411793

SPV-25

पुस्तिका में पृष्ठों की संख्या : 24
Number of Pages in Booklet : 24
पुस्तिका में प्रश्नों की संख्या : 150
No. of Questions in Booklet : 150

प्रश्न-पुस्तिका संख्या व बारकोड /
Question Booklet No. & Barcode

इस प्रश्न-पुस्तिका को तब तक न खोलें जब तक कहा न जाए । **Do not open this Question Booklet until you are asked to do so.**

Paper Code : 02   **Sub : Civil Engineering**

समय : 02:30 घण्टे + 10 मिनट अतिरिक्त*
Time : 02:30 Hours + 10 Minutes Extra*

Exam Date-30/07/2025

अधिकतम अंक : 150
Maximum Marks : 150

प्रश्न-पुस्तिका के पेपर की सील/पॉलिथीन बैग को खोलने पर प्रश्न-पत्र हल करने से पूर्व परीक्षार्थी यह सुनिश्चित कर लें कि :
• प्रश्न-पुस्तिका संख्या तथा ओ.एम.आर. उत्तर-पत्रक पर अंकित बारकोड संख्या समान हैं ।
• प्रश्न-पुस्तिका एवं ओ.एम.आर. उत्तर-पत्रक के सभी पृष्ठ व सभी प्रश्न सही मुद्रित हैं । समस्त प्रश्न, जैसा कि ऊपर वर्णित है, उपलब्ध हैं तथा कोई भी पृष्ठ कम नहीं है/ मुद्रण त्रुटि नहीं है । किसी भी प्रकार की विसंगति या दोषपूर्ण होने पर परीक्षार्थी वीक्षक से दूसरा प्रश्न-पत्र प्राप्त कर लें । यह सुनिश्चित करने की जिम्मेदारी अभ्यर्थी की होगी । परीक्षा प्रारम्भ होने के 5 मिनट पश्चात् ऐसे किसी दावे/आपत्ति पर कोई विचार नहीं किया जायेगा ।

On opening the paper seal/polythene bag of the Question Booklet before attempting the question paper, the candidate should ensure that :
• Question Booklet Number and Barcode Number of OMR Answer Sheet are same.
• All pages & Questions of Question Booklet and OMR Answer Sheet are properly printed. All questions as mentioned above are available and no page is missing/misprinted.
If there is any discrepancy/defect, candidate must obtain another Question Booklet from Invigilator. Candidate himself shall be responsible for ensuring this. No claim/objection in this regard will be entertained after five minutes of start of examination.

परीक्षार्थियों के लिए निर्देश	INSTRUCTIONS FOR CANDIDATES

परीक्षार्थियों के लिए निर्देश

1. प्रत्येक प्रश्न के लिये एक विकल्प भरना अनिवार्य है ।
2. सभी प्रश्नों के अंक समान हैं ।
3. प्रत्येक प्रश्न का मात्र एक ही उत्तर दीजिए । एक से अधिक उत्तर देने की दशा में प्रश्न के उत्तर को गलत माना जाएगा ।
4. **OMR** उत्तर-पत्रक इस प्रश्न-पुस्तिका के अन्दर रखा है । जब आपको प्रश्न-पुस्तिका खोलने को कहा जाए, तो उत्तर-पत्रक निकाल कर ध्यान से केवल **नीले बॉल पॉइंट पेन से** विवरण भरें ।
5. कृपया अपना रोल नम्बर ओ.एम.आर. उत्तर-पत्रक पर सावधानीपूर्वक सही भरें । गलत रोल नम्बर भरने पर परीक्षार्थी स्वयं उत्तरदायी होगा ।
6. ओ.एम.आर. उत्तर-पत्रक में करेक्शन पेन/व्हाइटनर/सफेदा का उपयोग निषिद्ध है ।
7. प्रत्येक गलत उत्तर के लिए प्रश्न अंक का 1/3 भाग काटा जायेगा । गलत उत्तर से तात्पर्य अशुद्ध उत्तर अथवा किसी भी प्रश्न के एक से अधिक उत्तर से है ।
8. प्रत्येक प्रश्न के पांच विकल्प दिये गये हैं, जिन्हें क्रमशः 1, 2, 3, 4, 5 अंकित किया गया है । अभ्यर्थी को सही उत्तर निर्दिष्ट करते हुए उनमें से केवल एक गोले (बबल) को उत्तर-पत्रक पर नीले बॉल पॉइंट पेन से गहरा करना है ।
9. यदि आप प्रश्न का उत्तर नहीं देना चाहते हैं तो उत्तर-पत्रक में पांचवें (5) विकल्प को गहरा करें । यदि पाँच में से कोई भी गोला गहरा नहीं किया जाता है, तो ऐसे प्रश्न के लिये प्रश्न अंक का 1/3 भाग काटा जायेगा ।
10.* प्रश्न-पत्र हल करने के उपरांत अभ्यर्थी अनिवार्य रूप से ओ.एम.आर. उत्तर-पत्रक जाँच लें कि समस्त प्रश्नों के लिये एक विकल्प (गोला) भर दिया गया है । इसके लिये ही निर्धारित समय से 10 मिनट का अतिरिक्त समय दिया गया है ।
11. यदि अभ्यर्थी 10% से अधिक प्रश्नों में पाँच विकल्पों में से कोई भी विकल्प अंकित नहीं करता है तो उसको अयोग्य माना जायेगा ।
12. मोबाइल फोन अथवा अन्य किसी इलेक्ट्रॉनिक यंत्र का परीक्षा हॉल में प्रयोग पूर्णतया वर्जित है । यदि किसी अभ्यर्थी के पास ऐसी कोई वर्जित सामग्री मिलती है तो उसके विरुद्ध आयोग द्वारा नियमानुसार कार्यवाही की जायेगी ।

चेतावनी : अगर कोई अभ्यर्थी नकल करते पकड़ा जाता है या उसके पास से कोई अनधिकृत सामग्री पाई जाती है, तो उस अभ्यर्थी के विरुद्ध पुलिस में प्राथमिकी दर्ज कराते हुए राजस्थान सार्वजनिक परीक्षा (भर्ती में अनुचित साधनों की रोकथाम अध्युपाय) अधिनियम, 2022 तथा अन्य प्रभावी कानून एवं आयोग के नियमों-प्रावधानों के तहत कार्यवाही की जाएगी । साथ ही आयोग ऐसे अभ्यर्थी को भविष्य में होने वाली आयोग की समस्त परीक्षाओं से विवर्जित कर सकता है ।

