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महाराष्ट्र अभियांत्रिकी सेवा (स्थापत्य) (मुख्य) प - 2017

प्रश्नपुस्तिका क्रमांक दि 17 डिसेंबर, 2017

BOOKLET No. 203937

प्रश्नपुस्तिका-II

संच क्र. **A**

R10

स्थापत्य अभियांत्रिकी पेपर – 2

वेळ : 2 (दोन) तास

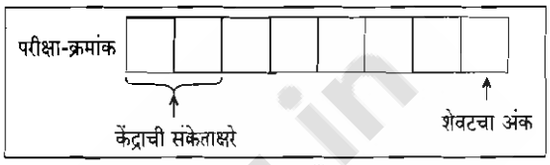
एकूण प्रश्न : 100

एकूण गुण : 200

सूचना

(1) सदर प्रश्नपुस्तिकेत **100** अनिवार्य प्रश्न आहेत. उमेदवारांनी प्रश्नांची उत्तरे लिहिण्यास सुरुवात करण्यापूर्वी या प्रश्नपुस्तिकेत सर्व प्रश्न आहेत किंवा नाहीत याची खात्री करून घ्यावी. असा तसेच अन्य काही दोष आढळल्यास ही प्रश्नपुस्तिका समवेक्षकांकडून लगेच बदलून घ्यावी.

(2) आपला परीक्षा-क्रमांक ह्या चौकोनांत **न विसरता बॉलपेनने** लिहावा.



(3) वर छापलेला प्रश्नपुस्तिका क्रमांक तुमच्या उत्तरपत्रिकेवर विशिष्ट जागी उत्तरपत्रिकेवरील सूचनेप्रमाणे **न विसरता नमूद करावा.**

(4) या प्रश्नपुस्तिकेतील प्रत्येक प्रश्नाला 4 पर्यायी उत्तरे सुचविली असून त्यांना 1, 2, 3 आणि 4 असे क्रमांक दिलेले आहेत. त्या चार उत्तरांपैकी सर्वात योग्य उत्तराचा क्रमांक उत्तरपत्रिकेवरील सूचनेप्रमाणे तुमच्या उत्तरपत्रिकेवर नमूद करावा. अशा प्रकारे उत्तरपत्रिकेवर उत्तरक्रमांक नमूद करताना तो संबंधित **प्रश्नक्रमांकासमोर** छायांकित करून दर्शविला जाईल याची काळजी घ्यावी. **ह्याकरिता फक्त काळ्या शाईचे बॉलपेन वापरावे, पेन्सिल वा शाईचे पेन वापरू नये.**

(5) सर्व प्रश्नांना समान गुण आहेत. यास्तव सर्व प्रश्नांची उत्तरे द्यावीत. घाईमुळे चुका होणार नाहीत याची दक्षता घेऊनच शक्य तितक्या वेगाने प्रश्न सोडवावेत. क्रमाने प्रश्न सोडविणे श्रेयस्कर आहे पण **एखादा प्रश्न कठीण वाटल्यास त्यावर वेळ न घालविता पुढील प्रश्नांकडे वळावे.** अशा प्रकारे शेवटच्या प्रश्नापर्यंत पोहोचल्यानंतर वेळ शिल्लक राहिल्यास कठीण म्हणून वगळलेल्या प्रश्नांकडे परतणे सोईस्कर ठरेल.

(6) उत्तरपत्रिकेत एकदा नमूद केलेले उत्तर खोडता येणार नाही. नमूद केलेले उत्तर खोडून नव्याने उत्तर दिल्यास ते तपासले जाणार नाही.

(7) **प्रस्तुत परीक्षेच्या उत्तरपत्रिकांचे मूल्यांकन करताना उमेदवाराच्या उत्तरपत्रिकेतील योग्य उत्तरांनाच गुण दिले जातील. तसेच "उमेदवाराने वस्तुनिष्ठ बहुपर्यायी स्वरूपाच्या प्रश्नांची दिलेल्या चार उत्तरांपैकी सर्वात योग्य उत्तरेच उत्तरपत्रिकेत नमूद करावीत. अन्यथा त्यांच्या उत्तरपत्रिकेत सोडविलेल्या प्रत्येक चार चुकीच्या उत्तरांसाठी एका प्रश्नाचे गुण वजा करण्यात येतील".**

