

DO NOT OPEN THIS TEST BOOKLET UNTIL YOU ARE ASKED TO DO SO**TEST BOOKLET SERIES****TEST BOOKLET
AE(C)-PWD/2015**

Time Allowed : 2 Hours]

[Maximum Marks : 100

*All questions carry equal marks.***INSTRUCTIONS**

1. Immediately after the commencement of the examination, you should check that test booklet does not have any unprinted or torn or missing pages or items, etc. If so, get it replaced by a complete test booklet.
2. **Encode clearly the test booklet series A, B, C or D as the case may be in the appropriate place in the answer-sheet.**
3. Write your Roll Number only in the box provided alongside.
Do not write anything else on the Test Booklet.
4. This Test Booklet contains **100** items (questions). Each item comprises four responses (answers). Choose only one response for each item which you consider the best.
5. After the candidate has read each item in the Test Booklet and decided which of the given responses is correct or the best, he has to mark the circle containing the letter of the selected response by blackening it completely with Black or Blue ball pen. In the following example, response "C" is so marked :



6. Do the encoding carefully as given in the illustrations. While encoding your particulars or marking the answers on answer sheet, you should blacken the circle corresponding to the choice in full and no part of the circle should be left unfilled.
7. You have to mark all your responses **ONLY** on the ANSWER SHEET separately given according to 'INSTRUCTIONS FOR CANDIDATES' already supplied to you. *Responses marked on the Test Booklet or in any paper other than the answer sheet shall not be examined.*
8. All items carry equal marks. Attempt all items. Your total marks will depend only on the number of correct responses marked by you in the Answer Sheet. There will be no negative marking.
9. Before you proceed to mark responses in the Answer Sheet fill in the particulars in the front portion of the Answer Sheet as per the instructions sent to you.
10. After you have completed the test, hand over the Answer Sheet only, to the Invigilator.

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1. The volumetric modulus of elasticity is called :
- (A) bulk modulus (B) 3-dimensional modulus
(C) proof modulus (D) none of these
2. The upper bound of Poisson's ratio for an anisotropic material may be :
- (A) between 0.3 and 0.5 (B) between 0.5 and 1.0
(C) 0.5 (D) above 1.0
3. Bar is a member which is subjected to :
- (A) axial pull (B) axial compression
(C) eccentric pull (D) none of these
4. The factor of safety under dynamic loading, as compared to factor of safety under static loading is :
- (A) more (B) equal
(C) less (D) none of these
5. The cross-section of a shaft is :
- (A) solid circular only (B) square only
(C) hollow circular only (D) all of these

6. Impact test enables one to estimate the property of :
- (A) hardness (B) toughness
(C) strength (D) creep
7. Mohr stress circle diagram agrees with the analytical solution :
- (A) approximately (B) exactly
(C) partially (D) all of these
8. The 'rail' of Indian Railways is the example of :
- (A) beam on elastic foundation (B) continuous beam
(C) overhanging beam (D) semi-cantilever beam
9. Consideration of shear centre is important for beams of :
- (A) thin sections (B) aeroplanes
(C) angle sections (D) all of these
10. A continuous beam is deemed as 'deep' when ratio of span ' l ' and ' D ' is :
- (A) less than 2.5 (B) less than 1.0
(C) more than 3.0 (D) more than 5.0

11. The ends of vertical stirrups are anchored in :
- (A) compression zone (B) tensile zone
(C) neutral axis (D) none of these
12. The value of bond stress for bars in compression, as compared to value of bond stress for bars intension should be :
- (A) decreased by 25% (B) kept equal
(C) increased by 25% (D) decreased by 10%
13. The depth of a T-beam as balanced section is based on the assumption that :
- (A) N.A. lies in the rib
(B) Compression taken by concrete area in the rib neglected
(C) Both of the above
(D) None of the above
14. The torsional effect is considerable in case of :
- (A) L-beam (B) T-beam
(C) Beam around stair (D) Both (A) and (C)
15. Maximum spacing for shear reinforcement measured along axis of a member should *not* exceed for vertical stirrups by :
- (A) $0.75d$ (B) d
(C) $1.25d$ (D) $1.5d$

