32/2024

Booklet Serial No.

7302666

22/AE/CM/M–2024-06

Booklet Series

C

Question Booklet

CIVIL ENGINEERING – II

Paper – VI

Candidate's Roll Number

Time Allowed : 01 Hour

Maximum Marks : 100

Read the following instructions carefully before you begin to answer the questions.

IMPORTANT INSTRUCTIONS

1. This Question Booklet contains **50** questions in all.
2. **All** questions carry equal marks.
3. Attempt **all** questions.
4. An Answer Sheet has been supplied inside the question booklet to mark the answers. **You must write your Roll Number and encode it and write other particulars in the space provided in the Answer Sheet, failing which your Answer Sheet will not be evaluated.**
5. **Immediately after commencement of the examination, you should check up your Question Booklet and attached answer sheet and ensure that the Question Booklet Series is printed on the top left-hand corner of the Booklet and the series encoded in answer sheet are same. Also please check that the Booklet contains 12 printed pages including 2 pages (Page Nos. 11 and 12) for Rough Work and no page or question is missing or unprinted or torn or repeated or question booklet and answer sheet have different series. If you find any defect in this Booklet and attached answer sheet, get it replaced immediately by a complete Booklet with OMR sheet of the same series.**
6. You must write your Roll Number in the space provided on the top of this page. Do not write anything else on the Question Booklet.
7. Questions and their responses are printed in English version in this Booklet. Each question comprises of **four** responses — (A), (B), (C) and (D). You are to select ONLY ONE correct response and mark it in your Answer Sheet. In case you feel that there are more than one correct response, mark the response which you consider the best. In any case, choose ONLY ONE response for each question. Your total marks will depend on the number of correct responses marked by you in the Answer Sheet.
8. In the Answer Sheet, there are **four** circles — Ⓐ, Ⓑ, Ⓒ and Ⓓ against each question. To answer the questions, you are to mark with **Black/Blue ink ballpoint pen ONLY ONE circle** of your choice for each question. Select only one response for each question and mark it in your Answer Sheet. If you mark more than one circle for one question, the answer will be treated as wrong. **Use Black/Blue ink ballpoint pen only to mark the answer in the Answer Sheet. Any erasure or change is not allowed.**
9. You should not remove or tear off any sheet from the Question Booklet. You are not allowed to take this Question Booklet and the Answer Sheet out of the Examination Hall during the examination. **After the examination has concluded, you must hand over your Answer Sheet to the Invigilator**. Thereafter, you are permitted to take away the Question Booklet with you.
10. Failure to comply with any of the above instructions will render you liable to such action or penalty as the Commission may decide at their discretion.
11. Candidates must assure before leaving the Examination Hall that their Answer Sheets will be kept in Self Adhesive LDPE Bag and completely packed/sealed in their presence.

1. A canal is 80 km long and has an average surface width of 15 m. If the evaporation measured in a class A pan is 0.5 cm/day, the volume of water evaporated in a month of 30 days is (in m^3)

(A) 180000

(B) 18000

(C) 12600

(D) 126000

2. For a given specific energy E, the critical depth y_c for a rectangular channel is given by

(A) $y_c = 4/5E$

(B) $y_c = 2/3E$

(C) $y_c = 3/2E$

(D) $y_c = 3/4E$

3. A fall is constructed to

(A) Overcome surplus energy

(B) Destroy the surplus energy

(C) Create surplus energy

(D) Maintain surplus energy

4. Most efficient channel section is

(A) Rectangular

(B) Triangular

(C) Half hexagon in the form of trapezoid

(D) Semicircular

5. Which type of open well is suitable when the sub-soil is formed of gravel or coarse sand deposits ?

(A) Wells with impervious lining

(B) Wells with pervious lining

(C) Unlined wells

(D) Temporary wells

6. In distribution pipes, drain valves are provided at

(A) Junction points

(B) Higher point

(C) Lower point

(D) Any where

7. In deriving the equation for the hydraulic jump in a rectangular channel in terms of conjugate depths and initial Froude number

