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

   (A) Surge tank

   (B) Spillway

   (C) Penstock

   (D) Economizer

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

   (A) Hydroelectric power plants are multipurpose

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

   (C) Hydroelectric power plant has high running cost

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

3. 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 m³)

   (A) 12600

   (B) 126000

   (C) 180000

   (D) 18000

   $$\frac{80 \times 1000 \times 15 \times 0.5 \times 3}{1000}$$

   $$1200 \times 150$$

   $$= 180000$$

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

   (A) Negative surge

   (B) Accelerated surge

   (C) Turbulent surge

   (D) Positive surge

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

   (A) $y_c = 3/2E$

   (B) $y_c = 3/4E$

   (C) $y_c = 4/5E$

   (D) $y_c = 2/3E$

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

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

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

   ✓(C) To increase it on both descending and ascending grades

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

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

   (A) Splayed

   ✓(B) Tee abutment

   (C) Straight

   (D) Return

8. Which of the following represents Dicken's formula for peak discharge (in m³/s) ? CD = Dickens constant, A = catchment area in km^2.

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

   ✓(B) $Q = C_D. A^{3/4}$

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

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

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

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

   (B) Force exerted by water vertically

   (C) Free motion of the sediment particles

   ✓(D) Drag force in the direction of the flow

10. A fall is constructed to

   (A) Create surplus energy

   (B) Maintain surplus energy

   (C) Overcome surplus energy

   (D) Destroy the surplus energy

11. The erosion between shoulder and pavement leads to

   (A) Drop

   (B) Flat drop

   (C) Edge drop

   (D) Break down

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

   (A) Energy and continuity equations are used

   (B) Energy, momentum and continuity equations are used

   (C) Continuity and momentum equations are used

   (D) Only continuity equation is used

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

   (A) Central core

   (B) Core wall

   (C) Outer zone

   (D) Transition zone

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

   (A) Uncontrolled outlet and spillways

   (B) Controlled outlet and spillways

   (C) Controlled outlet but uncontrolled spillways

   (D) Uncontrolled outlet but controlled spillways

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

   (A) To evaluate the traffic stream

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

   (C) To assess the quality of traffic movement

   (D) For survey data

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

    (A) Arithmetical increase method

    (B) Logistic curve method

    (C) Graphical method

    (D) Geometric progression method

17. Most efficient channel section is

    (A) Half hexagon in the form of trapezoid

    (B) Semicircular

    (C) Rectangular

    (D) Triangular

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

    (A) Plug

    B) Reducer

    (C) Elbow connector

    (D) Banjo connector

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

    (A) 2500 hectares

    (B) 5000 hectares

    (C) 2000 hectares

    (D) 10000 hectares

20. 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 1000

    (B) 1 in 1300

    (C) 1 in 1200

    (D) 1 in 1100

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

    (A) Distributary head regulator

    (B) Canal escape

    (C) Cross regulator

    (D) Canal fall

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

    (A) Alligator cracks

    (B) Pot hole

    (C) Shear

    (D) Ravelling

23. 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) 75%

    (B) 50%

    (C) 100%

    (D) 66.67%

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

    (A) Zero

    (B) 100 mm

    (C) 50 mm

    (D) 25 mm

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

    (A) Facultative

    (B) Blue-green bacteria

    (C) Anaerobic

    (D) Nitrifying

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

    (A) 1 : 4

    (B) 1 : 3

    (C) 1 : 6

    (D) 1 : 5

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

    (A) Unlined wells

    (B) Temporary wells

    (C) Wells with impervious lining

    (D) Wells with pervious lining

28. Aeration of water is done to remove

(A) Odour

(B) Hardness

(C) Bacteria

(D) Colour

29. 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) 1000

(B) 5000

(C) 3000

(D) 2000

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

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

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

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

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

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

(A) Hazen-Williams equation

(B) Thornthwaite equation

(C) Chezy's equation

(D) Manning's equation

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

(A) Skilled supervision is essential

(B) Coagulation is not essential

(C) Depreciation of plant is high

(D) Operational cost is high

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

(A) 5 to 10 years

(B) 20 to 30 years

(C) 15 to 20 years

(D) 10 to 15 years

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

(A) Impact test

(B) Shape test

(C) Crushing test

(D) Abrasion test

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

(A) 50 – 80%

(B) 40 – 70%

(C) 80 – 90%

(D) 60 – 90%

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

(A) 3.0%

(B) 1.7%

(C) 2.0%

(D) 2.5%

37. Soak pit shall *not* be less than

(A) 45 cm

(B) 100 cm

(C) 50 cm

(D) 90 cm

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

(A) Low with large gates

(B) Low with no gates

(C) High with no gates

(D) High with large gates

39. 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 volume of runoff

(B) Decrease the peak discharge

(C) Decrease the time base

(D) Increase the time to peak discharge

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

(A) 2 hours

(B) 20 hours

(C) 14 hours

(D) 8 hours

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

(A) Blaney – Criddle equation

(B) Penman's equation

(C) Tanks and Lysimeter

(D) None of the above

42. The highest CBR number is required for

(A) Pavement

(B) Base

(C) Sub base

(D) Sub grade

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

(A) P-trap

(B) W-trap

(C) S-trap

(D) Q-trap

44. In distribution pipes, drain valves are provided at

(A) Lower point

(B) Any where

(C) Junction points

(D) Higher point

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

(A) Triangular

(B) Trapezoidal

(C) Rectangular

(D) Circular

46. When did spread foundation is adopted for bridges ?

   (A) Good soil is available at shallow depth

   (B) Tension developed is more

   (C) Good soil is not available at shallow depth

   (D) Depth of water is more

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

   (A) Increase resistance against overturning

   (B) Strengthen the foundation

   (C) Increase tension at base of dam

   (D) Increase shear strength at base of dam

48. 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) 1 cm

   (B) 10 cm

   (C) 5 cm

   (D) 2 cm

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

   (A) Tack coat

   (B) Surface dressing

   (C) Prime coat

   (D) Seal coat

50. The relation between Transmissibility (T) and Permeability (K) for an aquifer of depth d is
   (A) $K = T.d$

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

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

   (D) $T = K.d$