INSTRUCTIONS FOR CANDIDATES

1. It is mandatory to fill one option for each question.
2. All questions carry equal marks.
3. Only **one** answer is to be given for each question. If more than one answers are marked, it would be treated as wrong answer.
4. The **OMR** Answer Sheet is inside this Question Booklet. When you are directed to open the Question Booklet, take out the Answer Sheet and fill in the particulars carefully with **Blue Ball Point Pen** only.
5. Please correctly fill your Roll Number in **OMR** Answer Sheet. Candidates will themselves be responsible for filling wrong Roll No.
6. Use of Correction Pen/Whitener in the OMR Answer Sheet is strictly forbidden.
7. 1/3 part of the mark(s) of each question will be deducted for each wrong answer. A wrong answer means an incorrect answer or more than one answers for any question.
8. Each question has five options marked as 1, 2, 3, 4, 5. You have to darken only one circle (bubble) indicating the correct answer on the Answer Sheet using BLUE BALL POINT PEN.
9. If you are not attempting a question then you have to darken the circle '5'. If none of the five circles is darkened, one third (1/3) part of the marks of question shall be deducted.
10.* After solving question paper, candidate must ascertain that he/she has darkened one of the circles (bubbles) for each of the questions. Extra time of 10 minutes beyond scheduled time, is provided for this.
11. A candidate who has not darkened any of the five circles in more than 10% questions shall be disqualified.
12. Mobile Phone or any other electronic gadget in the examination hall is strictly prohibited. A candidate found with any of such objectionable material with him/her will be strictly dealt with as per rules.

Warning : If a candidate is found copying or if any unauthorized material is found in his/her possession, F.I.R. would be lodged against him/her in the Police Station and he/she would be liable to be prosecuted under **Rajasthan Public Examination (Measures for Prevention of Unfair means in Recruitment) Act, 2022 & any other laws applicable and Commission's Rules-Regulations.** Commission may also debar him/her permanently from all future examinations.

उत्तर-पत्रक में दो प्रतियाँ हैं — मूल प्रति और कार्बन प्रति। परीक्षा समाप्ति पर परीक्षा कक्ष छोड़ने से पूर्व परीक्षार्थी उत्तर-पत्रक की दोनों प्रतियाँ वीक्षक को सौंपेंगे, परीक्षार्थी स्वयं कार्बन प्रति अलग नहीं करें । वीक्षक उत्तर-पत्रक की मूल प्रति को अपने पास जमा कर, कार्बन प्रति को मूल प्रति से कट लाइन से मोड़ कर सावधानीपूर्वक अलग कर परीक्षार्थी को सौंपेंगे, जिसे परीक्षार्थी अपने साथ ले जायेंगे। परीक्षार्थी को उत्तर-पत्रक की कार्बन प्रति चयन प्रक्रिया पूर्ण होने तक सुरक्षित रखनी होगी एवं आयोग द्वारा माँगे जाने पर प्रस्तुत करनी होगी ।

1. In a two-layer soil system, the top soil and bottom soil are of same thickness but the coefficient of permeability of the top soil is twice that of the bottom soil of coefficient of permeability 'k'. When horizontal flow occurs, the equivalent coefficient of permeability of the system will be

   (1) 2 k   (2) 1.5 k

   (3) 1.25 k   (4) 1.2 k

   (5) Question not attempted

2. In a homogeneous and isotropic soil, the elementary fields formed in a flow net are ideally :

   (1) Circular   (2) Square

   (3) Rectangular   (4) Triangular

   (5) Question not attempted

3. According to IS-1498, a fine-grained soil with a liquid of 62% that plots above the A-line on the plasticity chart is classified as :

   (1) CL   (2) CH

   (3) ML   (4) MH

   (5) Question not attempted

4. According to Taylor's stability concept, the stability number is defined as :

   (1) $\dfrac{H}{\gamma c}$ (2) $\dfrac{\gamma H}{c}$

   (3) $\dfrac{c}{\gamma H}$ (4) $\dfrac{\gamma}{cH}$

   (5) Question not attempted

5. Which of the following methods gives the most reliable estimate of field permeability in stratified soils ?

   (1) Constant head test

   (2) Jodhpur permeameter

   (3) Pumping-out test

   (4) Falling head test

   (5) Question not attempted

6. Which of the following relations about permeability of soil is incorrect ?

   (1) Permeability of coarse-grained soil is directly proportional to the square of specific surface of soil particles, at a given porosity.

   (2) Permeability of soil is directly proportional to the unit weight of pore fluid.

   (3) Permeability of soil is inversely proportional to the viscosity of pore fluid.

   (4) Permeability of soil is directly proportional to the square of grain size.

   (5) Question not attempted

7. Which soil identification test involves shaking a moist soil pat in the palm and observing for water sheen formation on its surface ?

   (1) Plasticity test

   (2) Shine test

   (3) Dispersion test

   (4) Dilatancy test

   (5) Question not attempted

8. **Assertion (A)** : For a given soil, the optimum moisture content increases with the increase in compactive effort.

Reason (R) : Higher the compactive effort, higher is the dry density at the same moisture content.

(1) Both (A) and (R) are true and (R) is the correct explanation of (A).

(2) Both (A) and (R) are true but (R) is NOT the correct explanation of (A).

(3) (A) is true but (R) is false.

(4) (A) is false but (R) is true.

(5) Question not attempted

9. The failure envelope for pure clay (with $\varphi = 0$) in the Mohr-Coulomb theory is :

(1) Horizontal

(2) Vertical

(3) Inclined at $45°$

(4) Parabolic

(5) Question not attempted

10. For local shear failure in soils, the bearing capacity factors used in Terzaghi's equation are typically :

(1) Same as general shear failure

(2) Smaller than general shear failure

(3) Larger than general shear failure

(4) Neglected in calculation

(5) Question not attempted

11. A Density Index (ID) of 0% indicates that the soil is in

(1) Densest possible state

(2) Loosest possible state

(3) Naturally compacted state

(4) Saturated state

(5) Question not attempted

12. Newmark's influence chart is constructed for which of the following assumptions about the soil medium ?

(1) Stratified, anisotropic, rigid

(2) Semi-infinite, homogeneous, isotropic, elastic

(3) Layered, plastic, compressible

(4) Homogeneous, perfectly plastic

(5) Question not attempted

13. Which of the following soil sampling methods produces least non-representative soil samples ?

(1) Split spoon sampler

(2) Test pit excavation

(3) Wash boring

(4) Shelby tube sampler

(5) Question not attempted

14. When the soil fill is horizontal on both sides on the retaining wall and angle of internal friction of soil is 30 degrees, what is the relation between coefficient of active earth pressure of soil (k_a) and coefficient of passive earth pressure of soil (k_p) ?