16. A circular bunker and conical dome have a ring beam at their junction. The ring beam is designed for :
- (A) hoop tension (B) hoop compression
(C) meridional tension (D) none of these
17. The reversible nature loads are :
- (A) earthquake load (B) wind load
(C) both (A) and (B) (D) none of these
18. In ultimate strength design, the internal load is increased by :
- (A) load factor (B) factor of safety
(C) limiting factor (D) all of these
19. Buckling of top flange in plate girder is prevented by :
- (A) lateral stiffener (B) longitudinal stiffener
(C) shear stiffener (D) none of these
20. A plate girder is :
- (A) built-up beam (B) beam-column
(C) built-up column (D) none of these

21. Number of web plate employed in box-type plate girder may be :
- (A) only 1 (B) zero
(C) 2 or more (D) none of these
22. If increase in length of a member in a truss due to rise in temperature causes no change in the support reactions, then the truss is called :
- (A) Warren truss (B) Determinate truss
(C) Unstable truss (D) Indeterminate structure
23. The maximum number of unknown forces can be determined in a concurrent coplanar force system under equilibrium is :
- (A) zero (B) 2
(C) 3 (D) 6
24. For a cantilever beam of length 'L' carrying a u.d.l. w per unit length, the deflection at the free end is given by :
- (A) $\frac{wL^3}{8EI}$ (B) $\frac{wL^2}{24EI}$
(C) $\frac{wL^4}{8EI}$ (D) $\frac{wL^3}{12EI}$

25. If a cantilever beam of length l and flexural rigidity EI is carrying a concentrated load P at the free end, the total strain energy will be :

(A) $\frac{P^2L^3}{2EI}$

(B) $\frac{P^2L^3}{3EI}$

(C) $\frac{P^2L^3}{6EI}$

(D) $\frac{P^2L^3}{12EI}$

26. Clockwise moment M are acting at both the ends of a uniform simply supported beam. The ratio of slope at the end to the slope at centre will be :

(A) 0.5

(B) 1

(C) 2

(D) 3

27. If a moment M is applied to the hinged end of a prismatic propped cantilever, then the moment at the fixed end will be :

(A) M

(B) $\frac{M}{2}$

(C) $\frac{M}{3}$

(D) $\frac{M}{4}$

28. The area of analogous column of a propped cantilever of length L and constant

EI is equal to :

(A) $\frac{L}{EI}$

(B) $\frac{2L}{EI}$

(C) $\frac{3L}{EI}$

(D) ∞ (infinity)

29. A three hinged parabolic arch subjected to uniform load w per unit horizontal

length the maximum bending moment is :

(A) $\frac{wL^2}{4}$

(B) $\frac{wL^2}{8}$

(C) $\frac{wL^2}{12}$

(D) zero

30. A symmetric two hinged parabolic arch has span L and rise h . The horizontal

thrust in the arch due to uniformly distributed load w is :

(A) $\frac{wL^2}{3h}$

(B) $\frac{wL^2}{8h}$

(C) $\frac{wL^2}{12h}$

(D) $\frac{wL^2}{16h}$

31. The shape of the cable suspended between two points is :
- (A) parabolic (B) catenary
(C) circular (D) dependent upon the loads
32. A cable of span L and central dip ' d ' is subjected to uniform load, w per unit horizontal length. The horizontal component of tension in the cable is :
- (A) $\frac{wL^2}{4d}$ (B) $\frac{wL^2}{8d}$
(C) $\frac{wL^2}{12d}$ (D) $\frac{wL^2}{16d}$
33. Euler's hyperbola is the graphical expression between :
- (A) stress and strain in the column
(B) critical stress σ_{cr} and flexural rigidity EI
(C) critical stress σ_{cr} and slenderness ratio $\frac{L_e}{r}$
(D) none of the above
34. The allowable stress in a column can be increased by :
- (A) increasing the radius of gyration
(B) increasing the eccentricity
(C) increasing the slenderness ratio
(D) none of the above

