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TR/TES/M/Civil-I/DIP-Gr.II/2026

Test Booklet Series

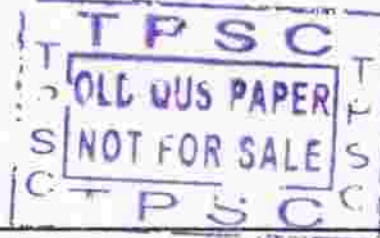
**TEST BOOKLET
CIVIL ENGINEERING
PAPER-I**

B

(Signature of the Candidate)

(Invigilator's Signature)

Time Allowed – 3 (three) hours



Maximum Marks – 200

INSTRUCTIONS

1. IMMEDIATELY BEFORE THE COMMENCEMENT OF THE EXAMINATION, YOU SHOULD CHECK THAT THIS TEST BOOKLET DOES NOT HAVE ANY UNPRINTED OR TORN OR MISSING PAGES OR ITEMS ETC. IF SO, GET IT REPLACED BY TEST BOOKLET OF SAME SERIES.
2. **ENCODE CLEARLY THE TEST BOOKLET SERIES IN THE OMR ANSWER SHEET ONLY IN THE APPROPRIATE PLACE IN THE ANSWER SHEET BY BLACK BALL POINT PEN ONLY.**
3. This Test Booklet is divided into three SECTION i.e., SECTION-A, SECTION-B and SECTION-C.
 - (A) **SECTION-A (MCQ Pattern)** contains 40 items (questions). Each question, carrying two (2) marks only, has four responses (answers). You will select the response which you want to mark on the OMR Sheet. In case you feel that there is more than one correct response, mark the response which you consider the most appropriate. In any case choose **ONLY ONE** response for each item.
 - (B) Questions under **SECTION-B (Conventional Method)** and **SECTION-C (Conventional Method)** are to be answered in separate Answer Book.
4. You have to mark all your responses of **SECTION-A by Black Ball Point Pen only** on the separate OMR Answer Sheet provided. See directions in the Answer Sheet.
5. Before you proceed to mark in the Answer Sheet the responses to various items of **SECTION-A** in the Test Booklet, you have to fill in some particulars in the Answer Sheet.
6. On completion of the Examination, you should handover the OMR Answer Sheet for **SECTION-A** and Answer Book for **SECTION-B & C** to the Invigilator only. You are permitted to take the Test Booklet with you.
7. Sheets for rough work are appended on the Test Booklet at the end.
8. **Instructions for wrong and multiple answer(s) SECTION-A :**
 - (a) There will be four alternatives for the answer to every question. However, there will be no negative marking for wrong answer.
 - (b) If a candidate gives more than one answer, it will be treated as a **Wrong Answer** even if one of the given answers happens to be correct.

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SECTION-A

2×40=80

- Answer all questions. Each question carries 2 marks.
- All Symbols have their usual meanings.

Example : Poise is the unit of

- (A) Surface tension (B) Buoyant force
 (C) Coefficient of viscosity (D) Gravitational force

Answer : (C) Coefficient of viscosity.

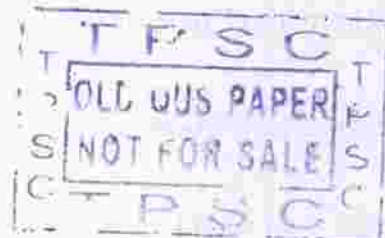
- Choose the correct answer from the four alternatives provided with each question and mark on the OMR Sheet.

1. If one end of hinged column is made fixed and the other free, how much is the critical load compared to the original value ?

- (A) One-fourth (B) One-half
 (C) Twice (D) Four times

2. With the increased value of plasticity index of a soil, the quantity of lime required for its stabilization will

- (A) Decrease
 (B) Increase
 (C) Remain unaffected
 (D) Sometime increase and sometime decrease



3. The contact pressure for a rigid footing resting on clay at the centre and the edges are respectively

- (A) Maximum and zero (B) Maximum and minimum
 (C) Zero and maximum (D) Minimum and maximum

4. As per IS 456-2000, what is the maximum free water to cement ratio of an M20 grade of reinforced concrete under mild exposure conditions ?