(1) $k_a = 3 k_p$ (2) $k_a = 9 k_p$

(3) $k_a = k_p / 3$ (4) $k_a = k_p / 9$

(5) Question not attempted

15. In case of under reamed piles, depending upon the feasibility of construction and design requirements, the diameter of the under reamed bulb varies between _____.

(1) 1-1.5 times the stem diameter

(2) 1.5-2.0 times the stem diameter

(3) 2-3 times the stem diameter

(4) 3-4 times the stem diameter

(5) Question not attempted

16. A three hinged arch shown in the figure is quarter of a circle. If the vertical and horizontal components of reaction at A are equal, the value of θ is _____.
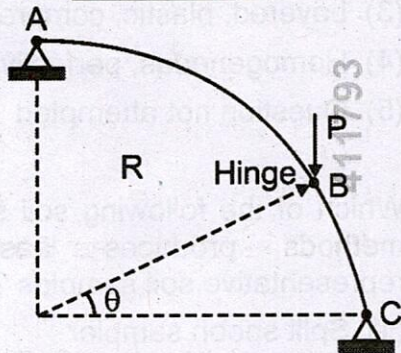
(1) P/2

(2) 0

(3) √2P

(4) P/√2

(5) Question not attempted

17. A hollow circular section, of external diameter 200 mm and thickness t mm has a moment of inertia approximately 50×10^6 mm^4. This section is to be used as a beam. If the maximum permissible bending stress of the material of the beam is 100 MPa, the maximum bending moment that the beam can carry will be equal to _____.

(1) 50 kNm

(2) 25 kNm

(3) 62.50 kNm

(4) 125 kNm

(5) Question not attempted

18. A cantilever beam of length L is subjected to vertically downward uniformly varying load of intensity $\frac{w}{2}$ kN/m at the fixed end which reduces linearly to 0 at the free end. The bending moment at the fixed end of the cantilever beam is _____.

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

(2) $\frac{wL^2}{6}$

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

(4) $\frac{wL^2}{24}$

(5) Question not attempted

19. The deflection at the free end of a cantilever with a uniformly distributed load w over the entire span L is

(1) $\frac{wL^3}{3EI}$

(2) $\frac{wL^4}{3EI}$

(3) $\frac{wL^3}{8EI}$

(4) $\frac{wL^4}{8EI}$

(5) Question not attempted

20. A three hinged parabolic arch has hinged support at each of the two springings and a hinge at the crown. The crown is at the centre of the arch length. The span of arch is L and the maximum rise at the crown is h. The arch is subjected to a vertically downward uniformly distributed load of w kN/m throughout its horizontal span. The horizontal thrust at any of its springings is

(1) zero

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

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

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

(5) Question not attempted

4

21. A cantilever beam of span 3 m, is subjected to a uniformly distributed load w kN/m throughout its length L. If the slope at the ends of the beam is not to exceed 0.04 radians, the deflection at the free end of the beam is

(1) 0.08 m   (2) 0.09 m

(3) 0.12 m   (4) 0.16 m

(5) Question not attempted

22. The shear force of a cantilever beam AB of length L carrying a uniformly distributed load of w per unit length is _____ at the free end B.

(1) wL (2) $wL/2$

(3) zero   (4) $wL/4$

(5) Question not attempted

23. Where does the maximum bending moment occur in a simply supported beam subjected to a point load at the centre of span L ?

(1) At a distance L/4 from each support

(2) At a distance L/3 from each support

(3) At the support

(4) At the point load

(5) Question not attempted

24. If Young's modulus (E) and Poisson's ratio (1/m) are known, the shear modulus (N) can be given by
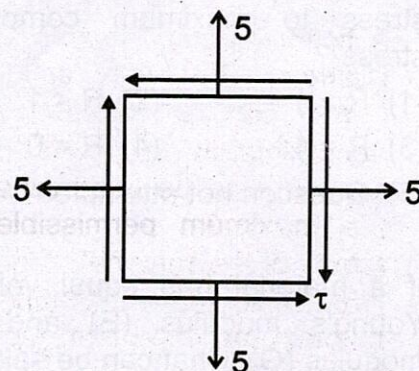
(1) $N = \dfrac{mE}{(2m+1)}$ (2) $N = \dfrac{2mE}{(m+1)}$

(3) $N = \dfrac{mE}{2(m+1)}$ (4) $N = \dfrac{mE}{2(m-1)}$

(5) Question not attempted

25. A steel wire of 10 mm diameter is bent into a circular arc of 20 metre radius. What will be the maximum stress induced in it ?

Take $E = 2 \times 10^5$ N/mm^2

(1) 25 N/mm^2 (2) 50 N/mm^2

(3) 75 N/mm^2 (4) 100 N/mm^2

(5) Question not attempted

26. For the stress state (in MPa) shown in the figure, the major principal stress is 10 MPa. The shear stress τ is _____.

(1) 0 MPa   (2) 2.5 MPa

(3) 5 MPa   (4) 25 MPa

(5) Question not attempted

27. The deflection of a cantilever beam with a point load w at the free end is given by

(1) $\dfrac{wl^2}{2EI}$

(2) $\dfrac{wl^3}{2EI}$

(3) $\dfrac{wl^3}{3EI}$

(4) $\dfrac{wl^2}{3EI}$

(5) Question not attempted

28. Which of the following is/are determined at a point of a given beam by moment area method ?

P. Shear force

Q. Bending moment

R. Slope

S. Deflection

Select the correct answer using the codes given below :

(1) P and Q

(2) Q and R

(3) P and S

(4) R and S

(5) Question not attempted

29. A beam with a T-section has its neutral axis closer to the flange. Under positive bending, what will be the ratio (R) of maximum tensile stress to maximum compressive stress ?

(1) R > 1

(2) R < 1

(3) R = 1

(4) R = 0

(5) Question not attempted

30. If a material has equal values of Young's modulus (E) and shear modulus (G), what can be said about its Poisson's ratio ?

