



2014

CODE .

प्रश्नपुस्तिका

प्रश्नपुस्तिका क्रमांक  
BOOKLET NO.

चाळणी परीक्षा

स्थापत्य अभियांत्रिकी

एकूण प्रश्न : 80

एकूण गुण : 200

वेळ : 3 ( तीन ) तास

### सूचना

- (1) सदर प्रश्नपुस्तिकेत 80 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 छापलेल्या 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 छायंकित 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 प्रश्नाकडे 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 उमेदवारांच्या उत्तरपत्रिकेतील योग्य उत्तरांनाच गुण दिले जातील. तसेच "उमेदवाराने वस्तुनिष्ठ बहुपर्यायी स्वरूपाच्या प्रश्नांची दिलेल्या चार पर्यायांपैकी सर्वात योग्य उत्तरेच उत्तरपत्रिकेत नमूद करावीत. अन्यथा त्यांच्या उत्तरपत्रिकेत सोडविलेल्या प्रत्येक चार चुकीच्या उत्तरांसाठी एका प्रश्नाचे गुण वजा करण्यात येतील".

### ताकीद

ह्या प्रश्नपत्रिकेसाठी आयोगाने विहित केलेली वेळ संपेपर्यंत ही प्रश्नपुस्तिका आयोगाची मालमत्ता असून ती परीक्षाकक्षात उमेदवारांला 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

पर्यवेक्षकांच्या सूचनेविना हे सील उघडू नये

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कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK

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1. When both ends of a uniform column are fixed, then the value of crippling load is "P". If one end of that column is made free then the value of crippling load will change to :
- (1)  $0.25 P$                       (2)  $0.50 P$                       (3)  $2 P$                       (4)  $4 P$
- 
2. If  $A = \begin{bmatrix} 1 & 3 \\ 0 & 7 \end{bmatrix}$  then Eigen values of  $A^2 + A^5 + I$  are :
- (1) 3,16,857                      (2) 3,208                      (3) 6,15,862                      (4) None of these
- 
3. Optimum cycle time for signal design can be determined by :
- (1)  $C_0 = \frac{1.5 L + 5}{1 - Y}$                       (2)  $C_0 = \frac{1.5 L - 5}{1 - Y}$
- (3)  $C_0 = \frac{1.5 L + 5}{1 + Y}$                       (4)  $C_0 = \frac{1.5 L - 5}{1 + Y}$
- 
4. Bituminous materials are commonly used in highway construction because of their good :
- (1) Tensile and compressive strength
- (2) Binding and water proofing properties
- (3) Shear strength and tensile properties
- (4) Bond and tensile properties
- 
5. The most prominent characteristic of a turbulent flow is :
- (1) Large discharge
- (2) High velocity
- (3) Velocity of a point remains constant
- (4) Velocity and pressure at point exhibit irregular functions of high frequency
- 
6. For an ogee spillway if discharge  $(Q) = 6000 \text{ m}^3/\text{sec}$ , Coefficient of discharge  $(C_d) = 2.2$  and effective Length,  $(L_e) = 40 \text{ m}$  then the corresponding head is :
- (1) 16                      (2) 16.48                      (3) 16.28                      (4) 16.68
- 

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7. Recommended slump value of concrete used in footing ranges from :

- (1) 25 to 50                      (2) 25 to 75                      (3) 50 to 75                      (4) 50 to 100
- 

8. A prismatic beam fixed at both ends carries uniformly distributed load over the entire span. The ratio of bending moment at support to the bending moment at mid span is :

- (1) 0.25                      (2) 0.5                      (3) 2                      (4) 2.5
- 

9. Inorganic soil with low compressibility is represented by :

- (1) MH                      (2) SL                      (3) ML                      (4) CH
- 

10. At the neutral axis of a beam cross section :

- (1) Shear stress is maximum  
(2) Bending stress is maximum  
(3) Both shear stress and bending stress are maximum  
(4) Shear stress is minimum
- 

11. If the shear reinforcement in a RCC beam includes both bent up bars and vertical stirrups then the maximum shear resistance of bent up bar will be \_\_\_\_\_ of the total shear to be resisted.

