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HPSC AE

**Previous Year Paper
2010 Civil Engineering
Paper - II**



FORMAT

A

**BOOKLET
NUMBER**

10151

QUESTION BOOKLET

SECTION: 1	CIVIL ENGINEERING	60 ITEMS
SECTION: 2	GENERAL STUDIES	20 ITEMS
SECTION: 3	CURRENT AFFAIRS / GENERAL KNOWLEDGE	20 ITEMS

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TO DO SO**

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BOOKLET CAREFULLY**

Section 1: Civil Engineering

For Rough Work

1. A hook of 10 mm diameter is embedded in concrete for distance of 80 mm. If the bond stress is not to exceed 0.6 N/mm^2 , the maximum load that can be suspended is
 - a. 250 N
 - b. 500 N
 - c. 750 N
 - d. 1500 N
2. The ratio of maximum -ve bending moment of a cantilever to that of a cantilever propped at the free end to the same level as the fixed and same U. D. L. throughout the span is
 - a. 1
 - b. 2
 - c. 4
 - d. 6
3. A simply supported RCC beam carrying uniform load has deflection of 10 mm at the center. If both ends of the beam are now fixed, the deflection at the center would be
 - a. 25 mm
 - b. 10 mm
 - c. 8 mm
 - d. 2 mm
4. If 'M' is the external moment which rotates the near end of a prismatic beam without translation, the far end being fixed, then the moment induced at the far end is
 - a. $M/2$ in the same direction as M
 - b. $M/3$ in opposite direction as M
 - c. M in opposite direction
 - d. $M/4$ in the same direction
5. An RCC column 4 m long and 30 sq. cm. is reinforced with four bars 40 mm diameter longitudinally. If the compressive stress in concrete is not to exceed 49.2 kg/sq. cm. and $m=15$, the safe axial load for the column would be approximately
 - a. 200 tonnes
 - b. 100 tonnes
 - c. 50 tonnes
 - d. 10 tonnes
6. The ratio of the maximum deflection of a beam simply supported at its ends with an isolated central load and that with a uniformly distributed load over its entire length is
 - a. 1 : 1
 - b. $24/15$: 1
 - c. $15/25$: 1
 - d. $2/3$: 1

For Rough Work

7. A simply supported beam of span $(L + 2a)$ with equal overhangs 'a' carries a uniformly distributed load over the whole length 'b'. M changes sign if
- $L > 2a$
 - $L < 2a$
 - $L = 2a$
 - $L > 3a$
8. The usual rate of hydraulic loading on a high rate Trickling Filter is
- 1 - 2 $\text{m}^3/\text{m}^2/\text{day}$
 - 2 - 5 $\text{m}^3/\text{m}^2/\text{day}$
 - 5 - 10 $\text{m}^3/\text{m}^2/\text{day}$
 - 10 - 30 $\text{m}^3/\text{m}^2/\text{day}$
9. Four rain-gauge stations A, B, C and D in a catchment area have recorded rainfall of 20 cm, 25 cm, 22 cm and 15 cm respectively. If their Thiessen weights are 0.3, 0.4, 0.1 and 0.2. The average depth of rainfall on the catchment will be
- 21.2 cm
 - 24.2 cm
 - 26.2 cm
 - 30 cm
10. If the sedimentation tank is rectangular in shape having length 'L', width 'W', and depth 'D', then for discharge equal to 'Q', the setting velocity of a particle would be
- $Q/B \times D$
 - $Q/L \times W$
 - $Q/B \times W$
 - $Q/B \times L$
11. Flow through a venturi flume is maximum when the depth at the throat is
- One-fourth
 - One-third
 - Two-third
 - Half
12. As compared to reciprocating pumps, the discharging capacity of a centrifugal pump is more whereas its pressure head will be
- Too much
 - Same as that of reciprocating pumps
 - Less as compared to reciprocating pump
 - Too less
13. A channel of bed slope 0.0001 carries a discharge of $10\text{m}^3/\text{s}$ when the depth of flow is 1.2 m. The discharge carried by this channel at the same depth of flow, if the slope is increased to 0.0009, will be
- $10\text{m}^3/\text{s}$
 - $30\text{m}^3/\text{s}$
 - $60\text{m}^3/\text{s}$
 - $45\text{m}^3/\text{s}$
14. Sleeper density is
- Number of sleepers for two tracks
 - Number of sleepers per rail length
 - A sleeper on either side of a rail joint
 - Minimum distance between two neighbouring sleepers