(1) 0

(2) 0.25

(3) −0.5

(4) 0.5

(5) Question not attempted

31. The slenderness ratio in a tension member as per IS code where a member normally acting as a tie in a bracing system or roof truss but subjected to possible reversal of stresses resulting from the action of the wind or earthquake forces, should not exceed

(1) 180

(2) 350

(3) 400

(4) 100

(5) Question not attempted

32. Angle of inclination of the lacing bar with the longitudinal axis of the compression member should preferably be between

(1) 90°

(2) 10° to 30°

(3) 40° to 70°

(4) 30° to 40°

(5) Question not attempted

33. Minimum thickness of web in a plate girder, when the plate is painted and also directly exposed to weather, is

(1) 5 mm

(2) 6 mm

(3) 7 mm

(4) 10 mm

(5) Question not attempted

34. For gantry girder carrying, manually operated over head travelling cranes, the horizontal forces transverse to the rails increased by

(1) 10% of maximum static wheel load

(2) 25% of maximum static wheel load

(3) 5% of the weight of the crab and the weight lifted on the crane

(4) 10% of the weight of the crab and the weight lifted on the crane

(5) Question not attempted

35. Minimum spacing of vertical stiffeners is limited to –

(where d is the distance between the flange angles)

(1) 0.25 d   (2) 0.33 d

(3) 0.50 d   (4) 0.66 d

(5) Question not attempted

36. As per IS 800 : 2007, the nominal bearing strength of bolt is given by $2.5\,k_b dt f_u$, where k_b depends upon

(1) bolt diameter

(2) partial safety factor for material of bolt

(3) thickness of plate

(4) edge distance, diameter of bolt hole, ultimate tensile stress of bolt and plate

(5) Question not attempted

37. Economical Depth of web of a plate girder is given by :

(where M is maximum bending moment in the plate girder, f_b is allowable bending stress and t_w is thickness of web)

(1) $\sqrt{\dfrac{M}{f_b \cdot t_w}}$ (2) $1.1\sqrt{\dfrac{M}{f_b \cdot t_w}}$

(3) $1.2\sqrt{\dfrac{M}{f_b \cdot t_w}}$ (4) $1.3\sqrt{\dfrac{M}{f_b \cdot t_w}}$

(5) Question not attempted

38. Two ISLC 350 sections placed back to back at a clear spacing of 250 mm carry an axial factored compressive load of 800 kN. The lacing systems for this compound column shall be designed to resist a minimum transverse shear of _____.

(1) 20 kN   (2) 40 kN

(3) 400 kN   (4) 800 kN

(5) Question not attempted

39. In the post critical method of design of plate girder as per IS : 800-2007, web must have _____.

(1) intermediate transverse stiffeners

(2) longitudinal stiffeners

(3) transverse stiffeners at the supports

(4) tension stiffeners

(5) Question not attempted

40. The unsupported length of a column is 6 m. The bottom end of column is restrained against rotation and translation. The top end of column is restrained against translation but free for rotation. The effective length of column, as per IS : 800-2007 is

(1) 4.8 m   (2) 3.9 m

(3) 7.2 m   (4) 6 m

(5) Question not attempted

41. As per the provisions of IS : 800-2007, when battens are provided in compression members, the effective length of compression member is increased by

(1) 5%

(2) 10%

(3) 20%

(4) 0%

(5) Question not attempted

42. Which of the following is not a mode of failure of tension member as per IS : 800-2007 ?

(1) Gross section yielding

(2) Net section yielding

(3) Rupture of critical section

(4) Block shear failure

(5) Question not attempted

43. A simply supported T-beam roof section has the following particulars :

Thickness of slab : 100 mm

Width of rib : 300 mm

Depth of beam : 500 mm

Centre to centre distance of beams : 3000 mm

Effective span of beams : 6000 mm

What is the effective flange width of the T-beam ?

(1) 3000 mm

(2) 1900 mm

(3) 1600 mm

(4) 1500 mm

(5) Question not attempted

44. The maximum compression reinforcement in a doubly reinforcement beam of width 250, total depth 500, effective depth 460 mm, as per IS : 456-2000 should not exceed

(1) 5000 mm^2

(2) 4600 mm^2

(3) 7500 mm^2

(4) 6900 mm^2

(5) Question not attempted

45. The limiting depth of neutral axis for Fe 415 in limit state method is _____.

(1) 0.46d

(2) 0.48d

(3) 0.53d

(4) 0.42d

(5) Question not attempted

46. As per IS : 456-2000, the maximum compressive strain in concrete in axial compression only and no bending, is taken as _____.

(1) 0.002

(2) 0.0035

(3) 0.0035 minus 0.75 times the strain at the least compressed extreme fibre

(4) 0.004

(5) Question not attempted

47. A reinforced concrete member rectangular in cross-section of width b and depth D is subjected to combined action of bending moment M_u and torsional moment T_u. Equivalent shear force is calculated from the empirical relation as per IS 456 is given by

(1) $V_e = V_u + T_u\left(\dfrac{1+D/b}{1.7}\right)$

(2) $V_e = V_u + 1.6T_u/b$

(3) $V_e = V_u - T_u\left(\dfrac{1+D/b}{1.7}\right)$

(4) $V_e = V_u - 1.6T_u/b$

(5) Question not attempted

48. A doubly reinforced concrete beam has effective cover d' to the centre of compression reinforcement, x_u is the depth of neutral axis and d is the effective depth to the centre of tension reinforcement. What is the maximum strain in concrete at the level of compression reinforcement ?
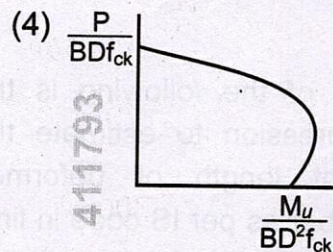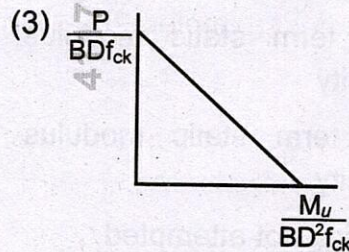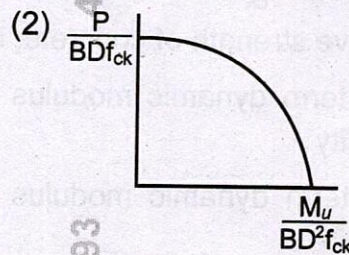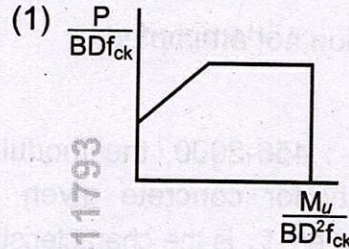
(1) $0.0035\left(1-\dfrac{d'}{d}\right)$

(2) $0.0035\left(1-\dfrac{d'}{x_u}\right)$

(3) $0.002\left(1-\dfrac{d'}{d}\right)$

(4) $0.002\left(1-\dfrac{d'}{x_u}\right)$

(5) Question not attempted

49. A rectangular reinforced column (B × D) has been subjected to uniaxial bending moment M and axial load P. Characteristic strength of concrete is f_{ck}. Which one among the following column design curve shows the relation between M and P qualitatively ?

