Maharashtra Civil Engineering Services

Previous Year Paper

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2021

संच क्र. **A**

प्रश्नपुस्तिका – II
स्थापत्य अभियांत्रिकी पेपर – 2

H16

प्रश्नपुस्तिका क्रमांक BOOKLET NO. [redacted]

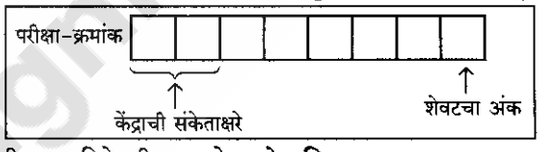
वेळ : 2 (दोन) तास

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. 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 उत्तर-क्रमांक नमूद करताना तो संबंधित प्रश्न-क्रमांकासमोर 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. एकापेक्षा जास्त उत्तरे नमूद केल्यास ते उत्तर चुकीचे धरले जाईल व त्या चुकीच्या उत्तराचे गुण वजा केले जातील.

(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 चुकीच्या उत्तरांसाठी 25% किंवा 1/4 गुण वजा/कमी 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 व्यक्तीविरुद्ध उक्त अधिनियमानुसार कारवाई करण्यात येईल व दोषी व्यक्ती शिक्षेस पात्र होईल.

पुढील सूचना प्रश्नपुस्तिकेच्या अंतिम पृष्ठावर पहा.

कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK

1. The vertical stress developed at a depth of 2 m, below the centre of point load is 4775 N/m^2. Then the point load causing the stress is

   (1) 40 N

   (2) 40 KN

   (3) 400 KN

   (4) 4000 KN

2. Friction piles in fine grained soils of low permeability transfer load to soil through side resistance without compacting soil, these piles are known as

   (1) End bearing piles

   (2) Compaction piles

   (3) Floating piles

   (4) None of the above

3. A cylindrical clay soil sample having 80 KN/m^2 cohesion is subjected to a cell pressure of 100 KN/m^2. The maximum deviator stress on the sample at failure will be

   (1) 100 KN/m^2

   (2) 160 KN/m^2

   (3) 180 KN/m^2

   (4) 200 KN/m^2

4. For an active earth pressure, Ka is given by expression

   (1) $Ka = \frac{1+\sin\phi}{1-\sin\phi}$ (2) $Ka = \frac{1-\sin\phi}{1+\sin\phi}$

   (3) $Ka = \frac{1+\sin\phi}{2}$ (4) $Ka = \frac{1-\cos\phi}{2}$

5. Match List – I with List – II and select the correct answer using the codes given below the list.

List – I (Allowable maxi. settlement I.S. 1904)	List – II (Type of foundation and soil type)
a. 65 to 100 mm	1. Isolated foundation on sand
b. 40 mm	2. Isolated foundation on clay
c. 65 mm	3. Rafts on sand
d. 40 to 65 mm	4. Raft on clay

Answer Options :

	a	b	c	d
(1)	1	4	3	2
(2)	4	1	2	3
(3)	1	4	2	3
(4)	4	1	3	2

6. Due to provision of 'sand drains' in the construction on compressible soil, most of the settlement occurs

(1) During construction

(2) After construction

(3) After one rainy season

(4) After one summer season

7. The cyclic pile load test was conducted on pile foundation to determine

(1) Point bearing resistance of pile only

(2) Skin friction of pile only

(3) Point bearing resistance and skin friction

(4) Negative skin friction

कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK

8. The compactive energy used in modified Proctor test is _____ times more than standard Proctor test.

(1) 2.0 (2) 2.5

(3) 3.5 (4) 4.5

9. A vertical excavation was made in a clay deposit having unit weight of 16 KN/m^3. It caved in after the depth of digging reached 3m.Then, C =