पर्यवेक्षकांच्या सूचनेविना हे सील उघडू नये

ताकीद

ह्या प्रश्नपत्रिकेसाठी आयोगाने विहित केलेली वेळ संपेपर्यंत ही प्रश्नपुस्तिका आयोगाची मालमत्ता असून ती परीक्षाकक्षात उमेदवाराला परीक्षेसाठी वापरण्यास देण्यात येत आहे. ही वेळ संपेपर्यंत सदर प्रश्नपुस्तिकेची प्रत/प्रती, किंवा सदर प्रश्नपुस्तिकेतील काही आशय कोणत्याही स्वरूपात प्रत्यक्ष वा अप्रत्यक्षपणे कोणत्याही व्यक्तीस पुरविणे, तसेच प्रसिद्ध करणे हा गुन्हा असून अशी कृती करणाऱ्या व्यक्तीवर शासनाने जारी केलेल्या "परीक्षांमध्ये होणाऱ्या गैरप्रकारांना प्रतिबंध करण्याबाबतचा अधिनियम-82" यातील तरतुदीनुसार तसेच प्रचलित कायद्याच्या तरतुदीनुसार कारवाई करण्यात येईल व दोषी व्यक्ती कमाल एक वर्षाच्या कारावासाच्या आणि/किंवा रुपये एक हजार रकमेच्या दंडाच्या शिक्षेस पात्र होईल.

तसेच ह्या प्रश्नपत्रिकेसाठी विहित केलेली वेळ संपण्याआधी ही प्रश्नपुस्तिका अनधिकृतपणे बाळगणे हा सुद्धा गुन्हा असून तसे करणारी व्यक्ती आयोगाच्या कर्मचारीवृंदापैकी, तसेच परीक्षेच्या पर्यवेक्षकीयवृंदापैकी असली तरीही अशा व्यक्तीविरूद्ध उक्त अधिनियमानुसार कारवाई करण्यात येईल व दोषी व्यक्ती शिक्षेस पात्र होईल.

पुढील सूचना प्रश्नपुस्तिकेच्या अंतिम पृष्ठावर पहा

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1. The dimensions of dynamic viscosity are

(1) L^2/T (2) M/LT

(3) MT/L (4) T/L^2

2. If the velocity potential function $\phi = 5\ (x^2 - y^2)$, the velocity components at the points (4, 5) will be

(1) u = – 35, v = 40

(2) u = – 40, v = 55

(3) u = – 40, v = 50

(4) u = 40, v = – 50

3. Printer's ink is an example of

(1) Newtonian fluid

(2) Non-Newtonian fluid

(3) Thixotropic substance

(4) Elastic solid

4. Dynamic Viscosity of a gas

(1) Increases as temperature decreases

(2) Increases as temperature increases

(3) Is independent of temperature

(4) May increase or decrease with increase in temperature, depending on the nature of gas

5. According to Froude's model law

(1) $\frac{V_p \times L_p}{\nu_p} = \frac{V_m \times L_m}{\nu_m}$ (2) $\frac{V_m}{\sqrt{g_m L_m}} = \frac{V_p}{\sqrt{g_p L_p}}$

(3) $\frac{V_m}{\sqrt{p_m}} = \frac{V_p}{\sqrt{p_p}}$ (4) $\frac{V_m}{\sqrt{\sigma_m / \rho_m L_m}} = \frac{V_p}{\sqrt{\sigma_p / \rho_p L_p}}$

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6. For a hydrostatic pressure measurement in fluids at rest,

(1) The shear stress depends upon the coefficient of viscosity

(2) The shear stress is maximum on a plane inclined 45° to horizontal

(3) The shear stress is zero

(4) The shear stress is zero only on horizontal plane

---

7. If in a flow field $\frac{p}{\gamma} + \frac{v^2}{2g} + z$ = constant between any two points, flow must be

(1) Steady, compressible and irrotational

(2) Unsteady, incompressible and irrotational

(3) Steady, incompressible and irrotational

(4) Steady, compressible and along a stream line

---

8. For a centrifugal pump, suction lift head is the

(1) Vertical distance between the top surface of liquid level in the discharge tank and pump centre line

(2) Vertical distance between free surface of liquid level in the sump and pump centre line

(3) Head for overcoming friction loss in the suction pipe, entry loss at entrance to the friction pipe and running fluid in the suction pipe

(4) None of the above

---

9. The centre of buoyancy of a submerged body

(1) Coincides with the centre of gravity of the body

(2) Coincides with the centroid of the displaced volume of the fluid

(3) Is always below the centre of gravity of the body

(4) Is always above the centroid of the displaced volume of the liquid

---

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10. What is the range of the speed ratio for a Francis Turbine ?