(1)

(2)

(3)

(4)

(5) Question not attempted

50. The flexural strength of M25 concrete as per IS : 456-2000 is :

(1) 2.5 MPa   (2) 3.5 MPa

(3) 4.2 MPa   (4) 5.2 MPa

(5) Question not attempted

51. As per the provisions of IS : 1343-2012, the minimum grade of concrete required for design of pretensioned prestressed concrete members is _____.

(1) M25   (2) M30

(3) M35   (4) M40

(5) Question not attempted

52. As per IS : 456-2000, the modulus of elasticity for concrete given by $5000\sqrt{f_{ck}}$, where f_{ck} is the characteristics compressive strength of concrete, is

(1) Short term dynamic modulus of elasticity

(2) Long term dynamic modulus of elasticity

(3) Short term static modulus of elasticity

(4) Long term static modulus of elasticity

(5) Question not attempted

53. Which one of the following is the correct expression to estimate the development length of deformed reinforcing bar as per IS code in limit state design for tension reinforcement ?

(1) $\dfrac{0.87 f_y \phi}{4.5 \tau_{bd}}$ (2) $\dfrac{0.87 f_y \phi}{5 \tau_{bd}}$

(3) $\dfrac{0.87 f_y \phi}{6.4 \tau_{bd}}$ (4) $\dfrac{0.87 f_y \phi}{8 \tau_{bd}}$

(5) Question not attempted

54. The main reinforcement of a RC slab consists of 10 mm bars at 10 cm spacing. If it is desired to replace 10 mm bars by 12 mm bars, then the spacing of 12 mm bars should be

(1) 12 cm   (2) 14 cm

(3) 14.40 cm   (4) 16 cm

(5) Question not attempted

55. The horizontal component of hydrostatic force on a curved surface is equal to :

(1) Volume of liquid above the surface

(2) Weight of liquid on top

(3) Hydrostatic force on vertical projection

(4) Centroidal depth × surface area

(5) Question not attempted

56. The stability of a floating body increases with :

(1) Decrease in metacentric height (GM)

(2) Increase in metacentric height (GM)

(3) Decrease in distance between centre of buoyancy and centre of gravity (BG)

(4) Increase in centre of gravity (G)

(5) Question not attempted

57. Which type of manometer uses a heavy liquid like mercury and is suitable for high pressure measurement ?

(1) Inclined manometer

(2) Micro manometer

(3) U-tube manometer

(4) Inverted U-tube manometer

(5) Question not attempted

58. The assumption of zero viscosity in equation fluid flow leads to :

(1) Navier-Stokes equations

(2) Darcy's law

(3) Euler's equations

(4) Bernoulli's equation

(5) Question not attempted

59. Which of the following represents the Energy Gradient Line (EGL) in a pipe flow ?

(1) Line joining pressure heads

(2) Line above the pipe axis showing total head

(3) Line joining elevations

(4) Line joining stagnation points

(5) Question not attempted

60. The loss of head due to sudden enlargement is :

(1) Caused by vena contracta

(2) Due to friction only

(3) Due to separation and eddies

(4) Zero for incompressible fluids

(5) Question not attempted

61. Which parameter is kept constant for comparing the performance of different turbines using characteristic curves ?

(1) Head   (2) Discharge

(3) Power   (4) Cavitation

(5) Question not attempted

62. A Newtonian fluid in laminar shear flow between two plates shows a linear velocity distribution. The shear stress varies :

(1) Linearly with velocity

(2) Parabolically with distance

(3) Constant along the flow

(4) Linearly with distance from the stationary plate

(5) Question not attempted

63. The Navier-Stokes equations describe the motion of

(1) Solids under stress

(2) Elastic deformation of materials

(3) Viscous fluid substances

(4) Ideal gases in a vacuum

(5) Question not attempted

64. A submerged weir is one in which

(1) The water on the downstream side is below the crest level

(2) The water level downstream just touches the crest

(3) The water level downstream is above the crest level

(4) The water level downstream stands at the same level as that on the upstream side

(5) Question not attempted

65. Kinematic viscosity is defined as equal to

(1) Dynamic viscosity × density

(2) Dynamic viscosity / density

(3) Dynamic viscosity × pressure

(4) Density × pressure

(5) Question not attempted

66. In a Pelton wheel turbine, the maximum efficiency is obtained when the jet velocity is :

(1) Equal to the bucket speed

(2) Half the bucket speed

(3) Twice the bucket speed

(4) Zero

(5) Question not attempted

67. The bed form, which is not expected in an alluvial channel with sediment motion :

(1) Rippled   (2) Meandered

(3) Duned   (4) Anti-duned

(5) Question not attempted

68. If the field capacity of a soil is 25%, existing moisture content is 15%, and bulk density is 1.4 g/cm^3 with a root zone of 60 cm, the net irrigation depth is :

(1) 8.4 cm   (2) 9.0 cm

(3) 10.5 cm   (4) 11.2 cm

(5) Question not attempted

69. In canal systems, what is the most preferred method of running distributaries when water is insufficient ?

(1) Running all distributaries with reduced supply

(2) Simultaneous full supply to all canals

(3) Running distributaries turn by turn with full supply

(4) Prioritizing minor canals over majors

(5) Question not attempted

70. As per Lacey's regime theory, an irrigation channel is said to be in regime if some conditions are met. Which of the following conditions is incorrect for a regime channel ?

(1) Channel is flowing in unlimited incoherent alluvium of the same character as that transported.

(2) Silt grade is constant.

(3) Silt charge is constant.

(4) Discharge increases throughout the length of the channel.

