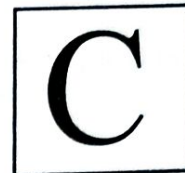


DO NOT OPEN THIS TEST BOOKLET TILL YOU ARE ASKED TO DO SO.

TR/TES/C-I/DIP/16

Test Booklet Series

TEST BOOKLET
CIVIL ENGINEERING PAPER – I
(DIPLOMA)



(Signature of the Candidate)

(Invigilator's Signature)

Time Allowed: 3 hours (Three hours)

Maximum Marks-200

I N S T R U C T I O N S

1. IMMEDIATELY AFTER 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 APPROPRIATE PLACE IN THE ANSWER SHEET BY BLACK BALL POINT PEN ONLY.
3. This Test Booklet is divided into three section, i.e Sections - A, Section - B & Section - C.
(A) Section -A (MCQ pattern) contains 40 items (questions). Each question, carrying 2 (two) 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. There shall be no negative marking for wrong / multiple answer.
(B) Questions under Section-B (Conventional Method) & 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 Answer Sheet provided. See directions in the Answer Sheet.
5. Before you proceed to answer the responses to various items in the Test Booklet, you have to fill in some particulars both in the Answer Sheet for Section-A and in the Answer Book for Section-B and Section-C.
6. On completion of the Examination, you should hand over the OMR Answer Sheet for Section-A & 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.

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SECTION -A

Answer all the following questions. Each question carries 2 marks. $2 \times 40 = 80$

Choose the correct answer from the four alternatives provided with each question and mark in the OMR answer sheet.

Example : The unit of measuring concrete work is

(A) sq m

(C) 10 sq m

☒ cum

(D) 10 cu m

1. The specific gravity of stone should not, in any case, be less than
 - (A) 1
 - (B) 1.5
 - (C) 2
 - (D) 2.5
2. A first class brick should have a minimum crushing strength of
 - (A) 7 MN/m²
 - (B) 10.5 MN/m²
 - (C) 12.5 MN/m²
 - (D) 14 MN/m²
3. The main constituent of Portland cement is
 - (A) lime
 - (B) alumina
 - (C) iron oxide
 - (D) alkalies
4. The final setting time of ordinary cement should not be more than
 - (A) 2 hours
 - (B) 4 hours
 - (C) 8 hours
 - (D) 10 hours
5. Which of the following statement is correct ?
 - (A) The sand used for making mortar should be fine.
 - (B) The rounded grains of sand produce a strong mortar.
 - (C) The mortar made with coarse sand is stronger than the one made with fine sand.
 - (D) All of the above.
6. The durability of concrete is proportional to
 - (A) Sand- cement ratio
 - (B) Water-cement ratio
 - (C) Cement-aggregate ratio
 - (D) Aggregate-water ratio

7. The slump test of concrete is used to measure its
 - (A) Consistency
 - (B) Tensile and compressive strength
 - (C) Impact value
 - (d) Homogeneity
8. A foundation consisting of thick reinforced concrete slab covering the entire area of the bottom of the structure, is known as
 - (A) pile foundation
 - (B) pier foundation
 - (C) raft foundation
 - (D) machine foundation
9. In combined footing
 - (A) depth of footing varies
 - (B) width of footing is uniform
 - (C) centre of gravity of the column loads must coincide with the centre of gravity of the footing
 - (D) all of the above
10. A type of bond in a brick masonry consisting of alternate course of headers and stretchers, is called
 - (A) English bond
 - (B) Flemish bond
 - (C) Stretching bond
 - (D) Heading bond
11. In stairs, the vertical portion of a step providing a support to the tread, is known as
 - (A) riser
 - (B) flier
 - (C) soffit
 - (D) pitch or slope
12. The cement which is commonly used in all types of structures and require no special consideration, is called
 - (A) rapid hardening cement
 - (B) normal setting cement
 - (C) quick setting cement
 - (D) white cement
13. Whenever some external system of forces acts on a body, it undergoes some deformation. As the body undergoes some deformation, it sets some resistance to the deformation. The resistance per unit area to deformation, is called
 - (A) strain
 - (B) stress
 - (C) pressure
 - (D) modulus of elasticity

