TPSC JE

Previous Year Paper
(Civil)(Diploma) Paper-II
2013

TR/TES/C-II/V(B)/13

CIVIL ENGINEERING

Paper : II

Grade : V(B) – Diploma

Full Marks – 200

Time – Three hours

The figures in the margin indicate full marks for the questions.

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

GROUP – A

Answer *all* the questions.   6×15=90

Answer for each question should be restricted to 40 words.

1. (a) What is reconnaissance survey ?

   (b) What is the fundamental difference between prismatic compass and the surveyor's compass ?

   (c) What do you mean by azimuth ?   2×3=6

[Turn over

2. (a) What do you mean by the 'fiducial edge' of the alidade ?

   (b) How will you continue levelling across a river ?

   (c) Define the terms 'contour interval' and 'horizontal equivalent'.   2×3=6

3. (a) What do the terms 'face left' and 'face right' mean ?

   (b) What is a 'planimeter' ?

   (c) What are the methods of plane tabling ?
                                                       2×3=6

4. (a) What is meant by minimum required sight distance ?

   (b) State reasons for the following :

      (i) Transit curves are provided on both sides of a circular curve on a railway track, and

      (ii) The gauge of a railway track is widened on sharp curves.   2+(2+2)=6

5. (a) What is the function of 'points and crossings' ?

   (b) Distinguish between A class, B class, C class stations as classified in Indian Railway from operational point of view.   2+4=6

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6. (a) What are the agencies responsible for construction and maintenance of highways on India ?

(b) What is sub-soil drainage and how is it provided ? 4+2=6

7. (a) List the name of :

(i) the different forms of air pollutants generated by man made activities, and

(ii) the adverse effects of air pollution.

(b) Describe the Green house effect on the environmental changes. (2+1)+3=6

8. (a) Write down the name of different parts of an Incinerator.

(b) What are the steps generally adopted in the disposal of refuse by sanitary landfill method ? 2+4=6

9. (a) Mention the various impurities in water which should be taken into account in deciding the potabilitity of water.

(b) Why turbidity in water is considered objectionable ? What is the unit of turbidity ?

(c) What is meant by pH value of water ? How is it measured ? 1+(2+1)+(1+1)=6

10. (a) What is hydraulic gradient ?

(b) Distinguish between laminar flow and turbulent flow in pipes.

(c) What is siphon ? Where is it used ?

$2 \times 3 = 6$

11. (a) What do you understand by

(i) steady and unsteady flow ;

(ii) uniform and non-uniform flow in the case of channels ?

(b) What is Chezy's formula ? $(2+2)+2=6$

12. Define the following terms (in case of fluid) :

(i) Intensity of pressure

(ii) Pressure head

(iii) Atmospheric pressure

(iv) Absolute pressure

(v) Gauge pressure and

(vi) Vacuum pressure. $1 \times 6 = 6$

13. (a) Define :

    (i) Evaporation

    (ii) Transpiration and

    (iii) Evapo-transpiration

(b) What is hydrograph ?

(c) Write down the name of indirect methods for estimating run off.   (1+1+1)+1+2=6

14. Write in brief about the causes of waterlogging and development of high water table.   6

15. Write down the name of :

    (i) beneficial effects of irrigation in agriculture and

    (ii) harmfull effects of faulty and excess irrigation on crop plants.   3+3=6

GROUP – B

Answer *all* the questions.   2×40=80

Choose the correct answers from each of the following questions having four alternatives.

1. In chain survey the area is divided into

    (a) rectangles   (b) triangle

    (c) squares   (d) circles

2. In an optical square, the mirrors are fixed at an angle of

(a) 30°

(b) 60°

(c) 45°

(d) 90°

3. Open traverse is suitable in the survey of

(a) ponds

(b) hills

(c) rivers

(d) estates

4. In plane table survey, the operation which must be carried out, is

(a) resection

(b) orientation

(c) intersection

(d) radiation

5. The surface of still water is considered to be

(a) level

(b) horizontal

(c) smooth

(d) None of these

6. The line joining points of equal elevation is known as a

(a) horizontal line

(b) contour line

(c) contour gradient

(d) level line

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7. A theodolite in which the telescope can be revolved through a complete revolution in a vertical plane is known as a