(1) 6 KN/m^2 (2) 12 KN/m^2

(3) 24 KN/m^2 (4) 48 KN/m^2

10. The warning signs on National and State Highways are to be located in advance of object at a distance of

(1) 40 meter (2) 60 meter

(3) 80 meter (4) 120 meter

11. Extra widening in highways on Horizontal curves is provided for

(1) Providing space for off tracking of wheels

(2) Better vision

(3) Providing road dividers

(4) Efficient drainage

12. While conducting a flakiness and elongation test on a sample of coarse aggregate having total weight of 1000 gram, it is found that, there are 200 gram flakey particles and 840 gram nonelongated particles. What are the flakiness and elongation indices (total) as per IS

(1) 4 percent (2) 18 percent

(3) 36 percent (4) 40 percent

13. Match the pair :

a. NHDP	1. Village Road Development
b. CRRI	2. Highway Research Board
c. PMGSY	3. Golden Quadrilateral
d. IRC	4. National Laboratory

Answer Options :

	a	b	c	d
(1)	4	2	1	3
(2)	2	3	1	4
(3)	2	4	1	3
(4)	3	4	1	2

14. As compared to a level surface, on an ascending gradient the stopping sight distance is

(1) More than level surface (2) Less than level surface

(3) Same as level surface (4) Depends on type of terrain

15. The terrains are classified by IRC for design purposes. The mountainous terrain has the cross slope of

(1) More than 60% (2) 25% to 60%

(3) 10% to 25% (4) Less than 10%

16. Which type of transition curve in horizontal alignment is recommended by Indian Road Congress ?

(1) Circular (2) Leminiscate

(3) Spiral (4) Cubic parabola

17. A good quality aggregate to be used in base course and surface course should not have crushing value more than _____ respectively.

(1) 45% and 30% (2) 30% and 20%

(3) 20% and 10% (4) 10% and 0%

कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK

18. 'STOP' sign in road signalling has following shape

(1) Circular (2) Octagonal (3) Triangular (4) Square

19. An isochrone is a line on the basin map

(1) Joining rain gauge stations with equal rainfall duration

(2) Joining points having equal standard time

(3) Connecting points having equal time of travel of the surface runoff to the catchment outlet

(4) That connects points of equal rainfall depth in a given time interval

20. Interception loss is

(1) more towards the end of a storm

(2) less at the beginning of a storm and gradually increases

(3) uniform throughout the storm

(4) high in the beginning of storm and gradually decreases

21. The rainfall on five successive days on a catchment was 2, 6, 9, 5 and 3 cm. If the ϕ-index for the storm can be assumed to be 3 cm/day, the total direct runoff from the catchment is

(1) 20 cm (2) 11 cm (3) 10 cm (4) 22 cm

22. The peak flow of out flow hydrograph will be smaller than the inflow hydrograph due to the storage effect. The reduction in peak value of hydrograph is known as

(1) Prism storage

(2) Routing

(3) Attenuation

(4) Basin lag

कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK

23. The Darcy's law is valid in a porous media flow when the Reynolds number is less than unity. This Reynolds number is defined as

(1) $\frac{\text{discharge velocity} \times \text{maximum grain size}}{\mu}$

(2) $\frac{\text{actual velocity} \times \text{average grain size}}{\gamma}$

(3) $\frac{\text{discharge velocity} \times \text{average grain size}}{\gamma}$

(4) $\frac{\text{discharge velocity} \times \text{pore size}}{\gamma}$

24. An IUH is a direct runoff hydrograph of

(1) One cm magnitude due to rainfall excess of 1-h duration

(2) That occurs instantaneously due to a rainfall excess of 1-h duration

(3) Unit rainfall excess precipitating instantaneously over the catchment

(4) Occurring at any instant in long duration

25. The mass curve of rainfall of a storm is a plot of

(1) rainfall depths for various equal durations plotted in decreasing order

(2) rainfall intensity Vs time in chronological order

(3) accumulated rainfall intensity Vs time

(4) accumulated precipitation Vs time in chronological order

26. The monthly rainfall at a place A during August 2020 was recorded as 50 mm above normal. Here the term normal means

(1) the rainfall in the same month in the previous year

(2) the rainfall was normally expected based on previous month's data

(3) the average rainfall computed from past 12 month's record

(4) the average monthly rainfall for August computed from a specific 30 years of past record

कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK

27. Dickens formula for peak flow discharge is

(1) $Q_P = C_D A^{2/3}$ (2) $Q_P = C_D A^{3/4}$

(3) $Q_P = C_D \sqrt{124 + A}$ (4) $Q_P = C_D A^{1/3}$

28. Accumulation of dust in the tunnel due to drilling and blasting is a serious hazard, as extended breathing of dust results in

(1) Skin cancer (2) Osteomyelitis

(3) Silicosis (4) Dyspepsia

29. The drainage arrangements for keeping off and removing of water may be classified as

(1) Predrainage or preventing the entry of excess water from entering the tunnel before starting of construction work

(2) Dewatering of tunnel i.e. removing the water that has entered the tunnel during the construction of tunnel

(3) Permanent drainage i.e. keeping water off the tunnel after its completion

(4) All of the above

30. In order to get desired degree of fragmentation, higher concentration of explosives shall be placed near _____ of the hole.

(1) bottom (2) top

(3) side (4) centre

31. Apart from the purpose of tunnel, which other aspects would be considered for determing the size of the tunnel ?

(1) The clear opening required to handle the volume of traffic, nature of traffic

(2) Thickness of lining

(3) The provisions required for the drainage facilities

(4) All of the above

कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK P.T.O.

32. Which one of the following factors is ***not*** important in deciding the type and capacity of ventilation system in tunnel ?

(1) Length of tunnel

(2) Shape of tunnel

(3) Size of tunnel

(4) Quantity of explosive and frequency of blasting used

33. While tunnelling in rock, which of the following method involve the driving of top portion in advance of the bottom portion ?

(1) Needle beam method

(2) Heading and Bench method

(3) Fore poling method

(4) Army or case method

34. Which of the following operations involved in tunnel excavation causes dust accumulations in tunnel atmosphere ?

(1) Drilling (2) Blasting

(3) Handling Muck (4) All of the above

35. Consider the following statements about Army method or case method of driving tunnel in soft ground :

a. It is simple method

b. It is not economical method

c. It can be used for construction of short tunnel of small size (cross-section)

Which of the above statement/s is/are correct ?

Answer Options :

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

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

कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK

36. Which of the following shape of tunnel is most suitable for sewers and water carrying purposes however this shape is ***not*** suitable for roads or railways ?

(1) 'D' Section
(2) Circular section
(3) Rectangular section
(4) Egg shaped section

37. If the head of water over the spillway is more than the designed head, _____ may occur.

(1) Rupture
(2) Corrosion
(3) Cavitation
(4) Sliding

38. The water is released at the rate of 20 cumec at the head of a canal. If the duty at the field is 1000 Ha/cumec and loss of water in transit is 25%, what would be the area of land that can be irrigated ?

(1) 10,000 Ha
(2) 12,500 Ha
(3) 15,000 Ha
(4) 17,500 Ha

39. The ratio of the quantity of water stored in the root zone of the crops to the quantity of water actually delivered in to the field, is called

(1) efficiency of water distribution
(2) efficiency of water storage
(3) efficiency of water use
(4) efficiency of water application

40. In case of gravity dam, when the reservoir is full, the maximum compressive stresses are at

(1) toe
(2) middle third of base
(3) center of base
(4) heel

41. Match the pair for suitability of method of irrigation.

a. Check flooding	1. Narrow ditch between rows of plants
b. Furrow method	2. Circuitous route of water
c. Contour farming	3. Low and flat levees used
d. Zig-zag method	4. Hilly area

