sand has a dry unit weight of 18kN/cum and a specific gravity of 2.7. If unit weight of water is 10kN/cum, the void ratio of the soil sample will be :

- (A) 0.5 (B) 0.6  
(C) 0.4 (D) 0.9

99. Consider the following statements

A well-graded sand should have

1. Uniformity coefficient greater than 6
2. Coefficient of curvature between 1 and 3
3. Effective size greater than 1mm

Of these statements

- (A) 1, 2 and 3 are correct (B) 1 and 2 are correct  
(C) 2 and 3 are correct (D) 1 and 3 are correct

100. The moisture content of a clayey soil is gradually decreased from a large value. The correct sequence of the occurrence of the following limits is :

1. Shrinkage limit
2. Plastic limit
3. Liquid limit

Select the correct answer :

- (A) 1, 2, 3 (B) 1, 3, 2  
(C) 3, 2, 1 (D) 3, 1, 2

101. A soil has a liquid limit of 40% and plasticity index of 20%. The plastic limit of the soil will be :

- (A) 20% (B) 30%  
(C) 40% (D) 60%

102. A flow net is drawn for a weir. The total head loss is 6 m, number of potential drops is 10 and the length of the flow path for the last square is 1m. The exit gradient is :

- (A) 0.6 (B) 0.7  
(C) 1.0 (D) 1.6

103. A sand deposit has a porosity of 0.375 and a specific gravity of 2.6. The critical hydraulic gradient for the sand deposit is :

- (A) 2.975 (B) 2.225  
(C) 1 (D) 0.75

104. A clay layer 5m thick in field takes 300 days to attain 50% consolidation with condition of double drainage. If the same clay layer is underlying by hard rock, then the time taken to attain 50% consolidation will be :

- (A) 300 days (B) 600 days  
(C) 900 days (D) 1200 days

105. The bearing capacity of a rectangular footing of plan dimensions 1.5 m × 3 m resting on the surface of a sand deposit was estimated as 600 kN/m<sup>2</sup> when the water table is far below the base of the footing. The bearing capacities in kN/m<sup>2</sup> when the water level rises to depths of 3 m, 1.5 m and 0.5 m below the footing are :

- (A) 600, 600, 400 (B) 600, 450, 350  
(C) 600, 500, 250 (D) 600, 400, 250

106. A clay deposit suffers a total settlement of 5 cm with one way drainage. With two-way drainage, the total settlement will be :

- (A) 10 cm (B) 2.5 cm  
(C) 20 cm (D) 5 cm

107. Varved clay is of :

- (A) Glacial origin (B) Aeolian origin  
(C) Biological origin (D) Pillurial origin

108. Density index is used in relation to :

- (A) Fine grained soils only (B) Coarse grained soils only  
(C) Any soil (D) Organic soils only

109. The permeability of partially saturated soil in laboratory can be determined using :  
(A) Falling head test (B) Constant head test  
(C) Packer's test (D) Horizontal capillary test
110. Critical hydraulic gradient is given by :  
(A) Sp.gr only (B) Unit weight only  
(C) Porosity, Sp.gr and Unit weight (D) Sine of angle of repose
111. A liquid flow is said to be uniform when :  
(A) The liquid particles at all sections have the same velocities  
(B) The liquid particles at different sections have different velocities  
(C) The quantity of liquid flowing per second is constant  
(D) Each liquid particle has a definite path
112. A soil is compacted at a moisture content of 12% with 10% air voids. The dry unit weight of soil, (taking G as 2.65 and unit weight of water as 10 kN/cum) is :  
(A) 20.11 kN/m<sup>3</sup> (B) 19.58 kN/m<sup>3</sup>  
(C) 18.10 kN/m<sup>3</sup> (D) 17.60 kN/m<sup>3</sup>
113. A 8 m thick clay layer is underlain by coarse sand containing artesian water under a Piezometer head of 10 m. The maximum depth of excavation that can be made in the deposit without bottom being subjected to flow out, taking unit weight of clay = 20 kN/m<sup>3</sup> is :  
(A) 0 m (B) 3 m  
(C) 18 m (D) 13 m
114. The net ultimate bearing capacity of a purely cohesive soil :  
(A) Depends on width of footing and is independent of depth of footing  
(B) Depends on depth of footing and is independent of width of footing  
(C) Depends on both width and depth of footing  
(D) Independent of both width and depth of footing
115. Contact pressure beneath a rigid footing resting on a cohesive soil is :  
(A) Less at edges compared to middle (B) More at edges compared to middle  
(C) Uniform throughout (D) Cannot be interpreted
116. When a retaining wall moves away from the backfill, the pressure exerted on the wall is termed as :  
(A) Passive earth pressure (B) Swelling pressure  
(C) Pore pressure (D) Active earth pressure

117. Neutral axis of the cross-section of a beam is that axis at which the bending stress is :  
(A) Zero (B) Minimum  
(C) Maximum (D) Infinity
118. Critical gradient of the seeping water through a permeable soil is :  
(A) directly proportional to square of void ratio  
(B) increases with decrease in void ratio  
(C) inversely proportional to shape of the soil particles  
(D) decreases with increase in specific gravity of soil
119. Expulsion rate of pore fluid from the soil is directly dependent on the \_\_\_\_\_ of the soil :  
(A) structure (B) texture  
(C) permeability (D) porosity
120. A beam of uniform strength has :  
(A) Same cross-section throughout the beam  
(B) Same bending stress at every section  
(C) Same bending moment at every section  
(D) Same shear stress at every section