(a) non-transit theodolite

(b) tilting theodolite

(c) transit theodolite

(d) All the above

8. In Simpson's formula, the number of ordinates must be

(a) even   (b) odd

(c) either even or odd   (d) None of these

9. The flow of water in a porous media

(a) can be turbulent also

(b) is always turbulent

(c) is always laminar

(d) is mostly turbulent

10. Which source of water among the following is not a surface source ?

(a) river

(b) well

(c) lake

(d) ocean

11. The average annual rainfall in India is a figure obtained by taking average over a period of

(a) 10 years

(b) 25 years

(c) 35 years

(d) 50 years

12. Ground water is usuallly free from

(a) suspended impurities

(b) dissolved impurities

(c) both suspended and dissolved impurities

(d) neither suspended nor dissolved impurities

13. 'Safe water' is one, which does not contain

(a) pathogenic bacteria (b) turbidity

(c) any colour

(d) any taste

14. Which of the following values of pH represents stronger acid ?

(a) 2

(b) 5

(c) 7

(d) 10

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(8)

850

15. The settling velocity of inorganic particles in a sedimentation tank of a water treatment plant is governed by

(a) Darcy's law

(b) Stokes law

(c) Dupuit's law

(d) None of these

16. In fluids, steady flow occurs when

(a) conditions of flow change steadily with time

(b) conditions of flow do not change with time at a point

(c) conditions of flow remain the same at adjacent point

(d) velocity vector remains constant at a point

17. The most efficient channel section, is

(a) semi-circular

(b) rectangular

(c) triangular

(d) half hexagon in the form of trapezoid

18. The instrument used for measuring the velocity of flow, is known as

(a) venturimeter

(b) orifice meter

(c) pitot tube

(d) None of these

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(9)

[Turn over

19. Energy equation is usually applicable to

   (a) non-uniform flow

   (b) turbulent flow

   (c) laminar flow

   (d) steady flow

20. The velocity of the fluid particle at the centre of the pipe section, is

   (a) minimum   (b) maximum

   (c) equal throughout   (d) None of these

21. Falling drops of water become spheres due to

   (a) adhesion   (b) cohesion

   (c) surface tension   (d) viscosity

22. Water belongs to

   (a) Newtonian fluids

   (b) Non-Newtonian fluids

   (c) Compressible fluids

   (d) None of these

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23. The digested sludge from septic tanks, is generally removed after a maximum period of

(a) 3 years   (b) 3.5 years

(c) 4 years   (d) 5 years

24. In a canal syphon, flow is

(a) under atmospheric pressure

(b) pipe flow

(c) with critical velocity

(d) under negative pressure

25. Irrigation canals are generally aligned along

(a) ridge line   (b) contour line

(c) valley line   (d) straight line

26. The depth of rice root zone, is

(a) 50 cm   (b) 60 cm

(c) 80 cm   (d) 90 cm

27. For standing crops in undulating sandy fields, the best method of irrigation, is

(a) sprinkler irrigation (b) free flooding
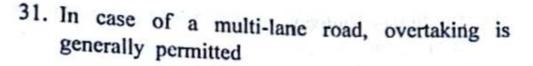
(c) check method   (d) furrow method

28. The measure to remove water logging of land, is

   (a) to reduce percolation from canals and water courses

   (b) to increase to outflow from the ground water reservoir

   (c) both (a) and (b)

   (d) neither (a) nor (b)

29. Useful soil moisture for plant growth, is

   (a) capillary water

   (b) gravity water

   (c) hydroscopic water

   (d) chemical water

30. In water bound macadam roads, binding material to hold stones, is

   (a) sand

   (b) stone dust

   (c) cement

   (d) brick dust

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31. In case of a multi-lane road, overtaking is generally permitted

   (a) from right

   (b) from left

   (c) from both right and left sides

   (d) None of these

32. Gauge of a permanent way, is

   (a) minimum distance between running faces of rails

   (b) minimum distance between outer faces of rails

   (c) distance between centres of rails

   (d) width of formation

33. Minimum gradient in station yard is generally limited to

   (a) 1 in 1000   (b) 1 in 750

   (c) 1 in 500   (d) zero

34. Arrangement made to divert the trains from one track to another, is known as

   (a) railway point   (b) railway crossing

   (c) turnout   (d) railway junction

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35. On Indian Railways standard length of rails for B.G. track, is