(A) 0.45

(B) 0.55

(C) 0.50

(D) 0.60

5. Log Angles machine is used to test the aggregate for

(A) Crushing strength

(B) Impact value

(C) Abrasion resistance

(D) None of these

6. King closures are related to

(A) doors and windows

(B) king post truss

(C) queen post truss

(D) brick masonry

7. The central part of a tree is called

(A) heart wood

(B) pith

(C) sap wood

(D) cambium layer

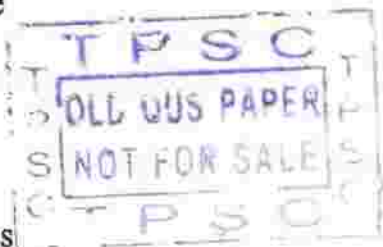
8. In case of stairs the vertical member between treads is known as

(A) flight

(B) ascend

(C) drop

(D) riser



9. Shear modulus, G is related to Young's modulus, E by the formula

(A) $E = 2G\left(1 + \frac{1}{m}\right)$

(B) $E = 2G\left(1 - \frac{1}{m}\right)$

(C) $E = 3G\left(1 + \frac{1}{m}\right)$

(D) $E = 3G\left(1 - \frac{1}{m}\right)$

10. Analysis of long columns is made by

(A) Rankine's theory

(B) Euler's theory

(C) Mohr's theory

(D) All of these

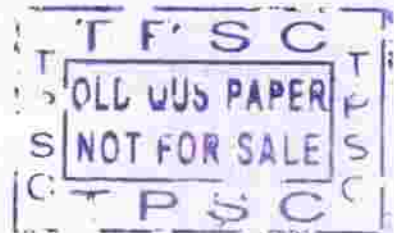
11. A simply supported beam with rectangular c/s is subjected to a central concentrated load. If the width and depth of the beam are doubled, then the deflection at centre of the beam will be reduced to

(A) 50%

(B) 25%

(C) 12.5%

(D) 6.25%



12. A bar of length, L m extends by 2 mm under a tensile force, P kg. The strain produced in the bar is

(A) $2/L$

(B) $0.2/L$

(C) $0.002/L$

(D) $0.0002/L$

13. The point of contraflexure is the point, where

(A) B. M. is maximum

(B) B. M. is minimum

(C) B. M. changes sign

(D) S. F. is zero

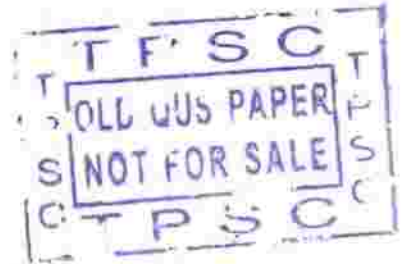
14. The maximum magnitude of shear stress due to shear force, F , on a rectangular section of area, A at the neutral axis is

(A) $\frac{F}{A}$

(B) $\frac{F}{2A}$

(C) $\frac{3F}{2A}$

(D) $\frac{2F}{3A}$



15. The B.M. diagram for a cantilever beam subjected to a couple at the free end of the beam would be

(A) rectangular

(B) triangular

(C) parabolic

(D) cubic parabolic

16. A propped cantilever with an overhang is indeterminate externally of

(A) first degree

(B) second degree

(C) third degree

(D) fourth degree

17. A shallow foundation is usually defined as a foundation which has

(A) depth less than 0.6m

(B) depth less than its width

(C) depth less than 1.0m

(D) None of these

18. Lime stabilisation is generally used for stabilizing

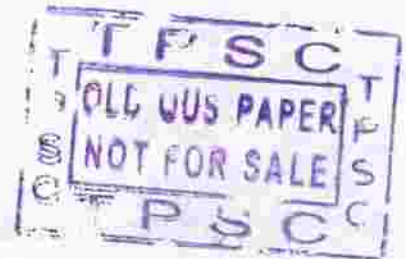
(A) gravels

(B) sands

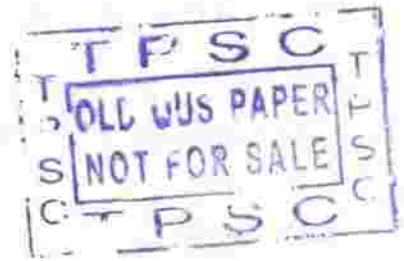
(C) clays

(D) All of these

19. The negative skin friction on a pile develops when
- (A) the soil in which it is driven is sandy soil
 - (B) the soil surrounding it settles more than the pile
 - (C) the ground water table rises
 - (D) the soil near the tip is clay
20. The stress developed at a point in the soil exactly below a point load at the surface is
- (A) proportional to the depth of point
 - (B) proportional to the square of the depth of point
 - (D) inversely proportional to depth of point
 - (D) inversely proportional to the square of the depth of point
21. The shrinkage of concrete is due to change in its
- (A) length
 - (B) cross-sectional area
 - (C) volume
 - (D) surface area
22. The separation of coarse aggregate from mortar during transportation is known as ____.
- (A) creeping
 - (B) segregation
 - (C) bulking
 - (D) bleeding