(1) 0·10 to 0·30 (2) 0·60 to 0·90

(3) 0·85 to 0·90 (4) 1·40 to 2·25

---

11. For high head, the suitable turbine is

(1) Pelton (2) Francis

(3) Kaplan (4) None of the above

---

12. The discharge through a single-acting reciprocating pump is

(1) $Q = \frac{ALN}{60}$ (2) $Q = \frac{2\,ALN}{60}$

(3) $Q = ALN$ (4) $Q = 2\,ALN$

---

13. The specific speed (N_s) of a pump is given by the expression

(1) $N_s = \frac{N\sqrt{Q}}{H_m^{5/4}}$ (2) $N_s = \frac{N\sqrt{P}}{H_m^{3/4}}$

(3) $N_s = \frac{N\sqrt{Q}}{H_m^{3/4}}$ (4) $N_s = \frac{N\sqrt{P}}{H_m^{5/4}}$

---

14. Jet ratio (m) is defined as the ratio of

(1) Diameter of the jet of water to diameter of the Pelton wheel

(2) Velocity of vane to velocity of the jet of water

(3) Velocity of flow to velocity of the jet of water

(4) Diameter of Pelton wheel to diameter of the jet of water

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15. A graph between the pressure head in the cylinder and the distance travelled by the piston from inner dead centre for one complete revolution of crank in known as

(1) Slip diagram

(2) Crank diagram

(3) Polar diagram

(4) Indicator diagram

---

16. A turbine is called impulse if at the inlet of the turbine

(1) Total energy is only kinetic energy

(2) Total energy is only pressure energy

(3) Total energy is the sum of kinetic energy and pressure energy

(4) None of the above

---

17. Which of the following statements is correct ?

(1) Curves at constant speed are called main characteristics curves.

(2) Curves at constant head are called main characteristic curves.

(3) Curves at constant efficiency are called operating characteristic curves.

(4) Curves at constant efficiency are called main characteristic curves.

---

18. The manometer head (H_m) of a centrifugal pump is given by

(1) Pressure head at outlet of pump – pressure head at inlet

(2) Total head at inlet – total head at outlet

(3) Total head at outlet – total head at inlet

(4) None of the above

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19. The Goodrich method is used for

(1) Determining reservoir capacity

(2) Flood routing

(3) Reservoir sediment evaluation

(4) Trap efficiency

---

20. The extent by which the inflow hydrograph gets modified due to the reservoir storage can be computed by a process known as

(1) River routing (2) Channel routing

(3) S hydrograph (4) Flood routing or reservoir routing

---

21. A permeable stratum which is capable of yielding appreciable quantities of groundwater under gravity is known a/an

(1) Well (2) Artesian well

(3) Aquifer (4) Aquiclude

---

22. In routing a flood through a reach, the point of intersection of inflow and outflow hydrographs coincides with the peak of outflow hydrograph

(1) In all cases of flood routing

(2) In channel routing only

(3) In all cases of reservoir routing

(4) When the inflow is into a reservoir with an uncontrolled outlet

---

23. The volume of groundwater extracted by gravity drainage from a saturated water bearing material is known as

(1) Field capacity (2) Specific retention

(3) Specific capacity (4) Yield

---

24. The distance from the centre of a pumped well to the point, where the drawdown is zero or is inappreciable, is known as

(1) Drawdown

(2) Cone of pressure

(3) Radius of influence

(4) Piezometric surface

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25. The well yield per unit drawdown is known as

(1) Specific capacity of a well (2) Efficiency of a well

(3) Retention of a well (4) Well loss

---

26. If within a zone of saturation, an impervious deposit below a pervious deposit is found to support a body of saturated material, then this body of saturated material is known as

(1) Flowing well (2) Aquiclude

(3) Artesian aquifer (4) Perched aquifer

---

27. If S_y = Specific yield and S_r = Specific retention, then

(1) $S_y + S_r = 0{\cdot}50$ (2) $S_y + S_r$ = Porosity

(3) $S_y + S_r = 1{\cdot}0$ (4) $S_y + S_r$ = Permeability

---

28. _____ is an example of a non-rigid dam.