(a) 10.06m
(b) 10.97m

(c) 11.89m
(d) 12.8m

36. Minimum stopping distance for moving vehicles on road with a design speed of 80 km/hour, is

(a) 80m
(b) 100m

(c) 120m
(d) 150m

37. The convexity provided to the carriageway between the crown and edge of the pavement, is known
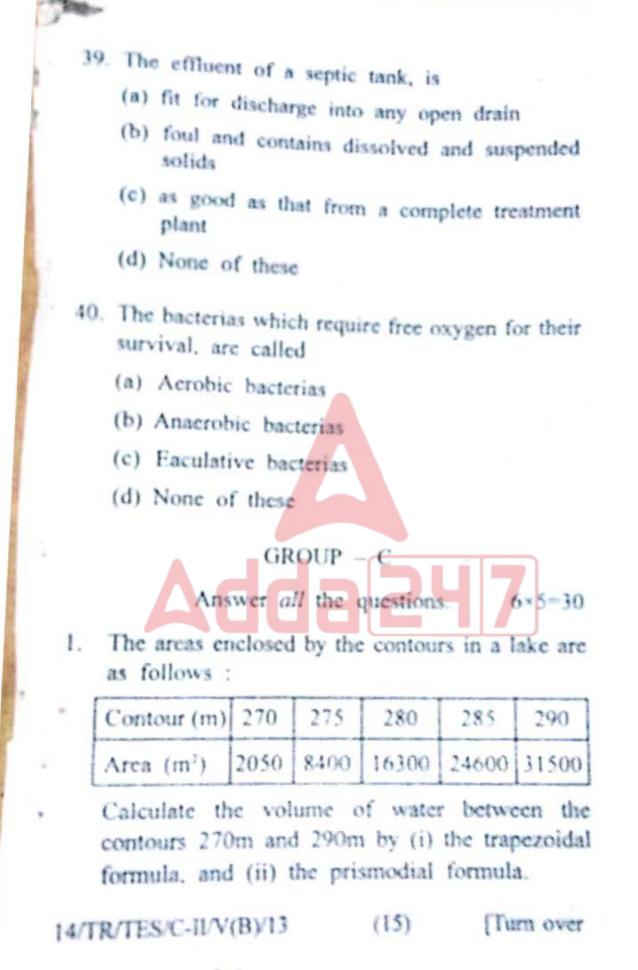
(a) super-elevation

(b) camber

(c) height of the pavement

(d) None of these

38. Hydrology is the science which deals with
(a) rain water
(b) river water
(c) flood water
(d) surface and underground water

39. The effluent of a septic tank, is

    (a) fit for discharge into any open drain

    (b) foul and contains dissolved and suspended solids

    (c) as good as that from a complete treatment plant

    (d) None of these

40. The bacterias which require free oxygen for their survival, are called

    (a) Aerobic bacterias

    (b) Anaerobic bacterias

    (c) Faculative bacterias

    (d) None of these

GROUP – C

Answer *all* the questions.   6×5=30

1. The areas enclosed by the contours in a lake are as follows :

Contour (m)	270	275	280	285	290
Area (m²)	2050	8400	16300	24600	31500

Calculate the volume of water between the contours 270m and 290m by (i) the trapezoidal formula, and (ii) the prismodial formula.

2. (a) Estimate the water requirement of a wheat crop of 130 days duration when the duty of water for the crop is 2496 ha.

    (b) Calculate the time required to irrigate a check basin of 20m long and 15m wide to a depth of 5 cm with a stream of 15 lit/sec.

3. What is the equilibrium cant on a 2 degree curve on a broad gauge if 15 trains, 10 trains, 5 trains and 2 trains are running at speeds of 50 kmph, 60 kmph, 70 kmph and 80 kmph respectively ?

4. For a constant specific energy of 1.8 kg-metre / kg, calculate the maximum discharge that may occur in a rectangular channel 5m wide.

5. A pipeline 22.5 cm in diameter and 1580m long has a slope of 1 in 200 for the first 790m and 1 in 100 for the next 790m. The pressure at the upper end of the pipeline is 1.1 kg/cm² and at the lower end is 0.55 kg/cm². Taking $f = 0.032$, determine the discharge through the pipe.