Answer Options :

	a	b	c	d
(1)	3	2	4	1
(2)	3	1	4	2
(3)	3	1	2	4
(4)	1	3	2	4

42. The discharge passing over an ogee spillway per unit length at its top is proportional to (H = Head over the top portion of the ogee spillway)

(1) $H^{2.5}$ (2) $H^{1.5}$ (3) H (4) $H^{0.5}$

43. The following details pertain to the crossing of a canal and a drain.

Bed level of canal = 311 m, full supply depth of canal = 1.8 m, Bed level of drain = 309.40 m, Depth of flow at high flood level = 2.20 m. The suitable type of cross drainage work is

(1) Aqueduct (2) Super passage

(3) Canal syphon (4) Syphon aqueduct

44. Lysimeter experiment is the principal method for direct measurement of

(1) Moisture content in soil

(2) Flow in canal

(3) Canal siltation

(4) Evapotranspiration

कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK

45. Which of the following canal structures is used to remove surplus water from canal into a natural drain ?

(1) Canal regulator
(2) Canal fall
(3) Canal outlet
(4) Canal escape

46. Which of the following is ***not*** a type of bridge based on location of bridge floor ?

(1) Deck bridge
(2) Through bridge
(3) Skew bridge
(4) Semi-through bridge

47. Which of the following will cause afflux on the upstream side of a bridge ?

(1) Rise of water level on upstream side
(2) Effective linear waterway of a bridge is less than the natural width of the stream immediately on the upstream side of bridge
(3) Both (1) and (2) of above
(4) None of the above

48. Following are the statements regarding economic span of bridge :

a. When suitable foundation for piers is not available at locations as per consideration of economic span, it is not advisable to adopt economic span.
b. Section of pier increases considerably if the span is increased beyond a certain value.

Which of the above statement/s is/are correct ?

Answer Options :

(1) Statement (a) only
(2) Statement (b) only
(3) Both (a) and (b)
(4) Neither (a) nor (b)

49. Which one of the following characteristics is ***not*** suitable for ideal site for bridge ?
(1) Steady flow of river
(2) Presence of sharp curve in the approaches
(3) Inerodible strata close to river bed
(4) Straight reach of stream

50. In case of 'road culvert', the linear waterway is limited to the length of
(1) 18 meter (2) 12 meter (3) 45 meter (4) 20 meter

51. A bridge constructed over a stream which remains dry for most part of the year is called as
(1) Abutment (2) Pier
(3) Culvert (4) None of the above

52. Which of the following methods are used for erection of steel girders ?
(1) Floating (2) Lifting
(3) Rolling (4) All of the above

53. When 'd' is normal scour depth, the maximum scour depth, at a right angled bend of stream, is taken as
(1) 1.25 d (2) 1.75 d (3) 2.00 d (4) 2.75 d

54. For determination of maximum scour depth, which of the following Lacey's regime equation is used in India ?
(1) $s = .473\left\{\frac{Q}{f}\right\}^{1/3}$ (2) $s = .473\left\{\frac{f}{Q}\right\}^{1/3}$
(3) $s = .473\left\{\frac{f}{Q}\right\}^{2/3}$ (4) $s = .473\left\{\frac{f}{Q}\right\}^{4/3}$

where,
s = Normal depth of scour in meter below HFL
Q = Discharge in m^3/sec
f = Lacey's silt factor

कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK

55. Which is called as 'Local Attraction' from the following ?

(1) Sharing compass with friend

(2) Effect of magnetic field on compass

(3) Running fast towards station

(4) None of the above

56. The lines joining points of equal dip are called

(1) Aclinic lines (2) Isoclinic lines

(3) Contour lines (4) Isogonic lines

57. Line AB and BC intersect at 'B' and $\angle B$ is measured by theodolite, then the deflection angle of line BC is given by

(1) $270° - \angle B$ (2) $180° + \angle B$ (3) $180° - \angle B$ (4) $90° + \angle B$

58. Which of the following methods are used for locating the plane table station ?

(a) Radiation method

(b) Traversing method

(c) Intersection method

(d) Resection method

Answer Options :

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

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

59. Setting out a simple curve by two theodolite method, requires,

(1) Angular measurements only

(2) Linear measurements only

(3) Both (1) and (2)

(4) None of the above

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60. On an old map, a line was drawn to a magnetic bearing of 320° 30′ when the declination was 3°30′ W. Find the present magnetic bearing of the line, if the declination is 4°15′E.