- (1) 25%                      (2) 50%                      (3) 15%                      (4) 30%
- 

12. As per IS - 875, for the purpose of specifying basic wind velocity, the country has been divided into :

- (1) 4 zones                      (2) 5 zones                      (3) 6 zones                      (4) 7 zones
- 

13.  $M_{ulimit}$  of a RCC beam of width 250 mm and effective depth 500 mm with concrete grade M20 and steel Fe415 is nearly :

- (1) 140 kNm                      (2) 120 kNm                      (3) 150 kNm                      (4) 175 kNm
- 

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14. A short RCC column of square cross section  $400 \text{ mm} \times 400 \text{ mm}$  with material grade M25 and Fe415 is reinforced with 8 bars of 20 mm diameter. The value of load ' $P_u$ ' is nearly :
- (1) 2274 kN                      (2) 1274 kN                      (3) 1574 kN                      (4) 1674 kN
- 
15. If a two hinged parabolic arch carries uniformly distributed load over the entire span then at any chosen cross section in the rib of the arch :
- (1) Only normal thrust will exist  
(2) Only bending moment and shear force will exist  
(3) Only shear force will exist  
(4) None of (1), (2) and (3)
- 
16. Minimum centre to centre spacing of friction piles of diameter (D) as per BIS code is :
- (1) 1.5 D                      (2) 2 D                      (3) 2.5 D                      (4) 3 D
- 
17. Water content of soil can :
- (1) Never be  $> 100\%$                       (2) Take value only from 0% to 100%  
(3) Be  $< 0\%$                       (4) Be  $> 100\%$
- 
18. Common parameter for a real beam and its corresponding conjugate beam is :
- (1) Loading                      (2) Span  
(3) Only shear force                      (4) Shear force and bending moment
- 
19. If the coefficient of friction on the road surface is 0.15 and a maximum super elevation 1 in 15 is provided, the maximum speed of the vehicles on a curve of 100 meter radius, is :
- (1) 32.44 km/hr                      (2) 42.44 km/hr                      (3) 52.44 km/hr                      (4) 62.44 km/hr
- 
20. The first stage of deciding the alignment of hill road, is :
- (1) Reconnaissance                      (2) Detailed survey  
(3) Trace out                      (4) Preliminary survey
- 

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21. Residual soils are formed by :

- (1) Glaciers                      (2) Wind                      (3) Water                      (4) None of these
- 

22. Route optimization of solid waste is necessary for :

- (1) Easy transportation                      (2) Radial transportation  
(3) Transfer station                      (4) All the above
- 

23. In a hydro-electric station of  $Q = 200 \text{ m}^3/\text{sec.}$ ,  $N_s = 480$  and  $H = 18 \text{ m}$ ,  $N = 150 \text{ rpm}$ . The power available at the shaft of turbine would be :

- (1) 782 kW                      (2) 13049 kW                      (3) 14076 kW                      (4) 94036 kW
- 

24. The effects of air pollutants on plants are :

- (1) Necrosis                      (2) Epinasty  
(3) Both (1) and (2)                      (4) Neither (1) nor (2)
- 

25. The coefficient of active earth pressure for loose sand having an angle of internal friction of  $30^\circ$  is :

- (1)  $\frac{1}{3}$                       (2) 3                      (3) 1                      (4)  $\frac{1}{2}$
- 

26. Solution of  $(D^3 + \pi^2 D) = 0$ ,  $y(0) = 0$ ,  $y(1) = 0$ ,  $y'(0) + y'(1) = 0$  is :

- (1)  $y = c \sin \pi x$                       (2)  $y = c \cos \pi x$                       (3)  $y = c \tan \pi x$                       (4)  $y = c e^x \sin \pi x$
- 

27. For what value of  $\lambda$  and  $\mu$  the equations  $x + 2y + 3z = 4$ ,  $x + 3y + 4z = 5$ ,  $x + 3y + \lambda z = \mu$  has no solution ?

- (1)  $\lambda = 4$ ,  $\lambda = 5$                       (2)  $\lambda \neq 4$ ,  $\lambda \neq 5$                       (3)  $\lambda = 4$ ,  $\lambda \neq 5$                       (4) None of these
- 

28. Influence line diagram is drawn for :

- (1) Given loading on structure                      (2) Static unit load  
(3) Moving unit load                      (4) None of (1), (2) and (3)
- 

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29. Which of the following is a measure of particle size range ?