35. A circular ring is simply supported on equally spaced columns and subjected to u.d.l. over entire length. The twisting moment in the beam is maximum :
- (A) at the column support
 - (B) at the point of contraflexure
 - (C) at the point where shear force is zero
 - (D) none of the above
36. Elasticity of soil is the property by which it regains its original position, when the load is :
- (A) applied
 - (B) extended
 - (C) pressed
 - (D) removed
37. The ratio of volume of voids to total volume of solid mass is known as :
- (A) Void ratio
 - (B) Porosity
 - (C) Density
 - (D) Specific gravity
38. For soil a rise in water-level may reduce :
- (A) Density
 - (B) Specific gravity
 - (C) Porosity
 - (D) Bearing capacity

39. The property of soil by virtue of which it deforms rapidly without rupture or volume change rebound is called :

- (A) Ductility (B) Plasticity
(C) Permeability (D) Porosity

40. Soil between soil and clay is called :

- (A) Shale (B) Hard pan
(C) Loam (D) Silt

41. Saturated clay tests for shear strength can be performed by :

- (A) Tri-axial compression test
(B) Direct shear test
(C) Unconfined compression test
(D) None of the above

42. The angle of dispersion for column or wall is taken as :

- (A) 30 (B) 40
(C) 45 (D) 60

43. Slope failure through the toe is called :

- (A) Face failure (B) Base failure
(C) Toe failure (D) Slope failure

44. Grillage foundations are provided, when :
- (A) Heavy isolated loads exist
 - (B) Soil is hard
 - (C) Piles are not possible
 - (D) Raft foundation is unsuitable
45. The escape of pore water due to long static load and its compression therefrom is called :
- (A) Compaction
 - (B) Swelling
 - (C) Consolidation
 - (D) Subsidence
46. The minimum centre to centre distance between friction piles of 1 m diameter is :
- (A) 1 to 2
 - (B) 2 to 3
 - (C) 3 to 4
 - (D) 4 to 5
47. The piles used to increase the bearing capacity of the soil are called :
- (A) Friction
 - (B) Floating
 - (C) Compaction
 - (D) Compression
48. Under-reamed piles are normally :
- (A) Precast
 - (B) Bored
 - (C) Driven
 - (D) Sunken

49. Under certain conditions, the disadvantage of timber piles is :
- (A) less strength (B) less penetration
(C) less durability (D) none of these
50. The Westergaard equations are used for the analysis of :
- (A) Clayey soil (B) Stratified soil
(C) Sandy soil (D) Cohesive soil
51. A wearing surface prepared by laying bituminous concrete is called :
- (A) Sheet asphalt (B) Wearing coat
(C) Renewal coat (D) Carpet
52. By providing a ruling gradient, load carrying capacity is reduced by :
- (A) 15% (B) 20%
(C) 10% (D) 40%
53. Cross slope given to road surface is called :
- (A) Slope (B) Cross slope
(C) Gradient (D) Cross fall

54. On hilly roads, widening on curves is done :
- (A) On the inner side
 - (B) On the outer side
 - (C) More on inner side and less on the outer side
 - (D) None of the above
55. Crushed or broken stone for road construction is called :
- (A) Grit
 - (B) Aggregate
 - (C) Ballast
 - (D) Macadam
56. Minimum camber provided for bituminous surface on hill roads is :
- (A) 2.0%
 - (B) 2.25%
 - (C) 2.5%
 - (D) 3.0%
57. An underground passage for permitting maximum traffic is called :
- (A) Road tunnel
 - (B) Tunnel way
 - (C) Subway
 - (D) Under passage
58. The length of curve between straight and start of circular curve is known as :
- (A) Primary length
 - (B) Approach length
 - (C) Transition length
 - (D) None of these

