

24516

B. Tech. 7th Semester (Civil Engg.) Examination,

December-2012

GROUND WATER ENGG.

Paper-CE-453-F

Time allowed : 3 hours]

[Maximum marks : 100

**Note :** Attempt five questions in all. Question no. 1 is compulsory.

Attempt one question from each section. Each question carries equal marks.

1. (a) Define porosity.
- (b) The hydraulic conductivity of a confined aquifer having thickness of 5m is 10m/day. Determine the value of transmissivity.
- (c) What is unsteady flow ?
- (d) What are leaky artesian aquifers ?
- (e) Write the relation between transmissivity, width of aquifer and hydraulic conductivity.
- (f) What are the drawback of equilibrium formulas given by Theim and Dupuit.
- (g) List the reasons for failure of tubewells.
- (h) Compare cable tool and hydraulic rotary method of drilling.

- (i) Define well sickness.
- (j) Name various methods of ground water recharging.

2×10=20

### Section-A

- 2. (a) With the help of neat sketch explain different types of aquifer. 10
- (b) Derive the groundwater flow equation for steady flow in isotropic homogenous aquifer. 10
- 3. (a) Explain various methods of ground water exploration. 10
- (b) Define and explain the following terms :
  - (i) Transmissibility
  - (ii) Storativity
  - (iii) Compressibility
  - (iv) Specific storage
  - (v) Hydraulic diffusivity. 10

### Section-B

- 4. (a) What do you understand by spherical flow ?  
Why this type of flow is not used in practical ?  
10

- (b) Derive Theim equilibrium formula for discharge of well for unconfined aquifer case. 10
5. (a) What is mutual interference of a well ? How can this be avoided. 10
- (b) A well is located in a 30 m thick confined aquifer of permeability 35 m/day and storage coeff. of 0.004. If the well is pumped at a rate of 1500 litres per minute, calculate the drawdown at a distance of 40 m from the well after 20 hours of pumping. 10

### Section-C

6. (a) Enumerate different methods which are used for drilling tubewells ? Discuss any one of these methods in detail. 10
- (b) What is meant by tubewells ? What are their types? Show various components of tubewell with a neat sketch. 10
7. (a) What is well development ? What are its objectives ? 10
- (b) What is average life of tubewells and what are the reasons for their failure ? 10

**Section-D**

8. (a) Define ground water artificial recharge. What is the purpose of designing artificial recharge projects. Explain. 10
- (b) What are the various spreading methods of artificial recharge. Explain. 10
9. Write short notes on :
- (a) Induced Infiltration
- (b) Recharge wells
- (c) Modification of natural channel
- (d) Recharge pits. 4×5=20