- |                              |                   |
|------------------------------|-------------------|
| (1) Effective size           | (2) Uniformity    |
| (3) Coefficient of curvature | (4) None of these |
- 

30. If  $f(x) = x(x+1)(x+2)(x+3)$ , then  $f'(x) = 0$  has :

- |                      |                     |
|----------------------|---------------------|
| (1) One real root    | (2) Two real roots  |
| (3) Three real roots | (4) Four real roots |
- 

31. Level of Service 'A' concept in the HCM Manual means :

- (1) Forced flow operations is at low speed
  - (2) Free flow, with low volumes and high speed
  - (3) Approaches unstable flow, with tolerable speed
  - (4) Cannot be described by speed alone
- 

32. Attached growth system principle is used in :

- |                      |                              |
|----------------------|------------------------------|
| (1) Trickling filter | (2) Activated sludge process |
| (3) Grit chamber     | (4) Skimming tanks           |
- 

33. The hydrologic flood routing methods are :

- (1) Equation of continuity only
  - (2) Equation of motion only
  - (3) Both momentum and Continuity equation
  - (4) Energy equation
- 

34. For the scalar field  $u = \frac{x^2}{2} + \frac{y^2}{2}$  the magnitude of the gradient at the point (1, 3) is :

- |                   |                   |                   |                   |
|-------------------|-------------------|-------------------|-------------------|
| (1) $\frac{2}{9}$ | (2) $\frac{4}{9}$ | (3) $\frac{1}{3}$ | (4) $\frac{9}{2}$ |
|-------------------|-------------------|-------------------|-------------------|
- 

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35. Lysimeter is used to measure :

- |                        |                     |
|------------------------|---------------------|
| (1) Infiltration       | (2) Evaporation     |
| (3) Evapotranspiration | (4) Vapour pressure |
- 

36. Minimum specified height of a chimney for evolution of industrial gases other than those in thermal power plant, in the absence of data for the evolved gas is :

- |          |          |           |           |
|----------|----------|-----------|-----------|
| (1) 10 m | (2) 30 m | (3) 100 m | (4) 220 m |
|----------|----------|-----------|-----------|
- 

37. Crown corrosion in sewers occurs due to :

- |        |                      |                      |                     |
|--------|----------------------|----------------------|---------------------|
| (1) CO | (2) H <sub>2</sub> S | (3) H <sub>2</sub> O | (4) CH <sub>4</sub> |
|--------|----------------------|----------------------|---------------------|
- 

38. The average annual rainfall over the whole of India is estimated as :

- |            |            |           |            |
|------------|------------|-----------|------------|
| (1) 189 cm | (2) 319 cm | (3) 89 cm | (4) 119 cm |
|------------|------------|-----------|------------|
- 

39. Axial deformation of a uniform bar due to its own weight is equal to \_\_\_\_\_ times the deformation of the same bar, when subjected to a direct load equal to weight of the bar.

- |       |         |         |         |
|-------|---------|---------|---------|
| (1) 2 | (2) 1.5 | (3) 2.5 | (4) 0.5 |
|-------|---------|---------|---------|
- 

40. Disinfectants used for killing of pathogens are :

- |                      |                       |
|----------------------|-----------------------|
| (1) Silver           | (2) Hydrogen peroxide |
| (3) Bleaching powder | (4) All the above     |
- 

41. The maximum differential settlement in isolated footings on clayey soils should be limited to :

- |           |           |           |            |
|-----------|-----------|-----------|------------|
| (1) 25 mm | (2) 40 mm | (3) 65 mm | (4) 100 mm |
|-----------|-----------|-----------|------------|
- 

42. At a section in a loaded beam where shear force is zero, bending moment at that section will be ?

- |             |                               |
|-------------|-------------------------------|
| (1) Zero    | (2) Maximum                   |
| (3) Minimum | (4) May be maximum or minimum |
- 

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43. The specified ambient air quality standards for  $\text{NO}_2$  is about  $100 \mu\text{g}/\text{m}^3$ , which is ppm approximate :

- (1) 0.01                      (2) 0.05                      (3) 0.1                      (4) 0.5
- 

44. Toughness index is the ratio of :

- (1) Plasticity index to consistency index  
(2) Plasticity index to flow index  
(3) Liquidity index to flow index  
(4) Consistency index to liquidity index
- 

45. The value of the camber recommended for cement concrete roads in areas of heavy rainfall, is :

- (1) 1 in 25                      (2) 1 in 33                      (3) 1 in 40                      (4) 1 in 50
- 

46. A negative even integer  $x$  is randomly chosen from the negative integers greater than or equal to  $-20$ . What is the probability that  $2x + 10 > -10$  ?