(1) 317°0′ (2) 312°45′

(3) 317°45′ (4) 312°0′

61. What is the exact value of additive constant (f + d) ?

(1) 100 (2) 180 (3) 0 (4) 270

62. Which is the most accurate method of locating the sounding ?

(1) Range and time interval (2) Range and one angle from the shore

(3) Cross-Rope (4) Two angles from the shore

63. If a back sight observation is 0.665 m taken on known benchmark having 100.00 m value, then height of instrument or reduced level of line of collimation is

(1) 100.600 m (2) 100.650 m

(3) 100.665 m (4) 100.065 m

64. While measuring the length by tape, the sag correction, for the ends freely suspended is, _____.

Where, w = wt. of tape, l = length of tape, P = pull

(1) $\frac{w^2 l}{24P^2}$ (2) $(-)\frac{w^2 l}{24P^2}$ (3) $\frac{w l^2}{24P^2}$ (4) $(-)\frac{w l^2}{24P^2}$

65. Find the loss of head when a pipe of diameter 200 mm is suddenly enlarged to a diameter of 400 mm. The rate of flow of water through the pipe is 250 litre/s.

(1) 1.8 m (2) 8.1 m

(3) 5.8 m (4) 8.8 m

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66. The water is flowing with a velocity of 1.5 m/s in a pipe of length 2500 m and of diameter 500 mm. At the end of the pipe, a valve is provided. Find the rise in pressure if the valve is closed in 25 seconds. Take the value of C = 1460 m/s.

(1) 51 N/cm^2

(2) 25 N/cm^2

(3) 5 N/cm^2

(4) 15 N/cm^2

67. The centre of pressure for a vertically immersed surface lies at a distance equal to _____ the centre of gravity.

(1) $\frac{I_G}{A\bar{X}}$ below

(2) $\frac{I_G}{A\bar{X}}$ above

(3) $\frac{A\bar{X}}{I_G}$ below

(4) $\frac{A\bar{X}}{I_G}$ above

68. The kinematic viscosity is the

(1) Ratio of dynamic viscosity to the mass density

(2) Ratio of mass density of the liquid to the dynamic viscosity

(3) Product of dynamic viscosity and mass density of the liquid

(4) Product of dynamic viscosity and mass of the liquid

69. A stone weighs 392.4N in air and 196.2N in water. Compute the volume of stone.

(1) 8×10^4 cm^3 (2) 2×10^4 cm^3 (3) 4×10^4 cm^3 (4) 5×10^4 cm^3

70. Water is flowing through a pipe of diameter 30 cm at a velocity of 4 m/s. Find the velocity of oil flowing in another pipe of diameter 10 cm, if the condition of dynamic similarity is satisfied between the two pipes. The viscosity of water and oil is given as 0.01 poise and 0.025 poise. The specific gravity of oil = 0.8.

(1) 75.3 m/s (2) 37.5 m/s (3) 73.5 m/s (4) 57.3 m/s

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71. The buoyancy depends upon the

(1) Weight of the liquid displaced

(2) Pressure with which the liquid is displaced

(3) Viscosity of the liquid

(4) Compressibility of the liquid

72. A pen stock is 3000 m long. The pressure wave travels in it with a velocity of 1500 m/s. If the gates of the downstream side turbine are closed uniformly and completely in 5 seconds, then the closure is called

(1) Rapid

(2) Slow

(3) Sudden

(4) Ultra rapid

73. The boundary layer separates from the boundary due to progressive deceleration of flow. The boundary layer separation occurs when

