

24516

B.Tech. 7th Semester (Civil Engineering)

Examination, December-2015

GROUND WATER ENGINEERING

Paper-CE-453-F

Time allowed : 3 hours]

[Maximum marks : 100

**Note :** There are nine questions in all. **Question No. 1 is compulsory** and students have to attempt **one** question from each of the **four** sections.

1. (a) Define the term aquifer.  $2 \times 10 = 20$
- (b) List various types of strains in tubewells.
- (c) Mention any two methods of artificial recharge.
- (d) Define unsteady flow.
- (e) What do you mean by radius of influence ?
- (f) What are assumptions of Theis equation ?
- (g) A 30 cm well penetrates 50 m below the static water table. If coefficient of permeability is 10.07m/day. Determine the transmissibility of the aquifer.
- (h) What do you mean by partial penetration of an aquifer by a well ?
- (i) Why selection of pumping set important ?
- (j) In what conditions basin method of ground water recharge recommended ?

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## Section-A

2. (a) Explain 'steady' and 'Unsteady' flow of ground water stating their circumstances. Write down the corresponding equations of such flow, giving their validity. 10
- (b) Define the following terms : 10
- (i) Specific yield
- (ii) Transmissibility
- (iii) Ground water exploration
- (iv) Storage coefficient

3. (a) With the help of neat sketch explain different types of aquifer. 10
- (b) What are different methods of ground exploration? Explain in detail. 10
4. (a) What are leaky aquifers? Explain how you would determine the formation coefficient of leaky aquifer for steady case giving the equation? 10
- (b) What is mutual interference of a well? How can this be avoided. 10
5. (a) Explain the effect of partial penetration on the drawdown in the well. 10
- (b) How are the barrier and recharge boundaries are identified from pump test data? Explain with the help of neat diagrams. 10

## Section-C

6. (a) Describe various methods commonly used for lifting water. Explain each with neat sketch. 10
- (b) What is well development? List its favourable effects. Describe the various methods of well development. 10
7. (a) What do you mean by tube wells? How tube wells are classified? 10
- (b) What are reasons for failure of tubewells? What remedies will you suggest for increasing their life. 10

## Section-D

8. (a) Explain induced infiltration method of ground recharge. 10
- (b) What is the purpose of designing artificial recharge projects, explain. 10
9. (a) Mention various spreading methods of artificial recharge? Explain any two. 10
- (b) What factors lead to diminishing opportunity for natural recharge of ground water? List favourable conditions for artificial recharge. 10