(1) Arch dam (2) Timber dam

(3) Steel dam (4) Rockfill dam

---

29. 'Bank storage' in a dam reservoir

(1) Decreases the computed reservoir capacity

(2) Increases the computed reservoir capacity

(3) Sometimes decreases and sometimes increases the computed reservoir capacity

(4) Has no effect on reservoir capacity

---

30. In case of gravity dams, the factor of safety against over turning should not be less than

(1) 1·00 (2) 1·10 (3) 1·25 (4) 1·50

---

31. Sharper crest of an ogee spillway

(1) Increases the value of coefficient of discharge

(2) Decreases the effective head

(3) Increases stability of crest due to hydrostatic pressure

(4) Has no effect on any one of the above

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32. A land is known as waterlogged when
(1) Gravity drainage has ceased
(2) Permanent wilting point is reached
(3) The soil becomes completely saturated
(4) Capillary fringe reaches the root zone of the plants

33. Seepage failure of earth-filled dam is due to
(1) Toe erosion (2) Wave erosion
(3) Gullying (4) Sloughing

34. Auxiliary devices in stilling basins are provided
(1) To stabilise the flow
(2) To reduce the length of the basin
(3) As additional measure to control jump
(4) All of the above

35. Which of the following structures is constructed to separate under sluices from the main weir ?
(1) Marginal bund (2) Divide wall
(3) Head regulator (4) None of the above

36. The crest of an emergency spillway is placed
(1) Below the designed minimum reservoir water level
(2) At the designed minimum reservoir water level
(3) At or above the designed minimum reservoir water level
(4) None of the above

37. The road length of National Highway by Third Road Plan Formulae, in a certain district in India having its area as 13,400 sq.m will be
(1) 134 km (2) 268 km (3) 402 km (4) 1340 km

38. For the purpose of measuring the stopping sight distance, IRC had suggested the height of eye level of driver and the height of the object above the road surface as
(1) 1·5 m and 0·15 m (2) 1·2 m and 0·12 m
(3) 1·2 m and 0·15 m (4) 1·5 m and 0·12 m

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39. A vertical summit curve is formed at the intersection of two gradients, + 5% and – 5%. The length of summit curve needed to provide a stopping sight distance of 100 m will be

(1) 227 m (2) 0 m (3) 327 m (4) 197 m

40. The maximum utility system is based on the concept of

(1) Maximum utility per unit cost of road
(2) Maximum utility per unit length of road
(3) Maximum utility per unit population
(4) None of the above

41. Match the following :

a.	Primary survey	I.	Collect general characteristics of an area
b.	Map study	II.	Improvement in horizontal and vertical alignments
c.	Realignment of highway	III.	Collect physical information
d.	Reconnaissance	IV.	Alignment avoiding valleys, ponds or lakes

	a	b	c	d
(1)	I	IV	II	III
(2)	III	II	IV	I
(3)	I	II	IV	III
(4)	III	IV	II	I

42. Determine the safe stopping sight distance for design speed of 14 m/s for two-way traffic on a two lane road assuming the coefficient of friction as 0·28 and a reaction time of 2 seconds.

(1) 63·67 m (2) 61·47 m (3) 53·27 m (4) 73·57 m

43. As per the modified classification of road system by the Third Road Development Plan, 1981 – 2001, the roads in the country under 'Primary System' of road network consist of

(1) Expressways and National Highways
(2) State Highways (SH) and Major District Roads (MDR)
(3) Other District Roads (ODR) and Village Roads (VR)
(4) All of the above

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44. The Benkelman Beam Deflection method is used for

(1) Flexible overlay on flexible pavement

(2) Rigid overlay on rigid pavement

(3) Flexible overlay on rigid pavement

(4) Rigid overlay on flexible pavement

---

45. The width of carriageway for various classes of roads standardised by the Indian Road Congress (IRC) for two lanes without raised kerbs is

(1) 3·75 m

(2) 7·00 m

(3) 7·50 m

(4) 5·50 m

---

46. The strength of a bridge is termed as MBG loading of 1987. MBG refers to

(1) Model Broad Gauge

(2) Modified Broad Gauge

(3) Modified Budget Grant

(4) Main Broad Gauge

---

47. The centrifugal force is assumed to act at a height of _____ above the level of the carriageway of the bridge.

(1) 1 m (2) 1·2 m

(3) 1·5 m (4) 1·75 m

---

48. For all parts of bridge floors accessible only to pedestrains and for all footways, loading should be

(1) 200 kg/m^2 (2) 300 kg/m^2

(3) 400 kg/m^2 (4) 500 kg/m^2

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49. _____ loading is adopted on all roads on which permanent bridges and culverts are constructed.