(A) Continuity and momentum equations are used

(B) Only continuity equation is used

(C) Energy and continuity equations are used

(D) Energy, momentum and continuity equations are used

8. In trapezoidal weir, sides are inclined outward with a slope of

(A) 1 : 6

(B) 1 : 5

(C) 1 : 4

(D) 1 : 3

9. The design period for a water supply project is taken as

(A) 15 to 20 years

(B) 10 to 15 years

(C) 5 to 10 years

(D) 20 to 30 years

10. Which of the following is false about rapid gravity type filters used for water purification ?

(A) Depreciation of plant is high

(B) Operational cost is high

(C) Skilled supervision is essential

(D) Coagulation is not essential

11. Which of the following represents Dicken's formula for peak discharge (in m^3/s) ? CD = Dickens constant, A = catchment area in km^2.

(A) $Q = C_D . A^{1/4}$

(B) $Q = C_D . A^{2/3}$

(C) $Q = C_D . A^{1/3}$

(D) $Q = C_D . A^{3/4}$

12. Which of the following statement is true about hydroelectric power plant ?

(A) Hydroelectric power plant has high running cost

(B) Due to non-uniform flow of water frequency control in such plants is very difficult

(C) Hydroelectric power plants are multipurpose

(D) Water is used as fuel in hydroelectric power plant

13. Soak pit shall ***not*** be less than

(A) 50 *cm*

(B) 90 cm

(C) 45 cm

(D) 100 cm

14. Which type of bacteria is used in trickling filters ?

(A) Anaerobic

(B) Nitrifying

(C) Facultative

(D) Blue-green bacteria

15. Which of the following zone in zoned type embankment prevents piping through cracks ?

(A) Outer zone

(B) Transition zone

(C) Central core

(D) Core wall

16. Which has the flexibility to turn 360° with the port axis ?

(A) Elbow connector

(B) Banjo connector

(C) Plug

(D) Reducer

17. Which of the following method is widely used in India for the computation of consumptive use ?

(A) Blaney – Criddle equation

(B) Tanks and Lysimeter

(C) Penman's equation

(D) None of the above

18. The hydraulic structure which controls the supply to an off-taking channel from the parent channel is

(A) Cross regulator

(B) Canal fall

(C) Distributary head regulator

(D) Canal escape

19. In designing Imhoff tanks, the usual retention period is

(A) 14 hours

(B) 8 hours

(C) 2 hours

(D) 20 hours

20. The bottom portion of concrete gravity dam is usually stepped in order to

(A) Increase tension at base of dam

(B) Increase shear strength at base of dam

(C) Increase resistance against overturning

(D) Strengthen the foundation

21. Which of the following method is used to forecast the population of old and very large city ?

(A) Graphical method

(B) Geometric progression method

(C) Arithmetical increase method

(D) Logistic curve method

22. What percentage camber must be provided for a CC road passing through low rainfall area ?

(A) 2.0%

(B) 2.5%

(C) 3.0%

(D) 1.7%

23. A direct runoff hydrograph due to a storm idealized into a triangular shape has a peak flow rate of 60 m^3/s occurring at 25 hours from its start. If the base width of this hydrograph is 72 hours, and the catchment area is 777.6 km^2, the runoff from the storm is

(A) 5 cm

(B) 2 cm

(C) 1 cm

(D) 10 cm

24. The highest CBR number is required for

(A) Sub base

(B) Sub grade

(C) Pavement

(D) Base

25. When the hydraulic jump is in a moving form it is called

(A) Turbulent surge

(B) Positive surge

(C) Negative surge

(D) Accelerated surge

26. An irrigation project is classified as a major project when the Culturable Command Area (CCA) involved in the project is more than

(A) 2000 hectares

(B) 10000 hectares

(C) 2500 hectares

(D) 5000 hectares

27. Which of the following is ***not*** a classification of traps based on their shape ?

(A) S-trap

(B) Q-trap

(C) P-trap

(D) W-trap

28. What is the cross sectional shape of shallow surface drains ?

(A) Rectangular

(B) Circular

(C) Triangular

(D) Trapezoidal

29. The effect of grade on safe overtaking sight distance is

(A) To increase it on both descending and ascending grades

(B) To decrease it on descending grades and to increase it on ascending grades

(C) To increase it on descending grades and to decrease it on ascending grades

(D) To decrease it on both descending and ascending grades

30. The interface treatment provided to plug in the voids of porous surfaces and to bond loose particles in bituminous pavements is called