(5) Question not attempted

71. The most critical hydraulic failure mode in earthen dams is :

(1) Hydraulic jump formation

(2) Overtopping

(3) Uplift at base

(4) Earthquake-induced displacement

(5) Question not attempted

72. A key advantage of a glacis fall over a vertical drop fall is :

(1) Simplicity of construction

(2) Suitability for very steep slopes

(3) Less energy dissipation

(4) Better energy dissipation due to hydraulic jump

(5) Question not attempted

73. Which one of the following is not a component of the hydrologic cycle ?

(1) Evapotranspiration

(2) Precipitation

(3) Radiation

(4) Infiltration

(5) Question not attempted

74. The maximum intensity of rainfall for a specified duration and return period is represented by :

(1) Hyeteograph

(2) Mass curve

(3) IDF curve

(4) Double mass curve

(5) Question not attempted

75. The flow-mass curve is an integral curve of

(1) The hydrograph

(2) The hyeteograph

(3) The flow duration curve

(4) The S-curve

(5) Question not attempted

76. The tipping bucket rain gauge is most suitable for :

(1) Measurement of snowfall

(2) Manual recording of storm rainfall

(3) Automatic recording of rainfall intensity

(4) Long-term average rainfall analysis

(5) Question not attempted

77. The rising limb of a hydrograph is primarily influenced by :

(1) Base flow

(2) Infiltration rate

(3) Surface runoff and rainfall intensity

(4) Evapotranspiration

(5) Question not attempted

78. A stage-discharge curve is typically used to :

(1) Measure sediment load

(2) Convert stage readings into discharge

(3) Derive velocity profiles

(4) Analyze channel geometry

(5) Question not attempted

79. In aerobic biological treatment, what is the typical method used to supply oxygen to the micro-organisms ?

(1) Sedimentation

(2) Mechanical Mixing

(3) Aeration

(4) Recirculation

(5) Question not attempted

80. Which of the following is considered a primary air pollutant ?

(1) Ozone (O_3)

(2) Peroxyacetylnitrate (PAN)

(3) Sulphur dioxide (SO_2)

(4) Formaldehyde

(5) Question not attempted

81. Which of the following pollutants is NOT considered in the calculation of the Air Quality Index (AQI) as defined by Central Pollution Control Board (CPCB) in India ?

   (1) Particulate Matter less than 2.5 microns

   (2) Carbon dioxide (CO_2)

   (3) Ozone (O_3)

   (4) Sulphur dioxide (SO_2)

   (5) Question not attempted

82. What type of anaerobic reactor is used in STPs to generate methane gas from sludge ? (STP – Sewage Treatment Plant)

   (1) Aeration tank

   (2) Sludge digester

   (3) Trickling filter

   (4) Biofilter

   (5) Question not attempted

83. Which empirical formula for fire demand is given as $Q = 3182 \times \sqrt{P}$, where P is population in thousands ?

   (1) Freeman's formula

   (2) National Board of Fire Underwriters formula

   (3) Kuichling's formula

   (4) Buston's formula

   (5) Question not attempted

84. As per the Ambient Air Quality Standards in respect of noise, Environment Protection Rules, 1986, the limit of noise in db (A) during the daytime, in commercial area is

   (1) 75   (2) 65

   (3) 55   (4) 50

   (5) Question not attempted

85. A 5 ml sewage sample was diluted to 500 ml for subjecting it BOD test. The concentration of dissolved oxygen in the sample before the beginning of the BOD test was 8 mg/L and after 5 days incubation at 20 °C, it was 4 mg/L. The BOD of raw sewage was _____.

   (1) 400 mg/L   (2) 600 mg/L

   (3) 800 mg/L   (4) 1200 mg/L

   (5) Question not attempted

86. A waste water treatment method is said to be facultative when

   (1) The treatment method is based on aerobic process.

   (2) The treatment method is based on anaerobic process.

   (3) Both the aerobic and anaerobic processes occur simultaneously in the treatment process.

   (4) Both the aerobic and anaerobic processes occur consecutively in the treatment process.

   (5) Question not attempted

87. What is a common sign of iron and manganese presence in drinking water ?

   (1) Colourless appearance

   (2) Excess alkalinity

   (3) Rusty or reddish stains

   (4) Turbidity decreases

   (5) Question not attempted

88. The efficiency of a sedimentation tank in removing particulate matter primarily depends on :

   (1) The velocity of the flow

   (2) The chemical composition of the pollutants

   (3) The height of the stack

   (4) The ambient temperature

   (5) Question not attempted

89. Zero hardness of water can be achieved by

   (1) Using lime-soda process

   (2) Excess lime treatment

   (3) Ion exchange method

   (4) Using excess alum dosage

   (5) Question not attempted

90. Which parameter measures the oxygen required to chemically oxidize both organic and inorganic matter in wastewater ?

   (1) Biochemical Oxygen Demand

   (2) Chemical Oxygen Demand

   (3) Dissolved Oxygen

   (4) Total Organic Carbon

   (5) Question not attempted

91. The ratio of 'flowing through period' to 'detention period' in a sedimentation tank is called :

   (1) Surface loading

   (2) Displacement efficiency

   (3) Theoretical efficiency

   (4) Settling velocity

   (5) Question not attempted

92. The process, which involves chlorination beyond breakpoint chlorination, is known as :

   (1) Pre-chlorination

   (2) Super chlorination

   (3) Post chlorination

   (4) De-chlorination

   (5) Question not attempted

93. As per India's Environment (Protection) Rules, 1986, what is the maximum permissible BOD limit for treated industrial effluents discharged into surface water bodies for 3 days at 27 °C ?

   (1) 10 mg/L   (2) 20 mg/L

   (3) 30 mg/L   (4) 50 mg/L

   (5) Question not attempted

94. A two lane road in plain terrain with design speed of 75 kmph has horizontal curve of radius 300 m. The rate of super-elevation to be adopted for the horizontal curve, taking three fourth of design speed, as per IRC : 86-2018, is

   (1) 0.070   (2) 0.074

   (3) 0.083   (4) 0.148

   (5) Question not attempted

95. The recommended land width for collector streets in urban areas for plain terrain as per IRC : 86-2018 is

(1) 10-15 m   (2) 15-30 m

(3) 30-45 m   (4) 45-60 m

(5) Question not attempted

96. What is the value of mechanical widening while a vehicle is negotiating a curve of radius 50.0 m with a wheel base of 7.0 m ?