23. The strength of concrete mainly depends on
- (A) fineness of cement (B) quality of fine aggregates
(C) quality of coarse aggregates (D) water cement ratio
24. Shrinkage in concrete increases its
- (A) tensile strength (B) flexural strength
(C) bond strength (D) compressive strength
25. The useful liveable area of a building is also known as
- (A) carpet area (B) circulation area
(C) floor area (D) plinth area
26. For walls, columns and vertical faces of all structural members, the form work is generally removed after ____.
- (A) 24-48 hours (B) 3 days
(C) 7 days (D) 14 days
27. The phenomenon in which clay is made loose and any ingredient to be added to it is spread out on top and turned up and down in a vertical direction is known as ____.
- (A) Weathering (B) Blending
(C) Tempering (D) Cleaning



28. If the coefficient of active earth pressure is $1/3$, then what is the value of the coefficient of passive earth pressure ?

(A) $1/9$

(B) $1/3$

(C) 3

(D) 1

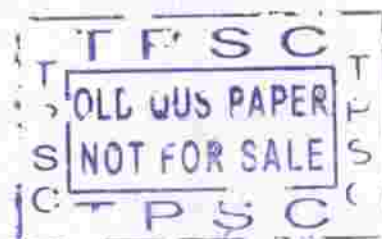
29. A cement bag contains 0.035 cubic meter of cement by volume. How many bags will five tonnes of cement comprise ?

(A) 80

(B) 40

(C) 100

(D) 20



30. What is the quantity of cement (in kg) and of dry sand (in cubic meter) respectively required for preparing 1 cubic meter of wet cement mortar of 1 : 5 proportion ?

(A) 312 and 1.08

(B) 270 and 1.00

(C) 290 and 1.04

(D) 290 and 1.00

31. M25 concrete with creep coefficient of 1.5, the long-term static modulus of elasticity (expressed in MPa) as per the provisions of IS:456-2000 is

(A) 25000

(B) 16666.67

(C) 5000

(D) 10000

32. When the deposits of efflorescence is not more than 10 percent of the exposed areas of brick, the presence of efflorescence is classified as

(A) Nil

(B) Moderate

(C) Serious

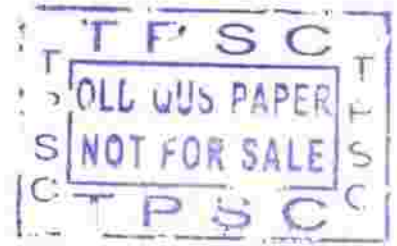
(D) Slight

33. The moisture content in a well-seasoned timber is

- (A) 4% to 6%
- (B) 10% to 12%
- (C) 15% to 20%
- (D) 100%

34. Marble is an example of

- (A) Igneous rock
- (B) Sedimentary rock
- (C) Metamorphic rock
- (D) Volcanic rock



35. Salvage value is defined as

- (A) Value of dismantled materials of a property at the end of its utility period
- (B) Estimated value of a built-up property at the end of its useful life without being dismantled
- (C) Value of the property shown in the account book in that particular year
- (D) Present value of a property considering it to be replaced at the current market rates

36. In which one of the following, the point of contraflexure will not occur ?

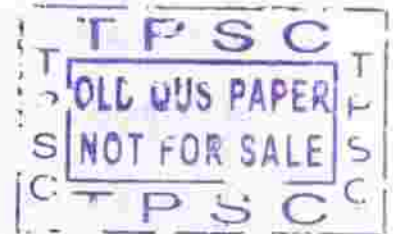
- (A) A two-span continuous beam of equal spans, simply supported and loaded by UDL over both spans
- (B) A fixed beam loaded by UDL
- (C) A propped cantilever loaded by UDL
- (D) A simply supported beam loaded by UDL

37. The shape of the bending moment diagram of a simply supported beam carrying linearly varying load is

- (A) Parabolic (B) Cubic curve
(C) Triangular (D) Linear

38. A beam of overall length l with equal overhangs on both sides carries a uniformly distributed load over the entire length. To have numerically equal bending moments at centre of the beam and at supports, the distance between the supports should be

- (A) $0.277 l$ (B) $0.403 l$
(C) $0.586 l$ (D) $0.707 l$



39. A beam has a triangular cross-section having base 40 mm and altitude 60 mm. If this section is subjected to a shear force of 36000 N, the maximum shear stress in the cross-section would be

- (A) 30 N/mm^2 (B) 45 N/mm^2
(C) 60 N/mm^2 (D) 15 N/mm^2

40. A simply supported beam has a uniform cross-section, with $b = 100 \text{ mm}$ and $d = 200 \text{ mm}$, throughout its length. The beam is subjected to a maximum bending moment of $6 \times 10^7 \text{ N-mm}$. What is the corresponding bending stress developed in the beam?