59. The stopping distance of a vehicle is equal to :
- (A) lag distance
 - (B) braking distance
 - (C) sum of (A) and (B) above
 - (D) difference of (A) and (B)
60. A highway meets a district road on a crossing. The vehicle should move through on :
- (A) district road
 - (B) highway
 - (C) any road
 - (D) none of these
61. Base line in the layout of a chain survey is :
- (A) longest main survey
 - (B) checkline
 - (C) tie line
 - (D) none of these
62. Which of the following can be shown in a plan ?
- (A) coniferous forest
 - (B) meadow
 - (C) swamp
 - (D) all of these
63. Curves of equal depth are called :
- (A) isochores
 - (B) isohypes
 - (C) isobaths
 - (D) isopotentials

64. The curvature correction in levelling is always :
- (A) negative (B) positive
(C) zero (D) none of these
65. The characteristics of contours are :
- (A) Contour line must close itself
(B) These have no sharp turnings
(C) Closer drawn contours show steep slopes
(D) All of the above
66. The permanent adjustment of theodolite includes :
- (A) elimination of parallex
(B) adjustment of telescope
(C) adjustment of vertical circle index
(D) both (B) and (C) above
67. Two objects may be visualized simultaneously by a :
- (A) pantograph (B) sonometer
(C) sextant (D) planimeter

68. Fluid continuum is a concept in which :
- (A) fluid is non-homogeneous
 - (B) fluid density is very low
 - (C) fluid particles are very closely spaced
 - (D) none of the above
69. Spherical shape of droplets of mercury is due to :
- (A) high density
 - (B) high surface tension
 - (C) high adhesion
 - (D) low vapour pressure
70. When a static liquid is subjected to uniform rotation in a container the free-surface assumes a shape of :
- (A) a cone
 - (B) a circular cylinder
 - (C) a paraboloid of revolution
 - (D) an ellipsoid of revolution
71. Normal acceleration in fluid flow situations exists only when :
- (A) streamlines are straight and parallel
 - (B) the flow is two-dimensional
 - (C) the streamlines are curved
 - (D) the flow is unsteady

72. A stagnation point is a point :

- (A) where the pressure is zero
- (B) where the total energy is zero
- (C) where the velocity of flow reduces to zero
- (D) where the total energy is maximum

73. The Buckingham-Pi theorem is widely used in the dimensional analysis and expresses the resulting equation in term of :

- (A) the dependent and independent variables
- (B) n -dimensionless parameters
- (C) $(n - m)$ dimensionless parameters
- (D) none of the above

74. The existence of boundary layer is on account of :

- (A) fluid density
- (B) gravitational effect
- (C) fluid viscosity
- (D) surface tension

75. For sand beds, the Darcy's law is valid if the Reynolds number defined by

$$R_e = \frac{ud_50}{\nu} \text{ is less than :}$$

- (A) 0.1
- (B) 1
- (C) 1000
- (D) 10

76. The thickness of turbulent boundary layer over a flat plate increases with distance 'x' along the plate more rapidly than in the laminar one. Other parameter remaining the same, it is proportional to :
- (A) $x^{4/5}$ (B) $x^{1/2}$
(C) $x^{1/5}$ (D) x
77. A streamlined body is defined as a body about which :
- (A) the flow is laminar
(B) the flow is along streamlines
(C) the flow separation is suppressed
(D) the drag is zero
78. For turbulent flow in smooth pipes, the entrance length is taken as :
- (A) 114 (B) 75
(C) 50 (D) 100
79. Water hammer is a phenomenon which is caused by :
- (A) Sudden opening of a valve in a pipeline
(B) Sudden closure (partial or complete) of a valve in pipeflow
(C) Incompressibility of fluid
(D) The pipe material being elastic
80. Alternate depths of flow in a channel are :
- (A) the depths at which the total energies are same
(B) the depths which occur at the same specific energy
(C) the depths for the same specific force
(D) the conjugate depths