(Take number of lanes = 1)

(1) 0.49 m   (2) 0.61 m

(3) 0.75 m   (4) 0.18 m

(5) Question not attempted

97. If a two-lane National Highway and a two-lane State Highway intersect at right angles, the number of potential conflicts points at the intersection, assuming that both the roads are two way is

(1) 11   (2) 17

(3) 24   (4) 32

(5) Question not attempted

98. What is the function of dowel bars in transverse contraction joints of rigid pavements ?

(1) Prevent vertical deflection

(2) Seal joints against water entry

(3) Allow thermal expansion

(4) Transfer load across the joint

(5) Question not attempted

99. According to IRC, the maximum permissible super-elevation in plain and rolling terrain is :

(1) 10%   (2) 7%

(3) 4%   (4) 6%

(5) Question not attempted

100. Which type of urban road is primarily intended to collect traffic from local streets and distribute it to arterial or sub-arterial roads ?

(1) Local Street

(2) Collector Street

(3) Arterial Road

(4) Urban Expressway

(5) Question not attempted

101. What is the maximum allowable water absorption of aggregates used in bituminous pavements ?

(1) 1%   (2) 1.5%

(3) 2%   (4) 2.5%

(5) Question not attempted

102. Which test is conducted to determine the ability of bitumen to stretch without breaking ?

(1) Softening Point Test

(2) Flash Point Test

(3) Penetration Test

(4) Ductility Test

(5) Question not attempted

103. The triangular warning sign indicating a right-hand curve is categorized under :

(1) Regulatory signs

(2) Informational signs

(3) Cautionary signs

(4) Guide signs

(5) Question not attempted

104. Which term describes the maximum number of vehicles that can pass a point under ideal roadway and traffic conditions ?

(1) Possible capacity

(2) Basic capacity

(3) Practical capacity

(4) Lane utilization rate

(5) Question not attempted

105. What is the loading gauge in the context of railway engineering ?

(1) The weight a track can carry

(2) The maximum height and width for rolling stock

(3) The track gauge width

(4) The total load on a bridge

(5) Question not attempted

106. What is the purpose of a **distant** signal in railway signalling ?

(1) To indicate the track speed ahead

(2) To give advance warning of the aspect of the next stop signal

(3) To control shunting operations

(4) To display the platform number

(5) Question not attempted

107. If the load, warping and frictional stresses in a concrete slab are 210 N/mm², 290 N/mm² and 10 N/mm² respectively, the critical combination of stresses during summer mid - night at the corner is

(1) 490 N/mm²   (2) 500 N/mm²

(3) 220 N/mm²   (4) 300 N/mm²

(5) Question not attempted

108. The range of camber to be provided for carriageways for thin bituminous surfacing for heavy rainfall areas, as per IRC : 86-2018 is

(1) 1.7%   (2) 2%

(3) 2.5%   (4) 3%

(5) Question not attempted

109. Which method of approximate estimation for building construction is based on total floor area ?

(1) Plinth area method

(2) Bay method

(3) Service unit method

(4) Item rate method

(5) Question not attempted

110. Which of the following statements is incorrect for Centre line method of estimation of quantities in a building ?

(1) The sum total length of centre lines of all walls has to be found out.

(2) For each cross junction, twice the width of the respective item is to be deducted from total length.

(3) For each T-junction, half the width of the respective item is to be deducted from total length.

(4) In the corners of the building where two walls are meeting, no deduction in length is needed.

(5) Question not attempted

111. Which one of the following methods is not used for calculation of earthwork in road construction ?

(1) Mid-sectional area method

(2) Plinth area method

(3) Prismoidal formula method

(4) Mean sectional area method

(5) Question not attempted

112. Which standard is followed for measurement of Building Works in a detailed estimate ?

(1) IS 875

(2) IS 1200

(3) IS 1893

(4) IS 456

(5) Question not attempted

113. Which type of estimate is required for obtaining technical sanction and execution of a contract ?

(1) Approximate Estimate

(2) Detailed Estimate

(3) Preliminary Estimate

(4) Budget Estimate

(5) Question not attempted

114. Which IS code given provisions for deductions in building estimation ?

(1) IS 456   (2) IS 875

(3) IS 1200   (4) IS 1893

(5) Question not attempted

115. How does the "lead and lift" factor impact the rate analysis of earthwork ?

(1) It determines the extra cost incurred due to the transportation of soil over a distance and its vertical lifting.

(2) It helps in calculating the cement requirement for RCC.

(3) It is used to determine the painting cost of walls.

(4) It affects only the labour cost, not the material cost.

(5) Question not attempted

116. A supplementary estimate is prepared when :

(1) Original work is completed under budget

(2) Project is cancelled

(3) Payment has been made

(4) Additional items not included in the original estimate

(5) Question not attempted

18

117. Which aggregate property significantly influences concrete's resistance to freezing and thawing cycles ?

(1) Particle shape

(2) Porosity and absorption

(3) Specific gravity

(4) Fineness modulus

(5) Question not attempted

118. Lime-cement mortar, also known as gauged mortar, is specially preferred for :

(1) Decorative pointing

(2) High-speed curing

(3) Improved water retentivity and frost resistance

(4) Fire resistance in chimneys

(5) Question not attempted

119. As per Indian standard, the maximum limit of slope of grain (cross grain) with reference to the longitudinal axis, for Grade I timber is

(1) 1 in 20

(2) 1 in 15

(3) 1 in 12

(4) 1 in 10

(5) Question not attempted

120. As per Indian standard for brickworks, when the salt deposit covers upto 50% of the exposed area of the brick, but accompanied by powdering or flaking of the surface, the liability to efflorescence shall be reported as