For Rough Work

15. Safe speed on B. G. curve is $V =$
- $44\sqrt{R} - 70$ kmph
 - $3.6\sqrt{R} - 6$ kmph
 - $4\sqrt{R} - 60$ kmph
 - $5\sqrt{R} - 20$ kmph
16. The siding provided on steep slopes so that a wagon at rest will NOT enter the main line is called
- Trap Siding
 - Catch Siding
 - Sick Siding
 - Refuse Siding
17. The limiting value of super elevation for B. G. track in Indian railways is
- 10 cm
 - 15 cm
 - 16.5 cm
 - 30 cm
18. In 85/25 grade of Bitumen, the figure of 25 represents
- Softening point in $^{\circ}\text{C}$
 - Melting point in $^{\circ}\text{C}$
 - Flash point in $^{\circ}\text{C}$
 - Penetration
19. As per IRC, in surface dressing, the quantity of Bitumen used for every 10 m^2 of the surface in first coat on WBM road is
- 17 - 19.5 kg
 - 10 - 12 kg
 - 12 - 17 kg
 - 19 - 22 kg
20. Permeability of soil varies
- Inversely as square of grain size
 - As square of grain size
 - As grain size
 - Inversely as grain size
21. In a flow net
- Flow lines and Equipotential lines meet at right angles to one another
 - Quantity of water flowing through each flow channel is different
 - Larger the dimensions of the field, smaller will be the hydraulic gradient
 - Different potential drop occurs between two successive equipotential lines
22. A soil has a bulk density of 22 kN/m^3 and water content 10%. The dry density of soil is
- 18.6 kN/m^3
 - 20 kN/m^3
 - 22 kN/m^3
 - 23.2 kN/m^3

For Rough Work

23. The ratio between (Liquid Limit-Water Content) and (Plastic Index for a soil mass) is called
- Liquid Index
 - Shrinkage Ratio
 - Consistency Index
 - Toughness Index

24. The following index properties were determined for four soils A, B, C and D

Soil Property	A	B	C	D
Liquid limit	0.50	0.49	0.43	0.47
Plastic limit	0.23	0.17	0.21	0.26

Which soil has more plastic index?

- B
 - C
 - D
 - A
25. In one method of plane table survey, the object to be plotted is sighted from two plane table stations (which are plotted after measuring and plotting to scale the distance between them) and the point of intersection of both the rays gives the position point of the object. This method is called
- Radiation Method
 - Intersection Method
 - Resection Method
 - Orientation Method

26. If the R. L. of a B. M. is 100 m, back sight is 1.215 m and the foresight is 1.870 m, the R. L. of the forward station is
- 99.345 m
 - 100.345 m
 - 100.655 m
 - 101.870 m

27. In a closed traverse ABC the following readings were taken

Line	Fore Bearing	Back Bearing
AB	19°	220°
BC	100°	277°
CA	227°	49°

If station A is free from local attraction, correct bearing of CB is

- 275°
 - 276°
 - 277°
 - 279°
28. The type of flooring suitable for use in churches, theatres, public libraries and other places where noiseless floor covering is desired, is
- Cork flooring
 - Glass flooring
 - Wooden flooring
 - Linoleum flooring

