Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.Tech (CE)/SEM-7/CE-701/2009-10

2009

WATER RESOURCE ENGINEERING – II

Time Allotted : 3 Hours Full Marks : 70

The figures in the margin indicate full marks.

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

GROUP – A
(Multiple Chocie Type Questions)

1. Choose the correct alternatives for any *ten* of the following : $10 \times 1 = 10$

   i) A river which does not change its alignment, slope and regime significantly is called

      a) stable river b) aggrading river

      c) degrading river d) none of these.

   ii) In a meandering river, silting occurs at

      a) concave or outer edge

      b) convex or inner edge

      c) centre of river bed

      d) none of these.

iii) The Lacey's regime width of the stream is given by

a) $W = 4{\cdot}75\ Q$ b) $W = 4{\cdot}75\ \sqrt{Q}$

c) $W = 4{\cdot}75\ Q^{2/3}$ d) none of these.

iv) The meander ratio is given by

a) M_L / M_B b) $M_L + M_B$

c) M_B / M_L d) $M_L \times M_B$.

v) If the flood rise and flood fall in a river is sudden, it is called

a) flashing river b) virgin river

c) tidal river d) none of these.

vi) Sills are generally provided to

a) deflect the river flow away from the river bank

b) prevent excessive scour and large depth

c) obstruct a branch of river

d) none of these.

vii) Geological formations that do not contain ground water at all are called

a) aquifers b) aquifuges

c) aquicludes d) aquitards.

viii) An aquifer confined at the bottom not at the top is called

a) leaky aquifer b) unconfined aquifer

c) confined aquifer d) perched aquifer.

ix) Specific yield of a well is

a) quantity of water available in the well

b) total quantity of water available in the well

c) flow of water per unit time

d) quantity of water per unit time per unit draw-down.

x) Specific retention of a soil is defined as

a) the ratio of the volume of water it will retain after saturation against the force of gravity to its own volume

b) the ratio of the volume of water that after saturation, can be drained by gravity to its own volume

c) the ratio of the volume of interstices to the total volume of the soil

d) the sum of porosity and specific yield.

xi) The depression of water table in a well due to pumping will be maximum (where R is the radius influence)

a) at a distance R from the well

b) at a distance $3R/4$ from the well

c) at a distance $R/2$ from the well

d) close to the well.

xii) A deep tubewell may have maximum yield of

a) 5 lits/sec b) 50 lits/sec

c) 100 lits/sec d) 200 lits/sec.

GROUP – B
(Short Answer Type Questions)

Answer any *three* of the following. 3 × 5 = 15

2. State the different objectives served by river training.

3. Discuss the rational method of determining high flood discharge in connection with bridge design.

4. Discuss the various steps involved in the planning of water resources development project.

5. What is meant by artificial recharge of ground water ? Enumerate the different methods which are used for this purpose.

6. Write short notes on strainer type tubewell.

7. Explain the Dupuit's equation. State the assumptions that enter in its development.

8. What is the relation between porosity, specific yield and specific retention ?

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

9. a) Describe modes of occurrence of ground water.

   b) Explain Darcy's law for determining ground water velocity.

   c) During a recuperation test, the water in an open well depressed by pumping, by 2·1 m and it recuperated 1·6 m in 90 minutes. Find the diameter of well to yield 10 litres per second under a depression head of 2 m.

10. a) Discuss the various steps involved in the planning of water resources development project. Explain in brief.

    b) Explain India's water resources project scenario.

11. a) A sample of silty sand has a volume of 7×10^4 mm^3. At the natural moisture content it weighs 1·478 N. The sample was then saturated with water and reweighed to a weight of 1·665 N. The sample was drained by gravity until it reached a constant weight of 1·434 N. The sample was then oven dried at 105 C until it reached a constant weight of 1·370. Assuming unit weight of water as 9810 N/m^3, compute the following :

    i) Water content under natural conditions

    ii) Volumetric water content under natural conditions

iii) Saturation ratio under natural conditions.

iv) Porosity

v) Specific yield

vi) Specific retention

vii) Water content at saturation.

b) Explain movement of ground water and factors the depend upon it.

11. a) Evaluate aquifer's parameters from Thiem's equation, Jacob method and Cooper's method.

b) Explain wells and their types.

12. Write short notes on any *five* of the following :

a) Artificial recharge of ground water

b) Confined, unconfined, perched and semiconfined aquifer

c) Marginal embankment

d) Groynes

e) Sea water intrusion in coastal aquifers

f) Recuperating test

g) Wells and Tubewells.

13. A gravity well has a diameter of 1 m. Before pumping is started the depth of water in the well is 50 m. When it is being done at the rate of 2000 lits /minute the drawdown in a well 20 m away is 4 m and in another well 40 m away is 2 m. Determine

    a) radius of influence

    b) co-efficient of permeability

    c) drawdown in the well

    d) specific capacity of the well

    e) max. rate at which water can be pumped from the well.

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