(1) $\frac{dp}{dx} = 0$

(2) $\left(\frac{\partial u}{\partial y}\right)_{y=0} = 0$

(3) $\frac{dp}{dx} < 0$

(4) $\left(\frac{\partial u}{\partial y}\right)_{y=0} > 0$

74. Chlorine existing in water as hypochlorous acid and hypochlorite ions is defined as

(1) Free available chlorine

(2) Combined available chlorine

(3) Chlorine demand

(4) Chloramines

75. Bacteria that obtain both energy and material from organic sources are called

(1) Autotrophs

(2) Heterotrophs

(3) Phototrophs

(4) Protists

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76. F/M ratio used for the design of extended aeration process is

(1) 0.3 to 0.4 day^{-1} (2) 0.3 to 0.6 day^{-1}

(3) 0.6 to 0.8 day^{-1} (4) 0.1 to 0.18 day^{-1}

77. To ensure proper aeration of water, it is necessary to

(1) Increase the area of water in contact with air

(2) Keep the surface of the liquid constantly agitated

(3) Increase the time of contact of water with air

(4) All of the above

78. As per BIS 10500 : 2012, acceptable limit for chloride in drinking water is

(1) 100 mg/*l* (2) 250 mg/*l* (3) 400 mg/*l* (4) 500 mg/*l*

79. Sequence of media from top to bottom in tri-media filter is

(1) Anthracite, Garnet, Sand

(2) Sand, Anthracite, Garnet

(3) Anthracite, Sand, Garnet

(4) Garnet, Sand, Anthracite

80. In conventional activated sludge process, MLSS is generally kept in which range ?

(1) < 100 mg/lit (2) 1000 – 2000 mg/lit

(3) 2000 – 3000 mg/lit (4) 3000 – 5000 mg/lit

81. In the Bio-medical Waste (Management and Handling) Rules, process recommended for human anatomical waste, animal waste, cyto-toxic drugs is

(1) Autoclave treatment (2) Hydroclave treatment

(3) Incineration (4) Microwave treatment

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P.T.O.

82. Which of the following is ***not*** the land filling method ?

(1) Area method
(2) Trench method
(3) Bangalore method
(4) Ramp method

83. The firm power which is always available for carrying the load or corresponding to stream flow

(1) Maximum
(2) Minimum
(3) Average
(4) All the above

84. Pumped-storage plants

(1) Use thermal energy to pump water and generate hydropower to meet peak demand
(2) Allow thermal power to take up peak load while the hydropower can take up the base load
(3) Convert low value 'off peak' energy into high value 'on peak' capacity and energy
(4) Convert low value thermal power into high value hydropower

85. A pelton turbine is running under net head of 10.0 m. The discharge passing through turbine is 1.0 m^3/s and the efficiency of turbine is 50%. What would be the power developed by turbine ? (Take $r_w = 9.81$ KN/m^3).

(1) 4.905 KW
(2) 49.05 KW
(3) 490.5 KW
(4) 4905 KW

86. In a reciprocating pump without air vessels, the acceleration head in the suction pipe is maximum at the crank angle θ =

(1) $\theta = 0°$
(2) $\theta = 90°$
(3) $\theta = 135°$
(4) $\theta = 180°$

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87. The hydraulic efficiency of impulse turbine is maximum when the velocity of wheel is _____ to/of the velocity of the jet of water at inlet.

(1) three fourth (2) one third

(3) half (4) equal

88. The discharge through a single acting reciprocating pump is
Where
A = Cross sectional area of piston or cylinder
L = Length of stroke
N = r.p.m. of the crank

(1) $Q = \frac{ALN}{60}$ (2) $Q = \frac{2ALN}{60}$ (3) $Q = ALN$ (4) $Q = 2ALN$

89. A single acting reciprocating pump, running at 60 rpm, delivers 0.01 m^3/s of water. The area of piston is 0.10 m^2 and stroke length is 50 cm. What would be the theoretical discharge of pump ?

