CIVIL ENGINEERING PAPER–II

Time Allowed : 3 hours   FM : 100   PM : 40

Marks for each question is indicated against it.
Attempt all questions.

1. Laminar and turbulent flows can be characterised and quantified using a number **(1+2=3)**
    (a) What is the Number?
    (b) In a pipe flow, apart from the Kinematic viscosity, what other parameters have to be known in order to derive this Number?

2. (a) Establish a Co-relation between Dynamic Viscosity and Kinematic Viscosity.
    (b) What is the unit of Kinematic Viscosity in SI system? **(1+1=2)**

3. In open channel flow, Hydraulic radius is a ratio of two quantities. Name them. **(1+1=2)**

4. Using Manning's equation for open channel flow,determine normal discharge for a 100 mm inside diameter RCC H/Pipe running half-full if the slope drops 1m over 1000m (Take Manning's co-efficient for RCC=0.015). **(5)**

5. (a) What is the standard size of brick in India in metric units as per recommendation of BIS?
    (b) What is the nominal size of the modular brick in the same unit? **(1+1=2)**

6. What is the minimum and maximum height of each course in a coursed rubble stone masonry as per CPWD specification? **(1+1=2)**

7. List the various factors affecting bearing capacity of **(2+2=4)**
    (a) granular soils   (b) cohesive soils

8. Give a brief definition of Sedimentation, Coagulation, Flocculation and Filtration in Water Treatment Processes. **(4)**

9. (a) Briefly describe the importance of water cement ratio in cement concrete.
    (b) Name any 4 different types of Cement available in India. **(2+2=4)**

10. (a) What is the type of Cement most widely available and used in civil engineering constructions in Mizoram?
    (b) Conc. HCl and HBr Tests are used to detect impurities and adulteration in a particular type of Cement available in Mizoram. Name the type.
    (c) What is the role of plasticisers in Cement concrete works? **(1+1+1=3)**

11. Give the   **(1+1+1=3)**

    (a) Minimum Grade of Concrete

    (b) Maximum free water cement ratio

    (c) Minimum Cement Content in kg/cum for Reinforced Cement Concrete Structures for storage of liquids

    as per Indian Standards.

12. Give the Minimum percentage of reinforcement in walls, floors, roofs in each of two directions at right angles within each surface zone for   **(1+1+1=3)**

    (a) HYSD bars

    (b) MS bars

    (c) Maximum spacing of bars for Reinforced Cement Concrete Structures for storage of liquids

    as per Indian Standards.

13.   (a) What are the basic assumptions of Rational Method of design of storm water drain?

    (b) The flow times required for storm water to reach point B for different droplets of water are 1 minute, 3 minutes and 4 minutes. The flow time from point B to C is 4 minutes. Assuming an Inlet time of 10 minutes, Calculate the time of concentration at point C.   **(2+3=5)**

14.   (a) Write and explain the hydraulic formulae for velocity of sewage flow in sewers under gravity.

    (b) What are the self cleansing and non-scouring velocities commonly adopted for sanitary cement concrete sewers?   **(2+2=4)**

15.   (a) List the various materials used for Sewers.

    (b) Describe with a neat sketch the various shapes of Sewers.   **(2+4=6)**

16.   (a) Describe the factors necessitating the location of a lamp-hole in a sewer system.

    (b) Describe the reasons for excluding grease and oil from the sewage in a sewer.   **(2+2=4)**

17. Briefly give reasons for the necessity of pumping Sewage.   **(2)**

18.   (a) What is Biochemical Oxygen Demand?

    (b) How will BOD behave if there is increase in the following water properties viz temperature, pressure and salinity? What is the basic difference between aerobic and anaerobic bacteria?   **(2+3+1=6)**

19. Write short notes on   **(2+2+2=6)**

    (a) Oxygen sag curve   (b) Sewage farming

    (c) Chlorination of sewage

20. Write short notes on   **(2+2=4)**

    (a) the role of grit chambers.

    (b) the Secondary treatment process of a typical Sewage Treatment Plant.

21. What is Oxidation Pond? Design a Septic tank for 20 users.   **(2+6=8)**

22.   (a) What is Incineration?

    (b) List the different types of Incinerators

    (c) What is pyrolysis?   **(2+3+1=6)**

23. Define   **(2+2=4)**

    (a) Composting   (b) Vermicomposting

24. State whether the following statements are True or False   **(8×1=8)**

    (a) 90% of the water on the Earth is salt water and only 10 % is fresh water.

    (b) The bearing capacity of soils increases with width of foundation in both cohesive and granular soils.

    (c) The Rational Method of determining runoff is used only for drainage areas less than 50 hectares.

    (d) Generally, COD is always higher than BOD.

    (e) Chlorination is one of the most popular methods of Filtration used in Water Treatment Plants.

    (f) A Septic tank is a small-scale sewage treatment plant that lacks connection to main sewage pipes.

    (g) All flows through circular concrete pipes irrespective of volume of flow can be characterised as pipe flow.

    (h) Indian Standard Code of Practice for Installation of Septic Tanks (Part I : Design Criteria and Construction) is available in IS : 2740 (Part I) – 1985.

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