(1) IRC Class A

(2) IRC Class AA

(3) IRC Class B

(4) IRC Class AB

---

50. According to the criteria recommended by IRC for Girder Bridges, the limiting load should not cause a deflection more than _____ of the span.

(1) 1/1000 (2) 1/1200

(3) 1/1500 (4) 1/2000

---

51. The centre-to-centre distance between any two adjacent supports is called the _____ of a bridge.

(1) span (2) clear span

(3) nominal span (4) effective span

---

52. The scour velocity of the stream is the

(1) Average velocity

(2) Maximum velocity at any time during the year

(3) Velocity which can move the particles of bed materials

(4) Velocity at which a highway bridge is liable to be damaged

---

53. The bridge structure having a gross length of 6 m or less between the faces of the abatement or extreme vintage boundaries is known as

(1) Causeway (2) Culvert

(3) Short span bridge (4) None of the above

---

54. In case of navigable rivers, the minimum free board provided is usually

(1) 30 cm to 45 cm

(2) 1·2 m to 1·5 m

(3) 2·4 m to 3·0 m

(4) 1·0 m

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55. NATM method of tunnelling is suitable for

a. Subway construction

b. Abnormal geological conditions

c. Soils at medium of shallow depth

d. Tunnelling large sections in very difficult ground

Answer options :

(1) a and b only (2) b and d only

(3) a, c and d only (4) a, b, c and d

---

56. Which one of the following shapes is suitable for the construction of tunnel in non-cohesive soils ?

(1) Rectangular (2) Horse-shoe

(3) Egg-shaped (4) Circular

---

57. The tunnels that are made to shortcut minor local obstacles are called

(1) Spiral tunnels (2) Short tunnels

(3) Off-spur tunnels (4) Saddle tunnels

---

58. Which among the following is ***not*** a part of shield equipment ?

(1) Gravel tank (2) Trailing dam

(3) Nipper car (4) Chute

---

59. The following operations are generally employed for the Needle Beam Method of tunnelling :

a. A trench jack is placed on the centre line of the needle beam to support the segment.

b. A monkey drift is driven for a short distance.

c. Drift is widened sideways and supported by lagging segments.

d. The roof of the monkey drift is supported by lagging.

e. The needle beam is slowly skidded forward into the monkey drift.

The correct sequence of operations is

(1) c – d – e – a – b (2) a – b – c – d – e

(3) b – d – e – a – c (4) b – a – e – d – c

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60. Which of the following is a serious health issue in case of workers involved in tunnelling operations ?

(1) Pneumonia (2) Deafness

(3) Silicosis (4) Jaundice

---

61. The amount of fresh air required to maintain ventilation for workers inside the tunnel should be

(1) 1 – 5 m^3/minute

(2) 6 – 14 m^3/minute

(3) 20 – 30 m^3/minute

(4) 30 – 50 m^3/minute

---

62. The method used to control the amount of dust, where use of water while drilling may be impracticable or undesirable is

(1) Dry system

(2) Vacuum hood system

(3) Control system

(4) Absorption system

---

63. In compressed air tunnelling, the amount of air required per minute per m^2 of face area is

(1) 1 $m^3/min/m^2$ (2) 6 $m^3/min/m^2$

(3) 10 $m^3/min/m^2$ (4) 20 $m^3/min/m^2$

---

64. The correct pair showing percentage of total solids in cow-dung and night soil is

	Cow-dung	*Night Soil*
(1)	1·4 – 1·8%	3 – 5%
(2)	1·0 – 2%	2·5 – 4·5%
(3)	18 – 25%	11 – 15%
(4)	70 – 80%	82 – 88%

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65. Which of the following pairs is ***not*** correctly matched ?