(A) Prime coat

(B) Seal coat

(C) Tack coat

(D) Surface dressing

31. The basic mechanism behind the phenomenon of sediment transport is

(A) Free motion of the sediment particles

(B) Drag force in the direction of the flow

(C) Drag force opposite to the direction of the flow

(D) Force exerted by water vertically

32. The relation between Transmissibility (T) and Permeability (K) for an aquifer of depth d is

(A) $T = K.\log d$

(B) $T = K.d$

(C) $K = T.d$

(D) $T = \ln (Kd)$

33. In a barrage, the crest level is kept at

(A) High with no gates

(B) High with large gates

(C) Low with large gates

(D) Low with no gates

34. What is the purpose of a Travel Time and Delay Study ?

(A) To assess the quality of traffic movement

(B) For survey data

(C) To evaluate the traffic stream

(D) To assess the time taken to travel by various vehicles

35. If the value of rate of change of specific energy is 7.79×10^{-4} m and $S_f = 0.00013$, the value of bed slope is

(A) 1 in 1200

(B) 1 in 1100

(C) 1 in 1000

(D) 1 in 1300

36. The maximum thickness of expansion joint in rigid pavements is

(A) 50 mm

(B) 25 mm

(C) Zero

(D) 100 mm

37. What is the name of the wingwall if the angle of splay 90° ?

(A) Straight

(B) Return

(C) Splayed

(D) Tee abutment

38. When did spread foundation is adopted for bridges ?

(A) Good soil is not available at shallow depth

(B) Depth of water is more

(C) Good soil is available at shallow depth

(D) Tension developed is more

39. Out of 120 cm of water pumped into a canal, 80 cu m of water could be supplied to a field. 60 cu m of water was stored in the root zone while water required in root zone prior to irrigation was 80 cu m. The storage efficiency of irrigation is

(A) 100%

(B) 66.67%

(C) 75%

(D) 50%

40. _____ in a hydro power plant is used to discharge surplus water on the downstream side of a dam.

(A) Penstock

(B) Economizer

(C) Surge tank

(D) Spillway

41. As per IRC 37, the maximum volume of traffic (in a vehicle per hour) entering from all legs of the rotary intersection can be handled efficiently is

(A) 3000

(B) 2000

(C) 1000

(D) 5000

42. Which of the following conditions is the chief characteristic of critical flow ?

(A) $Q^2R/gA^3 = 1$

(B) $QT^2/gA^2 = 1$

(C) $Q^2T/gA^3 = 1$

(D) $Q^2T^2/gA^3 = 1$

43. The erosion between shoulder and pavement leads to

(A) Edge drop

(B) Break down

(C) Drop

(D) Flat drop

44. For roughing type trickling filters what would be the BOD removal rate ?

(A) 80 – 90%

(B) 60 – 90%

(C) 50 – 80%

(D) 40 – 70%

45. Which of the following test measures the toughness of road aggregates ?

(A) Crushing test

(B) Abrasion test

(C) Impact test

(D) Shape test

46. A watershed got transformed from rural to urban over a period of time. The effect of urbanization on storm runoff hydrograph from the watershed is to

(A) Decrease the time base

(B) Increase the time to peak discharge

(C) Decrease the volume of runoff

(D) Decrease the peak discharge

47. Aeration of water is done to remove

(A) Bacteria

(B) Colour

(C) Odour

(D) Hardness

48. An existing flexible pavement that develops extensive cracks is called

(A) Shear

(B) Ravelling

(C) Alligator cracks

(D) Pot hole

49. A detention basin for flood control is the one which is provided with

(A) Controlled outlet but uncontrolled spillways

(B) Uncontrolled outlet but controlled spillways

(C) Uncontrolled outlet and spillways

(D) Controlled outlet and spillways

50. Which of the following is a method used to estimate potential evapotranspiration ?

(A) Chezy's equation

(B) Manning's equation

(C) Hazen-Williams equation

(D) Thornthwaite equation