(1) slight   (2) moderate

(3) heavy   (4) serious

(5) Question not attempted

121. Which test is conducted to ensure that cement does not undergo excessive volume change after setting ?

(1) Fineness test

(2) Setting time test

(3) Soundness test

(4) Consistency test

(5) Question not attempted

122. Which of the following is not a factor affecting the selection of water content in concrete mix design ?

(1) Type of curing

(2) Aggregate size

(3) Cement type

(4) Workability

(5) Question not attempted

123. Which zone of fine aggregate requires the lowest volume of coarse aggregate in mix design ?

(1) Zone I   (2) Zone II

(3) Zone III   (4) Zone IV

(5) Question not attempted

124. As per IS-456, the assumed standard deviation for M30 grade concrete under good site control is :

(1) 4.0 N/mm^2 (2) 4.5 N/mm^2

(3) 5.0 N/mm^2 (4) 6.0 N/mm^2

(5) Question not attempted

125. Which admixture enhances the bond between new and old concrete surfaces ?

(1) Pozzolanic admixture

(2) Polymer-bonding agent

(3) Plasticizer

(4) Retarder

(5) Question not attempted

126. What is the primary function of the cavity in a cavity wall ?

(1) Reduce cost of construction

(2) Increase compressive strength

(3) Prevent passage of moisture

(4) Act as thermal mass

(5) Question not attempted

127. A queen closer is a brick cut

(1) Along the length

(2) Along the width

(3) Diagonally

(4) Into four equal parts

(5) Question not attempted

128. Which stone joint uses a tongue and groove to prevent sliding of stones ?

(1) Plugged joint (2) Table joint

(3) Joggle joint   (4) Butt joint

(5) Question not attempted

129. When the value of probability factor is equal to zero, the chances of completion of project in time are _____.

(1) 0   (2) 25%

(3) 50%   (4) 100%

(5) Question not attempted

130. What is the thumb rule relating the rise and going of a staircase, based on comfortable stride of a person, also known as Blondel's formula ?

(1) Rise + Going = 60 cm approximately

(2) 2 × Rise + Going = 60 cm approximately

(3) Rise + 2 × Going = 60 cm approximately

(4) Rise + 1.5 × Going = 60 cm approximately

(5) Question not attempted

131. Which of the following best describes an activity with zero float in a project network ?

(1) The activity is optional.

(2) The activity has buffer time.

(3) The activity lies on the critical path.

(4) The activity can be delayed without affecting the project.

(5) Question not attempted

132. Which type of door is most suitable for narrow openings and simple construction ?

(1) Flush door

(2) Framed and panelled door

(3) Battened and ledged door

(4) Louvered door

(5) Question not attempted

133. The wedge-shaped stones forming the arch are called

(1) Headers   (2) Voussoirs

(3) Ashlars   (4) Stretchers

(5) Question not attempted

134. The manual fire-extinguishing equipment used in building is filled with

(1) Water

(2) Sand

(3) Nitrogen

(4) Carbon dioxide

(5) Question not attempted

135. What is the main horizontal member in scaffolding that runs parallel to the wall ?

(1) Putlog   (2) Bridle

(3) Ledger   (4) Bracing

(5) Question not attempted

136. Pick out the incorrect statement.

(1) A transit theodolite is one in which the telescope can be transited or revolved through 180° in a vertical plane.

(2) Centering is the process to setting the theodolite exactly over the station mark.

(3) Theodolite is an instrument used for measurement of horizontal angles only.

(4) Swinging the telescope is the process of turning the telescope in horizontal plane.

(5) Question not attempted

137. In compass surveying, if there are no observational and instrumental errors, both the stations at which the readings are taken are considered to be free from local attraction in which one of the following conditions for each line surveyed ?

(1) Fore bearing – Back bearing = 0°

(2) Fore bearing – Back bearing = 180°

(3) Fore bearing + Back bearing = 0°

(4) Fore bearing + Back bearing = 360°

(5) Question not attempted

138. The magnetic needle of a prismatic compass is balanced on a pivot and aligned along :

(1) The true north direction

(2) The magnetic meridian

(3) The geographic equator

(4) The observer's meridian

(5) Question not attempted

139. In plane table surveying, resection by the three-point problem is most accurately performed using :

(1) Radiation method

(2) Lehmann's rule

(3) Bessel's graphical solution

(4) Tangential method

(5) Question not attempted

140. Which levelling method minimizes errors due to Earth's curvature and atmospheric refraction ?

(1) Differential levelling

(2) Profile levelling

(3) Reciprocal levelling

(4) Fly levelling

(5) Question not attempted

141. Which principle allows three-dimensional perception in aerial photographs ?

(1) Image rectification

(2) Perspective projection

(3) Relief displacement

(4) Stereoscopy using parallax

(5) Question not attempted

142. Which signal type is most commonly used by modern total station EDM (Electronic Distance Measurement) systems for precise distance measurement ?

(1) Ultrasonic pulse

(2) Infrared or modulated microwave carrier

(3) Laser beam with gyroscope

(4) Acoustic echo

(5) Question not attempted

143. A Geodimeter comes under which category of electronic distance measuring instruments ?

(1) Microwave instruments

(2) Visible light instruments

(3) Infrared instruments

(4) None of these

(5) Question not attempted

144. Relief displacement in aerial photography does not depend on which of the following factors ?

(1) Height of the object above ground

(2) Radial distance from the principal point

(3) Size of the object photographed

(4) Flying height of the camera above ground

(5) Question not attempted

145. Transit method of adjusting a traverse is preferred over Bowditch's method when :

(1) Linear measurements are more accurate than angular measurements.

(2) Angular measurements are more precise than the linear measurements.

(3) Traverse is open.

(4) Bearing are not available.

(5) Question not attempted

146. The following curve has the property that the rate of change of curvature is same as the rate of change of increase of superelevation :

(1) Reverse curve

(2) Compound curve

(3) Transition curve

(4) Vertical curve

(5) Question not attempted

147. Which part of the electromagnetic spectrum is used mainly for remote sensing operations ?

(1) X-ray

(2) Ultra-violet

(3) Infrared

(4) Gamma Ray

(5) Question not attempted

148. In a contour map, what is implied by a sudden change in the spacing of contour lines from wide to very close spacing ?

(1) Change from steep to gentle slope

(2) Change from valley to ridge

(3) Change from gentle to steep slope

(4) Change from depression to plain

(5) Question not attempted

149. The principle of stadia method states that the ratio of the perpendicular to the base is constant in similar _____.

(1) right angled triangles

(2) plane triangles

(3) isosceles triangles

(4) scalene triangles

(5) Question not attempted

150. For a closed traverse, which of the following relations is incorrect ?

(1) Sum of the latitudes is equal to zero

(2) Sum of the departures is equal to zero

(3) Closing error = $\sqrt{[(\text{Sum of latitudes})^2 + (\text{Sum of departures})^2]}$

(4) Relative error of closure = Closing error/area of traverse

(5) Question not attempted

2

रफ कार्य के लिए स्थान / SPACE FOR ROUGH WORK

02
24