(1) Dead end system – Hardy-Cross method

(2) Residual pressure at ferrule point in rural area – 5 m

(3) Distribution reservoir – Central location

(4) Gridiron system – More number of valves

---

66. Consider the following statements pertaining to the sources of supply :

a. Groundwater has low organic content and high dissolved oxygen.

b. Lake water at the bottom has silt and bacteria.

c. River water in floods has low dissolved oxygen and colour.

Which of the above statements is/are correct ?

(1) a only

(2) b only

(3) c only

(4) a, b and c

---

67. As per I.S. 10500, acceptable limit for chlorides in mg/*l* in drinking water is

(1) 100 mg/*l* (2) 250 mg/*l*

(3) 500 mg/*l* (4) 1500 mg/*l*

---

68. Activated sludge process is an

(1) Aerobic attached growth system

(2) Anaerobic attached growth system

(3) Anaerobic suspended growth system

(4) Aerobic suspended system

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69. 'If B.O.D. of waste water sample after 5 days incubation at 20°C is 100 mg/*l*, deoxygenation rate constant at 20°C is 0·1 per day, ultimate B.O.D. will be

(1) 120·20 mg/*l*

(2) 146·25 mg/*l*

(3) 200·45 mg/*l*

(4) 225.60 mg/*l*

---

70. Which one of the following is the purpose of providing surge tank in pipelines carrying water ?

(1) To store water

(2) To increase pressure in the pipeline

(3) To store overflowing water

(4) To protect the pipeline against water hammer

---

71. In the activated sludge process, sludge volume index is used to decide

(1) Quality of raw sewage

(2) Quality of final effluent

(3) Recirculation ration of sludge

(4) Rate of aeration

---

72. An appurtenance used to connect high level branch sewer to low level branch sewer is

(1) Mahhole

(2) Drop manhole

(3) Inverted siphon

(4) Catch basin

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73. The maximum tolerances in overall length of a 20 m and 30 m metric chain should be respectively

(1) ± 2 mm, ± 8 mm

(2) ± 3 mm, ± 5 mm

(3) ± 5 mm, ± 8 mm

(4) ± 8 mm, ± 5 mm

---

74. Closed contour lines with one or more higher value contours inside it represent

(1) A hill (2) A depression

(3) A cliff (4) A valley

---

75. The lines joining points of equal dip are called

(1) Aclinic lines (2) Isogonic lines

(3) Agonic lines (4) Isoclinic lines

---

76. The magnetic bearing of the sun at noon is 178°. The magnetic declination at the place is

(1) 2° W (2) 2° E (3) 2° N (4) 2° S

---

77. If the lower clamp is tightened and the upper clamp is loosened, the theodolite may be turned

(1) With a relative motion between vernier and graduated scales of the lower plate

(2) Without a relative motion between vernier and graduated scales of the lower plate

(3) Both (1) and (2)

(4) About the horizontal axis

---

78. Total station is used for

(1) Remote object height determination

(2) Establishing horizontal control

(3) Establishing vertical control

(4) All of the above

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79. Sensitivity of a level tube increases with

a. An increase in radius of curvature of the bubble tube.

b. Smoothness of finish of the inner surface of the bubble tube.

Answer options :

(1) Only a is correct (2) Only b is correct

(3) Both are correct (4) None is correct

---

80. If the intercept on a vertical staff is observed as 0·75 m from a tacheometer with the line of sight horizontal, fitted with anallatic lens, the horizontal distance between the tacheometer and the staff station is

(1) 0·75 m (2) 7·5 m (3) 75 m (4) 750 m

---

81. Froude's transition curve is

(1) Cubic spiral (2) Cubic parabola

(3) Bernoulli's lemniscate (4) Ellipse

---

82. A triangulation station selected close to the main station for avoiding intervening obstruction is called

(1) Tie station (2) Eccentric station

(3) Pivot station (4) Satellite station

---

83. An owner of a building requires ₹ 15,000 to repair his building after 5 years. What sum should the owner have to invest now in order to recieve the required amount of money at a rate of compound interest 8% ?