(1) 0.10 m^3/s (2) 0.06 m^3/s (3) 0.05 m^3/s (4) 0.005 m^3/s

90. The runaway speed of a turbine is

(1) The maximum speed of the machine under no load but with governing

(2) The maximum speed of the machine under no load and no governing

(3) The maximum speed of the machine under full load

(4) The speed achieved by the machine when the governor is disconnected

91. If the centrifugal pump is having speed of the shaft 2800 rpm, discharge is 0.0016 m^3/sec. and head is 8.28 m then the specific speed of the pump is in rpm

(1) 21 (2) 24 (3) 23 (4) 26

92. Which of the followings documents will not be required for drafting the tender notice ?

(1) Schedule 'A' of proposed work

(2) Name of work and its location

(3) Estimated cost of work

(4) Validity of the tender

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93. Which of the following is/are applicable for 'hand mixing' of cement concrete ?

(a) The quantity of concrete to be less than 1 cum.

(b) The quantity of concrete to be less than 6 cum.

(c) Cement and sand shall be thoroughly mixed before adding coarse aggregates.

(d) Coarse aggregates and sand shall be thoroughly mixed before adding cement.

Answer Options :

(1) (b) and (d) (2) Only (b) (3) (a) and (c) (4) Only (d)

94. The covered area of a proposed building is 240 m^2, which includes a rear courtyard of 8 m × 5 m. If the plinth area rate for the building is Rs. 40,000 per sq.m, what would be the cost of building ?

(1) 112 lakh (2) 96 lakh (3) 80 lakh (4) 72 lakh

95. For a residential building, the quantities of uncoursed rubble masonry and brick work are 20 cum. and 40 cum. respectively. So for the work

(1) 20 cum. of rubble and 4 thousand bricks are required

(2) 25 cum. of rubble and 10 thousand bricks are required

(3) 25 cum. of rubble and 20 thousand bricks are required

(4) 20 cum. of rubble and 20 thousand bricks are required

96. A detailed description of the quality of materials and workmanship required to complete an engineering project in accordance with its drawings and details is known as

(1) Estimate (2) Specification

(3) Costing (4) Item rate

97. Which of the following is/are applicable for 'building lease' ?

(a) The lessor grants the lease of only land.

(b) The lessor grants the lease of only building.

(c) The lessee has to pay ground rent.

(d) The lessee has to pay rent for the building only.

Answer Options :

(1) (a) and (c) (2) (b) and (d) (3) (b) (4) (d)

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98. Which of the following method/s is/are deployed to find out book value ?

(a) Valuation based on profit.

(b) Rental method of valuation.

(c) Valuation from life.

(d) Development method of valuation.

Answer Options :

(1) (a) and (c)

(2) Only (c)

(3) (b) and (d)

(4) Only (b)

99. The amount paid by the contractor to the organization before getting the work order as a guarantee of execution of the work as per contract is termed as

(1) Security deposit

(2) Liquidated damage

(3) Bank guarantee

(4) Earnest rate

100. A tender is to be submitted in "Three Envelopes Method". "Envelope No. 1" shall contain the followings :

(a) DD for EMD, if applicable.

(b) Bank guarantee, if applicable.

(c) An income tax clearance certificate.

(d) Details of works in hand.

Which of the above is/are correct ?

Answer Options :

(1) Only (a)

(2) (a) and (b)

(3) (b) and (d)

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

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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 उत्तर-क्रमांक हा तुम्हाला स्वतंत्ररीत्या पुरविलेल्या उत्तरपत्रिकेवरील त्या त्या प्रश्न-क्रमांकासमोरील संबंधित वर्तुळ पूर्णपणे छायांकित करून दाखवावा. **ह्याकरिता फक्त काळ्या शाईचे बॉलपेन वापरावे, पेन्सिल वा शाईचे पेन वापरू नये.**

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