For Rough Work

29. If the difference between an edge of the pavement (18m wide) and its crown is 30cm, then the camber in the pavement is
- 1 in 60
 - 1 in 30
 - 1 in 15
 - 1 in 45
30. The width of rib in a T-beam should be sufficient to accommodate the required tensile steel bars and to give lateral stability to the structure. It should be at least equal to
- $\frac{1}{2}$ of the depth of T-beam
 - $\frac{1}{2}$ of the depth of the rib
 - $\frac{1}{3}$ of the depth of the slab
 - $\frac{3}{4}$ of the depth of the slab
31. If the modular ratio is 'm', steel ratio is 'r' the critical neutral axis constant "K" is given by
- $\frac{m}{m-r}$
 - $\frac{m}{m+r}$
 - $\frac{m+r}{m}$
 - $\frac{m^2}{r}$
32. The effective width of a column strip of a flat slab is taken as
- One-Fourth the width of the panel
 - Half the width of the panel
 - Half the diameter of the column
 - One-Third the diameter of the column
33. For M150 (1 : 2 : 4) cement concrete, the permissible value of shear stress is
- 5 kg/cm²
 - 10 kg/cm²
 - 20 kg/cm²
 - 30 kg/cm²
34. To safeguard a simply supported slab against cracking near supports, half of the main steel provided is bent up at a distance of $\frac{1}{7}$, measured from
- The end of the slab bearings
 - The centre of the slab bearings
 - The starting edge of the slab bearings
 - One third of the slab from top
35. In order to make a retaining wall safe against sliding, its horizontal thrust should be less than
- Maximum load of the wall
 - Co-efficient of friction between soil and the base slab
 - (Total Vertical Load of the wall) / (Co-efficient of friction between soil and base slab)
 - (Total vertical load of the wall) x (Co-efficient of friction between soil and the base slab)

For Rough Work

36. In a gusseted base, when the end of the column is machined for completed bearing on the base plate, then the axial load is assumed to be transferred to base plate
- 100% by direct bearing
 - 100% through fastenings
 - 50% by direct bearing and 50% through fastenings
 - 75% by direct bearing and 25% through fastenings
37. Combined system of sewers may be favoured where
- Rainfall is concentrated in a season of the year and DWF is often fluctuating from day to day
 - Rainfall is scattered through out the year and DWF is too small compared to storm water
 - Rainfall is distributed throughout the year such that it is $\leq 10 \times$ DWF
 - City is on steep rocky slopes
38. A waste sample of 5 ml is made upto 300 ml. with distilled water. The sample had an initial D.O. of 8.0 mg per litre and after 5 days the D. O. is zero. Hence BOD of the sample was
- 8 mg per litre
 - 472 mg per litre
 - 480 mg per litre
 - Test is invalid
39. A canal has to irrigate 12000 hectares of rice with a duty of 1000 hectares/cumec. For what discharge should the canal be designed if the capacity factor is 0.8 and the time factor is 0.75
- 9.6 m³ per second
 - 5.6 m³ per second
 - 20 m³ per second
 - 10 m³ per second
40. A flow net constructed for an earth dam storing water to a height of 20 m, the number of flow channels and the number of potential drops are found to be 4 and 10 respectively. If the permeability of the dam material is 3 m/day, the seepage per metre length of the dam is equal to
- 24 m³/day
 - 48 m³/day
 - 96 m³/day
 - 12 m³/day
41. The rainfall in four successive 12 hour-periods on a catchment are 4, 8, 9 and 3 cm. If the infiltration index ϕ for the storm is 0.5 cm-hour, then the total surface run off will be
- 0.5 cm
 - 5 cm
 - 10 cm
 - 15 cm

For Rough Work

42. The 4h unit hydrograph of a basin can be approximated as a triangle with base period of 48h and a peak ordinate of $200 \text{ m}^3/\text{sec}$. The area of the basin will be
- 1728 sq. km.
 - 3456 sq. km.
 - 4864 sq. km.
 - 5184 sq. km.
43. How many treads would be there in a straight stair connection between two floors with height difference of 3.6 m? The rise is 15 cm.
- 23
 - 24
 - 22
 - 26
44. In cinema theaters, to avoid reverberation, the longitudinal walls should be
- Perfectly parallel
 - Converging towards screen
 - Converging towards rear
 - Should be curvilinear
45. For 10 m^3 of reinforced brick work, the number of bricks used will be
- 2000
 - 3700
 - 4200
 - 500
46. In streamlines of flow net of a concentric circle, if the velocity at a radius of 0.6 m is 2.7 m/sec, then the velocity at a radius of 0.9 m will be
- 3.6 m/sec
 - 2.7 m/sec
 - 1.8 m/sec
 - 1.2 m/sec
47. For medium silt whose average grain size is 0.16 mm, Lacey's silt factor will be (approx.)
- 0.30
 - 0.5
 - 0.70
 - 1.32
48. In an unconfined compression test on a saturated clay, the undrained shear strength was found to be 6 t/m^2 . If a sample of the same soil is tested in an undrained condition, in triaxial compression at a cell pressure of 20 t/m^2 , then the major principal stress at failure will be
- 48 t/m^2
 - 32 t/m^2
 - 24 t/m^2
 - 12 t/m^2