(1) ₹ 10,207·50 (2) ₹ 10,720·50

(3) ₹ 10,270·50 (4) ₹ 10,072·50

---

84. While writing specifications, the following principles shall be adopted :

a. Description of materials

b. Workmanship, tools and plants

c. Protection of new work

d. Clauses of the specifications

e. Expression

Answer options :

(1) a, b and e (2) a, b, c, d and e

(3) b and e (4) a, d and e

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85. Purposes of rate analysis are

a. To determine the current rate per unit of an item at the locality

b. To examine the viability of rates offered by contractors

c. To calculate the quantity of materials and labour strength required for project planning

d. To fix labour contract rates

Answer options :

(1) a, b and d (2) b, c and d

(3) a, b and c (4) a, b, c, and d

---

86. The usual practice of bending of a bar near a support is at an angle of

(1) 30° (2) 45° (3) 60° (4) 15°

---

87. For painting corrugated steel sheet, surfaces shall be measured flat and the area worked out shall be increased by

(1) 10% (2) 12% (3) 14% (4) 20%

---

88. Which of the following specifications are ***not*** correct with reference to a brickwork ?

a. Brickwork shall be done in such a way that all joints are full of mortar.

b. For all exposed brickworks, double scaffolding having two sets of vertical supports shall be provided.

c. Bricks required for brick masonry with mud mortar need not be soaked.

Answer options :

(1) a and b only (2) a and c only

(3) b and c only (4) None of the above

---

89. The nominal lead and lift allowed for earthwork in excavations of foundations are

(1) 30 m and 1·5 m (2) 20 m and 2·0 m

(3) 15 m and 3·0 m (4) 10 m and 4·5 m

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90. Which method of depreciation is suitable for finding depreciation of a building having a life of 100 years ?

(1) Constant percentage method

(2) Straight-line method

(3) Sinking fund method

(4) Quantity survey method

---

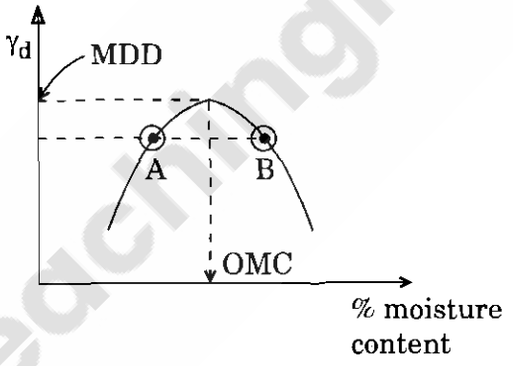
91. For 1 cumec of cement concrete proportion with stone chips 1 : 2 : 4, the required number of cement bags is

(1) 6·34 (2) 6·0

(3) 5·5 (4) 4·5

---

92. In a typical compaction curve as indicated in the diagram, points 'A' and 'B' have same dry densities. Choose the most appropriate statement from the following :



(1) Soil at 'A' will have more swelling potential and less shrinking upon moisture variation, compared to 'B'.

(2) Soil at 'A' will have same swelling and shrinking potential as soil at 'B'.

(3) Soil at 'A' will have less swelling potential and higher shrinking potential compared with soil at 'B'.

(4) The swelling-shrinking potential for soil at 'A' and 'B' cannot be predicted with the given data.

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93. Select the appropriate alternative from the following :

Soil deposit is called as 'over-consolidated', if

(1) $P_o > P_c$

(2) $P_o \leq P_c$

(3) $P_o = P_c$

(4) $P_o < P_c$

where P_o is the present effective overburden pressure and P_c is preconsolidation pressure.

---

94. Following are the statements about the major differences between Terzaghi's analysis ('T') and Meyerhof's analysis ('M') of bearing capacity :

a. 'T' is for homogeneous and isotropic soils but 'M' accounts for non-isotropy.

b. In 'T', the failure surfaces form upto founding level but in 'M', they are extended upto ground level.

c. In 'T', the angle of wedge formed beneath the foundation is assumed to be equal to the angle of internal friction of the soil but in 'M', it varies.

d. In 'T', the load acting on the foundation is concentric and vertical but in 'M', it is assumed as eccentric.

Ascertain the correctness of the above statements and write the correct code.

(1) Statement a is the only correct statement

(2) Statements a and b are correct

(3) Statements b and c are correct

(4) Statements a and d are correct

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95. A 10 m deep canal is constructed in purely cohesive soil having c = 0·2 kg/cm^2, ϕ = 0°, G = 2·5, e = 0·5. The stability number is 0·1. In a canal running in full condition, the factor of safety w.r.t. cohesion against failure of side slopes will be

(1) 1·0

(2) 1·5

(3) 2·0

(4) 2·5

---

96. *Statement A :* Terzaghi's bearing capacity theory assumes strip foundation in the analysis.