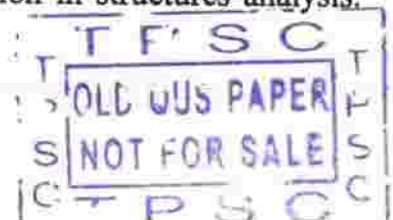
- (A) 30 N/mm^2 (B) 90 N/mm^2
(C) 60 N/mm^2 (D) 120 N/mm^2

SECTION – B

- Answer *all* questions. Each question carries 6 marks :

6×15=90

41. Draw stress-strain diagram for mild steel and mention salient points on the curve.
4+2=6
42. Explain two different tests required to be performed to ascertain the quality of bricks.
43. Explain ordinary bending and pure bending with example.
44. Explain various advantages and disadvantages of natural seasoning of timber.
45. Draw the shape of bending moment and shear force diagrams separately for
 - (a) cantilever beam and
 - (b) propped cantilever beam having same length carrying udl. and compare.
46. Distinguish between friction pile and end bearing pile. Briefly explain the functions, applications and characteristics of friction piles.
3+3=6
47. Define active earth pressure, passive earth pressure and earth pressure at rest. State the assumptions of Rankine's theory of active earth pressure.
4+2=6
48. Mention at least five requirements of a good stair with reference to the type of stair.
49. Enumerate the various causes of failure of foundation of a structure.
50. Explain the phenomenon of creep and the effect of creep in reinforced concrete structures.
3+3=6
51. Explain cube strength and cylinder strength in concrete and compare.
4+2=6
52. What is soil stabilisation ? State the various objectives of soil stabilisation. Distinguish between mechanical and chemical stabilisation of soil.
2+2+2=6
53. Briefly describe the concrete mix design procedure as per relevant IS code of practice.
54. What are the various factors affecting the workability of concrete ? Explain briefly.
55. Explain the principles of superposition and its application in structures analysis.

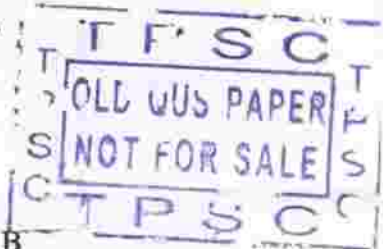
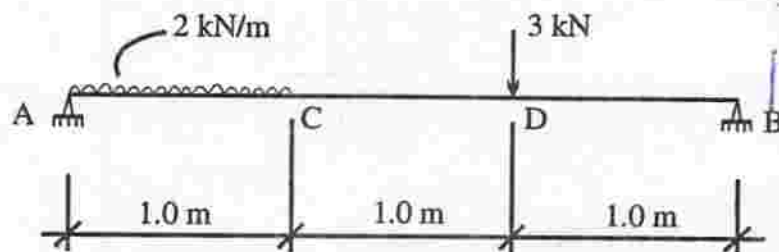


SECTION – C

- Answer *all* questions. Each question carries 6 marks :

$6 \times 5 = 30$

56. A simply supported homogeneous beam of rectangular cross-section of size 200 mm $\times$ 300 mm (depth) carries a uniformly distributed load of 6 kN/m over an effective span of 5m. Calculate the actual shear stress and bending stress at a point located at 1.0m from the left support and 50 mm above the neutral axis.
57. In the simply supported beam of AB of span 3m, an udl is acting for a length of 1m from left hand support A. A point load is acting at D, at a distance 1m from right hand support B. Draw shear force diagram and bending moment diagram for the beam with all values at salient points including maximum bending moment.



58. A hollow C_1 column whose outside diameter is 200 mm and has a thickness of 20 mm. It is 4.5m long and is fixed at the both ends. What is the safe load taken by column (use Rankine's formula and $FOS = 4$, $a = 1/1200$) ?
59. The ultimate load capacity of 10m long concrete pile of square cross-section 500 mm $\times$ 500 mm driven into a homogeneous clay layer having undrained cohesion value of 40 kPa is 700 kN. If the cross-section of the pile is reduced to 250 mm $\times$ 250 mm and the length of the pile is increased to 20m, then evaluate its ultimate load capacity.
60. Calculate the quantities of cement, sand and coarse aggregate for 40 cubic metre cement concrete having proportion 1:2:4. Assume appropriate data, if required for the purpose.