For Rough Work

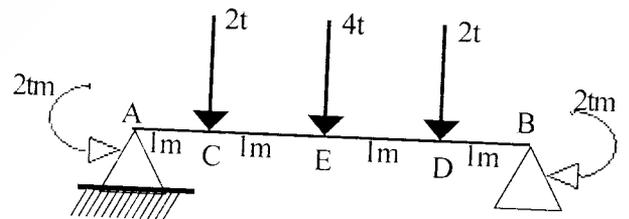
49. The natural void ratio of a saturated clay strata 3 m thick is 0.90. The final void ratio of the clay at the end of consolidation is expected to be 0.71. The total consolidation settlement of clay strata is
- 30 cm
 - 25 cm
 - 20 cm
 - 15 cm
50. Two identical clay samples of the same size designated as 'A' & 'B' are subjected to consolidation test under identical loading conditions. Drainage takes place through one face in sample 'A' & through both the faces in sample 'B'. 50% consolidation of sample 'A' occurs in 10 min. The time required for 50% consolidation to occur in sample 'B' will be
- 40 min.
 - 10 min.
 - 5 min.
 - 2.5 min.
51. The structure can be taken as silo if
- $h > b \tan\left(\frac{45 + \phi}{2}\right)$
 - $h > b \tan\left(\frac{90 + \phi}{2}\right)$
 - $b > h \tan\left(\frac{45 + \phi}{2}\right)$
 - $b > h \tan\left(\frac{90 + \phi}{2}\right)$
52. A grit chamber of dimensions 12.0 m x 1.50 x 0.80 m, liquid depth has a flow of 720 m³/hr surface loading rate & detention time respectively
- 40,000 m³/hr/m² & 1.2 minutes
 - 40,000 Lph/m² & 40 minutes
 - 40 m³/hr/m² & 12 minutes
 - 40,000 Lph/m² & 1.2 minutes
53. Fresh sludge has moisture content of 99% and after thickening, its moisture content is reduced to 96%. The reduction in volume of sludge is
- 3%
 - 5%
 - 75%
 - 97.5%
54. The limiting value of neutral axis for Fe 415 grade steel is
- 0.43d
 - 0.46d
 - 0.48d
 - 0.53d
55. The effective throat thickness of 6 m size fillet weld with angle of 75° between fusion faces is
- 3.6 mm
 - 4.0 mm
 - 4.2 mm
 - 4.5 mm

For Rough Work

56. At a hydraulic jump, depth at the two sides are 0.4 m & 1.4 m. The head loss in the jump is nearly
- 1
 - 0.9
 - 0.7
 - 0.45
57. If the value of friction factor $F = 0.02$, then the value of Chezy's constant will be
- $20g$
 - $20\sqrt{g}$
 - $\sqrt{80g}$
 - $\sqrt{160g}$
58. A dry sand specimen is put through a triaxial test. The cell pressure is 50 KPa and the deviator stress at failure is 100 KPa. The angle of internal friction for the sand specimen is
- 15°
 - 30°
 - 37°
 - 45°

59. A beam of length 10 m carries a U.D.L. of 20 KN/m over its entire length & rests on two simple supports. In order that the maximum B.M. produced in the beam is the least possible, the supports must be placed from the ends at a distance of
- 5.86 m
 - 4.14 m
 - 2.93 m
 - 2.07 m

60. A simply supported beam is loaded as shown in the given figure. The bending moment at E would be



- 6 tm (Sagging)
- 4 tm (Hogging)
- 6 tm (Hogging)
- 4 tm (Sagging)

Section 2: General Studies

For Rough Work

61. Which battle laid the foundation of Mughal rule in India?

- a. Battle of Plassey
- b. Battle of Talikota
- c. First Battle of Panipat
- d. Battle of Haldighati

