

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

TR/TES(CV-II)/IV/15

**TEST BOOKLET
CIVIL ENGINEERING PAPER-II**

Test Booklet Series

B

Signature of the Candidate

Invigilator's Signature

Time allowed : 3 hours (Three hours)

Maximum Marks : 200

INSTRUCTIONS

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 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 sections i.e. **Section-A, Section-B and 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.
 - (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 hand over the OMR Answer Sheet for Section-A and Answer Book for Section-B and 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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All symbols have their usual meaning.

SECTION – A

Select the single best answer and mark on the OMR sheet.

40×2=80

1. The earth's water circulatory system is known as
(A) Air cycle
(B) Vapour cycle
(C) Hydrological cycle
(D) None of these
2. The ratio of plasticity index to flow index is called as
(A) Toughness index
(B) Float index
(C) Tipping index
(D) None of these
3. Transpiration is essentially confined to
(A) Evening hours
(B) Day-light hours
(C) Night hours
(D) None of these
4. Evaporation from water bodies and soil masses together with transpiration from vegetation is termed as
(A) Evapotranspiration
(B) Precipitation
(C) Infiltration
(D) None of these
5. The sum of the interior angles of a closed traverse of N sides is equal to
(A) $(N - 1) \times 180^\circ$
(B) $(N - 3) \times 180^\circ$
(C) $(2N - 1) \times 180^\circ$
(D) None of these
6. On a turning point
(A) only a back sight is taken
(B) only a foresight is taken
(C) both back sight and foresight are taken
(D) None of these
7. The latitude of a line is obtained by multiplying its length by
(A) $\tan \theta$
(B) $\sin \theta$
(C) $\cos \theta$
(D) None of these
8. The main principle of surveying is to work from
(A) Lower to the higher
(B) Whole to the part
(C) Part to the whole
(D) None of these

9. The angle of intersection of the mirrors in an optical square is
 - (A) 60°
 - (B) 45°
 - (C) 35°
 - (D) None of these
10. Blue baby disease is caused in children by the presence of
 - (A) Excess nitrates in water
 - (B) Excess chlorine in water
 - (C) Excess ammonia in water
 - (D) None of these
11. Imhoff cone is used to measure, in sewage
 - (A) Settleable solids
 - (B) Total organic solids
 - (C) Total solids
 - (D) None of these
12. The ratio of the difference between the voids ratio of the soil in its loosest state and its natural void ratio to the difference between the voids ratio in loosest and densest state, is called
 - (A) Void index
 - (B) Density index
 - (C) Porosity index
 - (D) None of these
13. A flat camber is sufficient on relatively impervious pavement surface like cement concrete or bituminous concrete. The value of flat camber is
 - (A) 5.5 to 7%
 - (B) 1.7 to 2%
 - (C) 7.5 to 10%
 - (D) None of these
14. Full form of ESWL is
 - (A) Equal single wheel load
 - (B) Equal surge wheel load
 - (C) Equivalent single wheel load
 - (D) None of these
15. Westergaard's for temperature stresses is related to
 - (A) Cement concrete pavement
 - (B) Flexible pavement
 - (C) Railway track
 - (D) None of these
16. Unit of Headway is
 - (A) Seconds
 - (B) Metre
 - (C) Metre / sec
 - (D) None of these

17. Full form of PCU is

- (A) Passenger car unit
- (B) Public call unit
- (C) Percentage correction unit
- (D) None of these

18. Standard axle load is

- (A) 50 KN
- (B) 60 KN
- (C) 70 KN
- (D) None of these

19. Full form of O-D survey is

- (A) Origin and departure survey
- (B) Orientation and distribution survey
- (C) Origin and destination survey
- (D) None of these

20. Unit of traffic volume is

- (A) vehicle
- (B) vehicle / km
- (C) vehicle / hour
- (D) None of these

21. Superelevation is calculated by

- (A) $\frac{V}{gR}$
- (B) $\frac{V^2}{gR}$
- (C) $\frac{V^2}{5R}$
- (D) None of these

22. Pelton turbine has

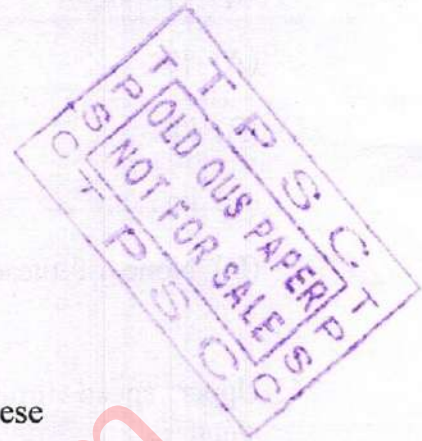
- (A) Horizontal shaft
- (B) Vertical shaft
- (C) Both horizontal and vertical shaft
- (D) None of these

23. Flow direction of water turbine (Francis turbine) is

- (A) Axial flow
- (B) Tangential flow
- (C) Radial inward flow or mixed flow
- (D) None of these