14. When a body is subjected to two equal and opposite pulls, as a result of which the body tends to extend its length, the stress and strain induced is

- (A) compressive stress, tensile strain
- (B) tensile stress, compressive strain
- (C) tensile stress, tensile strain
- (D) compressive stress, compressive strain

15. The ratio of linear stress to the linear strain is called

- (A) modulus of rigidity
- (B) modulus of elasticity
- (C) bulk modulus
- (D) poisson's ratio

16. When a change in length takes place, the strain is known as

- (A) linear strain
- (B) lateral strain
- (C) volumetric strain
- (D) shear strain

17. Strain energy is the

- (A) energy stored in a body when strained within elastic limits
- (B) energy stored in body when strained upto the breaking of a specimen
- (C) maximum strain energy which can be stored in a body
- (D) proof resilience per unit volume of a material

18. The bending moment on a section is maximum where shear force is

- (A) minimum
- (B) maximum
- (C) changing sign
- (D) zero

19. A section of beam is said to be in pure bending, if it is subjected to

- (A) constant bending moment and constant shear force
- (B) constant shear force and zero bending moment
- (C) constant bending moment and zero shear force
- (D) none of the above

20. At the neutral axis of a beam

- (A) the layers are subjected to maximum bending stress
- (B) the layers are subjected to minimum bending stress
- (C) the layers are subjected to compression
- (D) the layers do not undergo any strain

21. The maximum unit pressure that a soil can withstand without rupture in shear or without excessive settlement of the structure is called

- (A) allowable bearing pressure
- (B) safe bearing capacity
- (C) ultimate bearing capacity
- (D) bearing capacity

22. The property of a soil which is of great importance in finding settlement of structures, is

- (A) permeability
- (B) shear strength
- (C) consolidation
- (D) compressibility

23. The ratio of the unit weight of soil solids to that of water is called

- (A) void ratio
- (B) porosity
- (C) specific gravity
- (D) degree of saturation

24. The void ratio of a soil is defined as the ratio of the

- (A) weight of water to the weight of solids
- (B) volume of water to the volume of voids in the soil mass
- (C) total volume of the voids to the volume of soil solids
- (D) total volume of voids to the total volume of soil

25. The lateral earth pressure exerted by the soil when the retaining wall moves into the soil, is known as

- (A) earth pressure at rest
- (B) active earth pressure
- (C) passive earth pressure
- (D) total earth pressure

26. The workability of concrete is defined as the

- (A) ease with which it can be mixed, transported and placed in position in a homogeneous state
- (B) breaking up of cohesion in a mass of concrete
- (C) separation of water or water-cement mixture from the freshly mixed concrete
- (D) none of the above

27. The continuous strain which the concrete undergoes due to application of external loads, is called
- (A) workability
 - (B) bleeding
 - (C) segregation
 - (D) creep
28. The steel mould used for slump test is in the form of a
- (A) cube
 - (B) cylinder
 - (C) frustrum of a cone
 - (D) none of these
29. If the slump of concrete mix is 70 mm, its workability is considered to be
- (A) very low
 - (B) low
 - (C) medium
 - (D) high
30. The construction joints in cement concrete
- (A) should be located where bending moment is large
 - (B) should be located where shear force is large
 - (C) should not be provided at the corners
 - (D) should be spaced at a distance of 3m apart in case of huge structures
31. The ratio of the volume of moist sand to the volume of dry sand is known as
- (A) crushing value
 - (B) impact value
 - (C) bulking factor
 - (D) none of these
32. If the fineness modulus of sand is 3, then the sand is graded as
- (A) very fine sand
 - (B) fine sand
 - (C) medium sand
 - (D) coarse sand
33. The controlled concrete is used for
- (A) one grade of concrete mix
 - (B) three grades of concrete mix
 - (C) five grades of concrete mix
 - (D) all the seven grades of concrete mix
34. When a body is subjected to three mutually perpendicular stresses, of equal intensity, the ratio of direct stress to the corresponding volumetric strain is known as
- (A) Young's modulus
 - (B) modulus of rigidity
 - (C) bulk modulus
 - (D) Poisson's ratio