- (1) 0.2                      (2) 0.3                      (3) 0.4                      (4) 0.5
- 

47. To reduce the noise level on the railway track \_\_\_\_\_ material is used.

- (1) pebbles                      (2) aggregate                      (3) sand                      (4) iron
- 

48. In psychological terms, the car following theory may be expressed in the form of the equation :

- (1)  $\text{Response} = \text{Sensitivity} \times \text{Stimulus}$   
(2)  $\text{Response} = \text{Sensitivity} / \text{Stimulus}$   
(3)  $\text{Response} = \text{Sensitivity} + \text{Stimulus}$   
(4)  $\text{Response} = \text{Sensitivity} - \text{Stimulus}$
- 

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49. If a light flexible cable suspended from two points, is subjected to rise in temperature then the horizontal component of cable tension will :

- (1) Increase                      (2) Decrease                      (3) Remain same                      (4) Become zero
- 

50. Manning's equation for a lined channel is :

- (1)  $V = \frac{1}{N} R^{2/3} S^{1/2}$                       (2)  $V = \frac{1}{N} R^{1/2} S^{2/3}$   
(3)  $V = \frac{1}{N} R^{3/2} S^{1/2}$                       (4)  $V = \frac{1}{N} R^{1/3} S^2$
- 

51. A unit hydrograph has :

- (1) One unit of peak discharge  
(2) One unit of rainfall duration  
(3) Linear response and linear time variance  
(4) Non-linear time variance and linear response
- 

52. A model of spillway is constructed to a scale of 1 : 8 neglecting viscous and tension effects. If discharge in the prototype is 1000 m<sup>3</sup>/sec the rate of flow in model is :

- (1) 4.5                      (2) 5.5                      (3) 5                      (4) 2.5
- 

53. If  $f(z) = u + iv$  and  $u - v = (x - y)(x^2 + 4xy + y^2)$ , then  $f(z)$  is : (where  $z = x + iy$ )

- (1)  $-iz^3 + c$                       (2)  $-iz + 3$                       (3)  $iz^2$                       (4) None of these
- 

54. Continuous exposure to a whisper (very low sound) will lead to :

- (1) Gastroenteritis or hyper gastric problem  
(2) Hormonal imbalance  
(3) Color blindness  
(4) Permanent hearing damage
- 

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55. The geological formation which is essentially impermeable for flow of water even though it may contain water in its pore is called :

- (1) Aquifer                      (2) Aquifuge                      (3) Aquitard                      (4) Aquiclude
- 

56. Slenderness ratio of lacing bars should not be more than :

- (1) 100                      (2) 120                      (3) 145                      (4) 180
- 

57. Which statement is true about a Binomial Experiment ?

Statement - I : Each trial is independent of the others.

Statement - II : There are only two outcomes.

Statement - III : The probability of each outcome remains constant from trial to trial.

- (1) Only Statement - I                      (2) Only Statement - III  
(3) Statement - I and Statement - III                      (4) All are true
- 

58. 20 decibels + 20 decibels = ?

- (1) 20 db                      (2) 40 db                      (3) 23 db                      (4) 30 db
- 

59. Two geometrically similar pumps are running at a speed of 800 rpm. One has impeller diameter of 0.4 m and discharge of 15 litre per sec against a head of 18 m. If the other pump gives half of this discharge rate, the head of the second pump would be :

- (1) 11.33 m                      (2) 13.33 m                      (3) 12.33 m                      (4) 10.33 m
- 

60. The different types of collection systems for a household are :

- (1) Set out                      (2) Set out set in  
(3) Backyard                      (4) All the above
- 

61. Bearing stiffeners in a plate girder are provided at :

- (1) Support                      (2) Mid-span  
(3) Under the point load                      (4) Both (1) and (3)
- 

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62. Process of heating a solid waste and splitting its organic substances by thermal cracking and condensation is called :

- |                  |                   |
|------------------|-------------------|
| (1) Gasification | (2) Pulverization |
| (3) Incineration | (4) Pyrolysis     |
- 

63. The printers 'ink' is an example of :

- |                         |                           |
|-------------------------|---------------------------|
| (1) Non-Newtonian fluid | (2) Newtonian fluid       |
| (3) Elastic solid       | (4) Thixotropic substance |
- 

64. Lateral system (lacing or battening) in a built up column is designed to resist transverse shear equal to :

- |                        |                         |
|------------------------|-------------------------|
| (1) 25% of column load | (2) 2.5% of column load |
| (3) 20% of column load | (4) 10% of column load  |
- 

65. Sewage treatment works are normally designed for a design period of :

- |                    |                    |
|--------------------|--------------------|
| (1) 40 to 50 years | (2) 30 to 40 years |
| (3) 15 to 20 years | (4) 5 to 10 years  |
- 

66. Which of the following instruments is not connected with stream flow measurement ?

- |                                |                         |
|--------------------------------|-------------------------|
| (1) Hygrometer                 | (2) Echo depth recorder |
| (3) Electromagnetic flow meter | (4) Sounding weight     |
- 