24. The propeller turbine is a reaction turbine used for

- (A) Low heads
- (B) High heads
- (C) Very high heads
- (D) None of these



25. C. B. R (California Bearing Ratio) is represented in
- (A) %
 - (B) kg
 - (C) kg / cm²
 - (D) None of these
26. Upper speed limit for regulation is equal to
- (A) 15th percentile speed
 - (B) 85th percentile speed
 - (C) 98th percentile speed
 - (D) None of these
27. A hydrograph is a plot of
- (A) Discharge against temperature
 - (B) Discharge against distance
 - (C) Discharge against speed
 - (D) None of these
28. Instrument 'River surveyor' is used to measure
- (A) Discharge
 - (B) Rainfall
 - (C) Speed
 - (D) None of these
29. Mass curves are commonly used to facilitate
- (A) Mass computation
 - (B) Acceleration computation
 - (C) Density computation
 - (D) None of these
30. Free board in a dam is
- (A) A type of shutter
 - (B) Name of storage
 - (C) Margin between water level and top of dam
 - (D) None of these
31. The relationship between void ratio, e and porosity, n is
- (A) $n = \frac{e}{1 - e}$
 - (B) $e = n (1 + e)$
 - (C) $e = \frac{1 + n}{1 - e}$
 - (D) None of these
32. The ratio of volume of air voids to the volume of voids, is called
- (A) Air content
 - (B) Void ratio
 - (C) Porosity
 - (D) None of these

33. The uniformity co-efficient of soil is defined as the ratio of

(A) $\frac{D_{10}}{D_{20}}$

(B) $\frac{D_{20}}{D_{30}}$

(C) $\frac{D_{60}}{D_{10}}$

(D) None of these

34. A soil having uniformity co-efficient less than 5 is called

(A) Uniform

(B) Well graded

(C) Heavy graded

(D) None of these

35. The plasticity index is

(A) Liquid limit – shrinkage limit

(B) Liquid limit – plastic limit

(C) Plastic limit – shrinkage limit

(D) None of these

36. The dimensions of co-efficient of permeability are

(A) cm

(B) gm/cm²

(C) cm/sec

(D) None of these

37. Boussinesq assumption for soil, in analysis of intensity of stress in foundation material is that the soil mass is

(A) Finite

(B) Infinite

(C) Semi-infinite

(D) None of these

38. The dimensionless bearing capacity factors in Terzaghi's analysis correspond to

(A) general shear failure

(B) local strain failure

(C) bending failure

(D) None of these

39. The Indian Roads Congress (IRC) came into existence in

(A) 1927

(B) 1943

(C) 1947

(D) None of these

40. The portion of the road surface, which is used by the vehicular traffic is known as

(A) Carriageway

(B) Shoulder

(C) Expressway

(D) None of these

SECTION – B

Answer *all* the questions.

Each answer is restricted to forty (40) words.

15×6=90

1. What is a flyover? What are its advantages and limitations in a city like Agartala ?
2. What is a contour line ? What is the importance of contour maps in civil engineering works ?
3. What are the different types of error in plane table surveying ? How would you minimise them ?
4. What are the essential features of an ideal highway alignment ?
5. What are the various uses of 'O' and 'D' studies in traffic surveys ?
6. What is a benchmark ? Describe different types of benchmarks.
7. What is meant by superelevation and why is it considered essential on curves ? What do you understand by side friction in this connection ?
8. Explain briefly the various design factors that are to be considered in rotary intersection design.
9. What is a unit hydrograph ? List the assumptions involved in the unit hydrograph theory.
10. What is Potential Evapotranspiration (PET) ? Write down the Thornthwaite formula to calculate PET.
11. Write short notes on 'Negative skin friction'.
12. A soil sample is a mixture of cohesionless and cohesive soils. Explain a method of determining the grain size distribution of the soil.

13. What do you understand by the term 'consistency' of a soil ? How do you express the consistency of a soil ?
14. Explain what do you mean by storage and pondage. Why are they required ?
15. Describe the classification of hydraulic turbines in different categories.

SECTION – C

Answer *all* the questions.

5×6=30

1. A 30m tape used for measuring a line was found to be 30.01m at the beginning and 30.03m at the end of the work. The area of the plan drawn to scale of 1 cm = 10m was measured with the help of a planimeter and was found to be 51.46 cm². Find the correct area of the field.
2. The infiltration capacity of soil in a small watershed was found to be 6 cm/h before a rainfall event. It was found to be 1.2 cm/h at the end of 8 hours of storm. If the total infiltration during the 8 hours period of storm was 15 cm, estimate the value of the decay co-efficient K_h in Horton's infiltration capacity equation.
3. A soil has a bulk unit weight of 20.11 KN/m³ and water content of 15 percent. Calculate the water content if the soil partially dries to a unit weight of 19.42 KN/m³ and the voids ratio remains unchanged.
4. In a locality where the rainfall is heavy, it is proposed to construct a Other District Road of W.B.M pavement, 3.8 metre wide, a Major District Road of bituminous concrete pavement, 7.0 metre wide and a State Highway of cement concrete pavement, 7.0 metre wide. Find out the crown with respect to the edges.
5. Calculate the set-back from an obstruction to the centre line of road, if the radius of centre line of road is 450m and the sight distance required is 300m. The length of curve is 250m.