62. Nautical mile is a unit of distance in

- a. Road
- b. Space
- c. Railway Tracks
- d. Sea

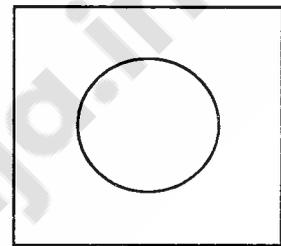
63. Seismograph is an instrument to measure

- a. Earthquake shocks
- b. Atmospheric Pressure
- c. Volcanic Activity
- d. Variations in Earth's rotation

64. Anaemia is caused due to the deficiency of

- a. Folic acid
- b. Vitamin A
- c. Vitamin B₁₂
- d. Iron

65. A Square metallic plate with a hole in the centre (as shown in the figure) is heated



On heating, the area of the hole

- a. Will increase
- b. Will decrease
- c. Will remain the same
- d. Will increase with every degree rise in temperature upto 90°, but decrease after

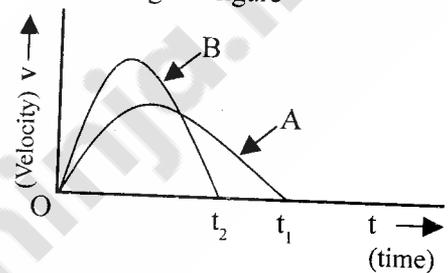
66. A milkman has 10 litres of pure milk in his can. He sells one litre of milk to the first customer and then adds one litre of water to the can. He then sells one litre of this milk to the second customer and then adds one litre of water to the can. At this stage, what is the percentage of pure milk in the can?

- a. 81%
- b. 85%
- c. 83%
- d. 70%

For Rough Work

67. A cube is painted in different colours on different sides. Red is opposite to the green, blue is between red and green, yellow is adjacent to orange, white is adjacent to yellow and green faces down
The side opposite to white is painted
- Orange
 - Yellow
 - Blue
 - Red
68. The length of a rectangular garden is one and a half times its breadth. If the cost of levelling the garden is 50 paise per square metre and the total cost of levelling is Rs. 1,500, then the length of the garden is
- $10\sqrt{5}$ m
 - $30\sqrt{5}$ m
 - $20\sqrt{5}$ m
 - $5\sqrt{5}$ m
69. A secret agency adopts a communication code of 16-26-13-11-6-9 for 'Kanpur'. On this basis, what will be the code for the statement, 'Sishir is well'?
- 8-18-8-19-18-9 18-8- 4-22-15-15
 - 26-3-6-8-14-9 8-18 2-6-5-5
 - 24-2-3-8-12-9 6-8 6-2-3-3
 - 8-4-5-9-3-9- 4-8 3-5-6-6

70. Two vehicles A and B start from one point and reach the same destination. The velocity-time curves for the two vehicles during the motion are shown in the given figure



- From this graph, it can be inferred that
- The distance travelled by the two vehicles is not the same
 - Vehicle B reached the destination earlier
 - The average velocity of A is higher than that of B
 - The peak velocities of the two vehicles are the same
71. Which one of the following is NOT a physical change?
- Dropping a piece of sodium amalgam in water
 - Magnetisation of iron
 - Addition of NaCl to water
 - Boiling of water
72. Which of the following is first utilised in human body for obtaining energy?
- Fat reserves
 - Protein reserves
 - Vitamin reserves
 - Glycogen reserves

For Rough Work

73. Which of the following causes eutrophication of a water body?
- Domestic waste
 - Poisonous metals
 - Agricultural run-off
 - Nuclear waste
74. The largest gland in the human body is
- Salivary
 - Pituitary
 - Pancreas
 - Liver
75. When milk is churned, the cream separates from it due to
- Centrifugal forces
 - Cohesive forces
 - Frictional forces
 - Gravitational forces
76. Given below are two statements, one labelled as Assertion (A) and the other labelled as Reason (R)
- Assertion (A)**
A radio telescope has better advantages than an optical telescope in revealing radio sources.
- Reason (R)**
The radio telescope can work in cloudy weather and penetrate interstellar dust clouds.
- In the context of the above two statements, which one of the following is correct?
- Both A and R are true and R is the correct explanation of A
 - Both A and R are true but R is not a correct explanation of A
 - A is true but R is false
 - A is false but R is true
77. Solidification of magma within Earth's crust leads to the formation of
- Metamorphic rocks
 - Sedimentary rocks
 - Plutonic rocks
 - Volcanic rocks