Statement B : Terzaghi's theory does not consider development of shear resistance in the soil mass above founding level.

(1) Both the statements A and B are true

(2) Statement A is true but B is false

(3) Statement A is false but B is true

(4) Both the statements A and B are false

---

97. *Statement A :* Plate load test is a short duration test and is not suitable in cohesive soils.

Statement B : Plate load test does not record the total settlement of the test plate in clayey soils.

(1) Both the statements A and B are true but B is not the correct explanation of A

(2) Statement A is true but B is false

(3) Statement A is false but B is true

(4) Both the statements A and B are true and B is the correct explanation of A

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98. A soft saturated clayey soil tested unconfined gave an axial stress of 50 kN/m^2 at failure. The shear strength of the soil is

(1) 50 kN/m^2

(2) 100 kN/m^2

(3) 25 kN/m^2

(4) None of the above

---

99. Match the following :

a.	Electro-osmosis	I.	Provide water free area for work
b.	Under reamed pile	II.	Elliminate differential settlement
c.	Cellular cofferdam	III.	Dewatering of fine grained soil
d.	Raft foundation	IV.	Foundation for expansive soil

	a	b	c	d
(1)	III	II	IV	I
(2)	III	IV	I	II
(3)	IV	III	I	II
(4)	I	IV	III	II

---

100. A wall 6 m high has a smooth vertical back and retained sand as a backfill which is submerged. The sand has γ_{sat} = 20 kN/m^3 and ϕ = 30°. The total active earth pressure is

(1) 90 kN/m^2

(2) 60 kN/m^2

(3) 120 kN/m^2

(4) None of the above

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सूचना – (पृष्ठ 1 वरून पुढे.....)

(8) प्रश्नपुस्तिकेमध्ये विहित केलेल्या विशिष्ट जागीच कच्चे काम (रफ वर्क) करावे. प्रश्नपुस्तिकेव्यतिरिक्त उत्तरपत्रिकेवर वा इतर कागदावर कच्चे काम केल्यास ते कॉपी करण्याच्या उद्देशाने केले आहे, असे मानले जाईल व त्यानुसार उमेदवारावर शासनाने जारी केलेल्या "परीक्षांमध्ये होणाऱ्या गैरप्रकारांना प्रतिबंध करण्याबाबतचे अधिनियम-82" यातील तरतुदीनुसार कारवाई करण्यात येईल व दोषी व्यक्ती कमाल एक वर्षाच्या कारावासाच्या आणि/किंवा रुपये एक हजार रकमेच्या दंडाच्या शिक्षेस पात्र होईल.

(9) सदर प्रश्नपत्रिकेसाठी आयोगाने विहित केलेली वेळ संपल्यानंतर उमेदवाराला ही प्रश्नपुस्तिका स्वत:बरोबर परीक्षाकक्षाबाहेर घेऊन जाण्यास परवानगी आहे. **मात्र परीक्षा कक्षाबाहेर जाण्यापूर्वी उमेदवाराने आपल्या उत्तरपत्रिकेचा भाग-1 समवेक्षकाकडे न विसरता परत करणे आवश्यक आहे.**

नमुना प्रश्न

Pick out the correct word to fill in the blank :

Q. No. 201. I congratulate you _____ your grand success.

(1) for (2) at

(3) on (4) about

ह्या प्रश्नाचे योग्य उत्तर "(3) on" असे आहे. त्यामुळे या प्रश्नाचे उत्तर "(3)" होईल. यास्तव खालीलप्रमाणे प्रश्न क्र. **201** समोरील उत्तर-क्रमांक "③" हे वर्तुळ पूर्णपणे छायांकित करून दाखविणे आवश्यक आहे.

प्र. क्र. 201. ① ② ● ④

अशा पद्धतीने प्रस्तुत प्रश्नपुस्तिकेतील प्रत्येक प्रश्नाचा तुमचा उत्तरक्रमांक हा तुम्हाला स्वतंत्ररीत्या पुरविलेल्या उत्तरपत्रिकेवरील त्या त्या प्रश्नक्रमांकासमोरील संबंधित वर्तुळ पूर्णपणे छायांकित करून दाखवावा. **ह्याकरिता फक्त काळ्या शाईचे बॉलपेन वापरावे, पेन्सिल वा शाईचे पेन वापरू नये.**

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