

Roll No.

24516

**B. Tech. 7th Semester
(Civil Engineering) XI**

Examination – December, 2013

GROUND WATER ENGINEERING

Paper : CE-453-F

Time : Three hours]

[Maximum Marks : 100

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : All questions carry equal marks. Attempt any *five* questions. **Q. No. 1 is compulsory.** Assume missing data, if any, suitably.

1. Define the following hydrological parameters:

8 × 2.5 = 20

- (i) Transmissibility
- (ii) Hydraulic conductivity
- (iii) Well sickness
- (iv) Leaky artesian aquifer
- (v) Silting of well
- (vi) Methods of ground water recharge
- (vii) Steady and unsteady flow
- (viii) Compressibility

SECTION - A

2. (a) Define aquifer. Explain the properties of an aquifer. 10
- (b) Explain ground water exploration. Describe various methods of investigations. 10
3. Derive an equation for steady and unsteady ground water flow in isotropic homogeneous aquifer. 20

SECTION - B

4. (a) Describe partial penetration of an aquifer by a well with diagram. 10
- (b) What do you understand by interference of wells? 10
5. (a) Derive Thiem's equilibrium formula for confined and unconfined aquifer. 10
- (b) Define spherical flow in a well. 10

SECTION - C

6. (a) Define average life of tube well. What are the causes of failure of tube well? What are the preventive measures to increase the average life of wells? 10
- (b) Explain different methods used in drilling operations. 10

7. Write short notes on :

20

- (i) gravel packing
- (ii) casing pipe and blind pipe
- (iii) installation of well screen
- (iv) alignment of tube well

SECTION - D

8. (a) What do you mean by artificial recharge of ground water? What is the necessity of it? 10
- (b) Explain in detail the induced infiltration method of artificial ground water recharge. 10
9. (a) Briefly describe recharge pits, shafts and recharge wells. 10
- (b) What are the various methods of water spreading in artificial recharge? 10