67. 'Speed Limit' Sign in Traffic Engineering is classified as :

- |                      |                    |
|----------------------|--------------------|
| (1) Warning Sign     | (2) Mandatory Sign |
| (3) Informatory Sign | (4) None of these  |
- 

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68. Arrange the order of following layers of the flexible pavement from bottom to top :

- (a) Sub base
- (b) Base
- (c) Subgrade
- (d) Dense Bituminous Macadam
- (e) Bituminous concrete

- |                             |                             |
|-----------------------------|-----------------------------|
| (1) (a), (b), (c), (d), (e) | (2) (c), (b), (a), (d), (e) |
| (3) (c), (a), (b), (d), (e) | (4) (c), (a), (b), (e), (d) |

69. Two plates of 16 mm and 14 mm thickness are joined by fillet weld, the maximum size of fillet weld may be :

- |             |             |             |             |
|-------------|-------------|-------------|-------------|
| (1) 18.5 mm | (2) 17.5 mm | (3) 12.5 mm | (4) 15.5 mm |
|-------------|-------------|-------------|-------------|

70. The major photochemical oxidant is :

- |                       |           |
|-----------------------|-----------|
| (1) Hydrogen peroxide | (2) Ozone |
| (3) Nitrogen oxide    | (4) PAN   |

71. Measurements of duty at the outlet of a canal is known as :

- |                      |                    |
|----------------------|--------------------|
| (1) Outlet factor    | (2) Gross quantity |
| (3) Lateral quantity | (4) Net quantity   |

72. Phreatic line in an earthen dam is :

- |                   |               |              |                |
|-------------------|---------------|--------------|----------------|
| (1) Straight line | (2) Parabolic | (3) Circular | (4) Elliptical |
|-------------------|---------------|--------------|----------------|

73. For the given data : wheel load ( $P$ ) = 4100 kg,  $E = 3 \times 10^5$  kg/cm<sup>2</sup>, pavement thickness ( $h$ ) = 15 cm, Poisson's ratio ( $\mu$ ) = 0.15, modulus of subgrade reaction ( $k$ ) = 3.0 kg/cm<sup>3</sup>, the radius of relative is :

- |              |              |              |              |
|--------------|--------------|--------------|--------------|
| (1) 63.34 cm | (2) 73.24 cm | (3) 82.15 cm | (4) 71.32 cm |
|--------------|--------------|--------------|--------------|

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74. The sewer pipes have to be designed and checked for :

- (1) Only maximum flow
  - (2) Only minimum flow
  - (3) Both maximum and minimum flow
  - (4) None of them
- 

75. Uniformly distributed load on a pre-stressed concrete beam can be effectively counteracted by :

- (1) Concentric straight tendon
  - (2) Eccentric straight tendon 50%
  - (3) Bent tendon
  - (4) Parabolic tendon
- 

76. At fully plastic section, infinite rotation occurs at :

- (1) Zero moment
  - (2) Constant elastic moment
  - (3) Constant plastic moment
  - (4) None of (1), (2) and (3)
- 

77. If  $f(t) = \delta\left(t - \frac{\pi}{4}\right) \sin 2t$  then Laplace Transform of  $f(t)$  :

- (1)  $e^{s\pi/4}$
  - (2)  $e^{-s\pi/4}$
  - (3)  $\frac{1}{s+1}$
  - (4)  $\frac{1}{s^2+1}$
- 

78. Length of back water curve can be expressed as :

- (1)  $L = \frac{E1 - E2}{Sb - Se}$
- (2)  $L = \frac{E2 - E1}{Sb - Se}$
- (3)  $L = \frac{E1 - E2}{Se - Sb}$
- (4)  $L = \frac{E2 - E1}{Se - Sb}$

Where  $E1$  and  $E2$  - Specific energies at the beginning and end of back water curve.

$Se$  and  $Sb$  - Slope of energy line and channel bed.

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79. If an element of a stressed body is in the state of pure shear with stress magnitude of 30 MPa, then the magnitude of principal stress will be :

- (1) 30 MPa      (2) 45 MPa      (3) 15 MPa      (4) 60 MPa
- 

80. Normal distribution theory tells us that for large samples, 95% of sample means lie within how many standard deviations above and below the population mean ?

- (1) The square root of the sample size  
(2) 95  
(3) Whatever the z-score is  
(4) 1.96
- 

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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 कापणी 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 स्वतःबरोबर 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.

कच्च्या कामासाठी जागा /SPACE FOR ROUGH WORK