81. Which of the following districts in Himachal Pradesh receives highest rainfall ?
- (A) Kullu (B) Mandi
(C) Solan (D) Kangra
82. Lime stone is most found in which of the following areas in H.P. ?
- (A) Hamirpur (B) Leh and Spiti
(C) Bilaspur (D) Shimla
83. Which of the following districts of H.P. is known for Humus Mountain speletal soils ?
- (A) Kinnaur (B) Chamba
(C) Una (D) Kullu
84. Which of the following form the border of H.P. ?
- (A) Delhi (B) Tibet
(C) Gujarat (D) M.P.
85. Wool weaving in H.P. is :
- (A) Small scale industry
(B) Cottage industry
(C) Public sector enterprise
(D) Gram Panchayat owned industry

86. In which of the following years Himachal Pradesh was a centrally administered territory ?
- (A) 1950 (B) 1951
(C) 1952 (D) 1955
87. Jhoor is the major dance in :
- (A) Mizoram (B) Chhattisgarh
(C) Jharkhand (D) Himachal Pradesh
88. Chait Durgasthmi is celebrated in the Shakti Shrines of :
- (A) Hathkote (B) Kullu
(C) Chamba (D) Paonta Sahib
89. Buffalo fights are the highlight of :
- (A) Ladarcha Fair (B) Sari Fair
(C) Lahaul Festival (D) Haryali Fair
90. Which of the following recipes of H.P. is *not* unique ?
- (A) Bada/Poldu (B) Nasasta
(C) Dal Bhati (D) Sweet Meat

91. Which of the following statements about the District Collector is true ?
- (A) He is the Chief Co-ordinator of district administration.
 - (B) He is the Chairman of the District Planning Committee always.
 - (C) He is the Chairman of the Metropolitan Area Planning Committee.
 - (D) He is the Chief Executive Officer of the Zila Parishad in all the states.
92. Who of the following was the Chairman of the Expenditure Reforms Commission, 2001 ?
- (A) L.K. Jha
 - (B) K.P. Geethakrishnan
 - (C) T.S.R. Subramaniam
 - (D) Raghu Ram Rajan
93. A leader of the House in Parliament is *not* available for consultation by the presiding officer of the House on :
- (A) arrangement of government business
 - (B) discussion on matters of urgent public importance
 - (C) a motion to suspend a member from the services of the House
 - (D) a motion of no-confidence against the government
94. Ministry of Social Justice and Empowerment deals with the welfare of :
- (A) SC/ST/OBC
 - (B) Disabled and minorities
 - (C) Senior citizens
 - (D) All of these
95. The first Administrative Reforms Commission was appointed in the year
- (A) 1962
 - (B) 1964
 - (C) 1966
 - (D) 1968

96. Which of the following statements about the election of the President of India is *not* correct ?
- (A) Presidential election must be held before the expiry of the term of his office.
- (B) Election of the President is held through an electoral college.
- (C) Election of the President cannot be held if there are some vacancies in the electoral college.
- (D) Only a citizen of India can contest election to the office of President.
97. Which of the following is matched *correctly* ?
- (A) Bio-technology Policy — 2001
- (B) Industrial Policy — 2003
- (C) Horticulture Policy — 1985
- (D) Information Technology Policy — 1980
98. The location of Peter Mokabe World Cup Stadium is in :
- (A) Polokwane, South Africa (B) Damisk, Syria
- (C) Tehran, Iran (D) Bangkok, Thailand
99. Roger Federer is associated with :
- (A) Volleyball (B) Football
- (C) Tennis (D) Cricket
100. Akbar was born on :
- (A) 15th October, 1542 (B) 15th December, 1545
- (C) 30th January, 1542 (D) 15th September, 1542