For Rough Work

78. Consider the following statements.
1. Ohm's law is applicable to all conductors
 2. The resistance of a pure metallic wire increases with increasing temperature
 3. The equivalent resistance of a set of resistors joined in parallel is less than the value of the smallest resistor in the set
- Of these statements
- a. 1 and 2 are correct
 - b. 1 and 3 are correct
 - c. 1, 2 and 3 are correct
 - d. 2 and 3 are correct
79. A classroom for 50 students is to be built. Each student requires 5 sq. m. of floor area and 15 cu. m. of air. If the room is to be 20 m long, what should be the height of the room in metres?
- a. 7
 - b. 3.5
 - c. 2.8
 - d. 3.0
80. The sound from guitar and a violin can be differentiated because of the difference in the
- a. Intensity or loudness
 - b. Quality or timbre
 - c. Frequency or pitch
 - d. Method of playing

Section 3: Current Affairs/ General Awareness

For Rough Work

81. Which is the best-known bird sanctuary in Haryana?
- Sultanpur
 - Bharatpur
 - Rajaji
 - Sariska
82. The term Fourth Estate refers to
- Judiciary
 - Parliament
 - Press
 - Very backward state
83. The busiest airport of the world is located in
- Chicago
 - London
 - Tokyo
 - New York
84. Which is the longest railway platform in India?
- Calcutta
 - Mumbai
 - Sonepur
 - Kharagpur
85. Which is India's largest lake?
- Nainital
 - Sambhar
 - Sishram
 - Chilka
86. The first woman in the world to have climbed Mount Everest twice is
- Bachendri Pal
 - Molly Chacko
 - Santosh Yadav
 - Theresia Kiesl
87. The current Secretary-General of the UNO is?
- Boutros-Boutros Ghali
 - Hosni Mubarak
 - Kofi Annan
 - Stephanopoulos
88. Which state is the greatest beneficiary from the Sardar Sarovar Dam?
- Madhya Pradesh
 - Gujarat
 - Maharashtra
 - Rajasthan
89. The BSE Sensex is based on the price movement of how many scrips?
- 20
 - 30
 - 40
 - 50
90. The biggest dome in the world is located at
- Bijapur
 - Bidar
 - Fatehpur Sikri
 - Golconda

For Rough Work

91. The recent tests conducted in Pokharan were only on
- Nuclear fission devices
 - Nuclear fusion devices
 - Nuclear fission as well as fusion devices
 - 'Clean' nuclear devices which leave no radioactive waste
92. The Internet Service "Mantra Online" is a joint venture between
- Satyam Infotech & Indiaworld.com
 - VSNL & Telstra
 - Bharti Enterprises & British Telecommunications
 - MTNL & Wipro Infotech
93. The flight number of the recently hijacked Indian Airlines plane was
- IC-418
 - IC-841
 - IC-814
 - IC-148
94. What is "hotline"?
- An electric wire
 - Line of control in the battle field
 - Imaginary line indicating atmospheric pressure
 - A telecommunication link
95. Who was the "Man of the Match" in the recently played World Cup '99 final between Australia & Pakistan?
- Glenn McGrath
 - Steve Waugh
 - Mark Waugh
 - Wasim Akram
96. The recently crowned Miss India-World is
- Lara Datta
 - Yukta Mukhi
 - Priyanka Chopra
 - Diya Mirza
97. The 'Railway Minister' in the BJP-led Government is
- Ram Vilas Paswan
 - Sharad Yadav
 - Mamta Banerji
 - Nitish Kumar
98. Which among the following is NOT a Nobel-Laureate?
- Mother Teresa
 - Rabindra Nath Tagore
 - J. C. Bose
 - Manmohan Singh
99. The newly appointed CEO of 'Microsoft Corporation' is
- Steve Ballmer
 - Bill Gates
 - Steven Jobs
 - Alan Greenspan
100. The telecommunication / Internet company promoted by Sam Pitroda is
- Telecom International
 - WorldTel
 - World Phone
 - Infosys Technologies