35. When a load on the free end of a cantilever beam is increased, failure will occur

- (A) at the free end
- (B) at the fixed end
- (C) in the middle of the beam
- (D) at a distance $2L / 3$ from free end

36. The shear force diagram of a cantilever beam of length L and carrying a uniformly distributed load of W per unit length will be

- (A) a right angled triangle
- (B) an isosceles triangle
- (C) an equilateral triangle
- (D) a rectangle

37. When there is a sudden increase or decrease in shear force diagram between any two points, it indicates that there is a

- (A) point load at the two points
- (B) no loading between the two points
- (C) uniformly distributed load between the two points
- (D) uniformly varying load between the two points

38. When a cantilever beam is loaded at its free end, the maximum compressive stress shall develop at

- (A) bottom fibre
- (B) top fibre
- (C) neutral axis
- (D) centre of gravity

39. A first class brick should not absorb water more than % of its own dry weight after 24 hours immersion in cold water.

- (A) 10
- (B) 15
- (C) 20
- (D) 25

40. A good building stone is one which does not absorb more than % of its weight of water after one day's immersion.

- (A) 5
- (B) 10
- (C) 15
- (D) 25

Candidates are required to give their answers in their own words as far as practicable.

SECTION – B

Answer *all* the following questions.

Each answer is to be restricted to 40 words.

6×15 = 90

1. What is concrete ? Define the initial setting time of cement.
2. Describe the term 'Beam of Uniform Strength'. What is the common method of obtaining the beam of uniform strength?
3. Define Stress and Strain.
4. Describe Active Earth Pressure and Passive Earth Pressure.
5. What is Foundation ? Differentiate between Shallow Foundations and Deep Foundations.
6. What do you understand by Workability of Concrete ? What are the common factors which affect the Workability of Concrete ?
7. What is Singly Reinforced Beam ? Why Steel is generally used as reinforcement in RCC work ?
8. Define Bond Length of steel bar. Why it is important ?
9. What do you understand by Detailed Estimate? What are the importance of preparation of Detailed Estimate ?
10. How the area required for Isolated Column Footing is assessed ? What are the considerations for ascertaining the depth of Isolated Column Footing ?
11. Define Construction Planning. What are the methods of Construction Planning and Scheduling ?
12. Define Safe Bearing Capacity of Soil. What is its importance in designing the foundation of a structure ?
13. Define Pile Foundation. How the pile transfers the load to the soil ?

14. Why Damp Proofing is done in the building ? What are the general causes of dampness in a building?

15. Differentiate between Retaining Wall and Breast Wall.

SECTION - C

Answer the following questions.

6×5=30

1. A simply supported beam of length of L mm is loaded with uniformly distributed load of W N/mm over its entire length. Calculate the reactions, maximum bending moment and maximum shear force. Draw the bending moment and shear force diagram.
2. A hollow rectangular section is having outer width of 20 mm and depth of 12 mm and the inner width of 16 mm and depth of 9 mm. Calculate the moment of inertias both along 'X-axis' and 'Y-axis' passing through its centre.
3. A hollow circular mild steel column of external diameter 300 mm and internal diameter 250 mm carries an axial load of 1500 KN. Determine the compressive stress in the column. If the initial length of the column is 3.75m, find the decrease in length of the column. Take $E=2 \times 10^5$ N/mm².
4. A steel plate is bent into a circular arc of radius 10 metre. If the plate section be 120 mm wide and 20 mm thick, find the maximum stress induced and the bending moment which can produce this stress. Take $E = 2 \times 10^5$ N/mm².
5. A hollow steel cantilever pipe of 2.4 metre length and 100 mm outer diameter is to support two concentrated loads of 2.15 KN each placed at centre and free end of the cantilever pipe. Determine the minimum thickness of the pipe if the allowable bending stress is 160 N/mm².