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Code No: **R42013** **R10** **Set No.1**

IV B.Tech II Semester Regular/Supplementary Examinations, April/May – 2016

GROUND WATER DEVELOPMENT AND MANAGEMENT

(Civil Engineering)

Time: 3 hours **Max. Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks
*****

1. a) Explain the ground water hydrological cycle with a neat sketch.
   b) Describe the vertical distribution of ground water. [7+8]

2. How do you analyse unsteady flow towards a well either in confined or unconfined aquifer? Discuss any one solution method. [15]

3. Explain with the help of neat sketches, giving relevant equation:
   a) Electrical Resistivity method on the ground surface
   b) Drilled well logging techniques (Normal Lateral and S.P Logs) [7+8]

4. a) Explain the unsteady flow towards a well with a neat sketch.
   b) What are the modifications suggested by Jacob to simply the Theis method. Explain in detail. [7+8]

5. a) List the tube well drilling method and discuss them.
   b) How do you develop a tube well after its construction? [7+8]

6. Derive a time variant regional ground water flow equation for confined and phreatic aquifers involving recharge. Discuss the various types of recharge terms that can be grouped together, and a method for their estimation. [7+8]

7. a) Discuss the various methods of drilling along with their suitability.
   b) Explain in detail how you interpret the log data. [7+8]

8. What are the elements of management? How do you compare the same with watershed management? [15]

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Code No: **R42013** **R10** **Set No.2**

IV B.Tech II Semester Regular/Supplementary Examinations, April/May – 2016
GROUND WATER DEVELOPMENT AND MANAGEMENT
(Civil Engineering)

Time: 3 hours **Max. Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks
*****

1 Define Ground water porosity, Specific yield and Specific retention, permeability, transmissivity and storage coefficient. Explain formation properties affecting these parameters. [15]

2 Explain Chow's method of determining hydraulic properties of the aquifers through pumping test? [15]

3 Explain in detail about geomatics methods used for sub surface investigations of groundwater? [15]

4 Determine the minimum distance to be maintained between the wells of 0.25 m diameter are proposed to the constructed screening a confined aquifer, such that there is no mutual interference. The pumpage from each will be 5432 m^3/day, equilibrium drawdown to be maintained is 8.1 m and transmissivity of the aquifer is 801 m^2/day and the well efficiency is 92%. [15]

5 Discuss the concepts of basin management and explain any case study illustrating groundwater basin management? [15]

6 Explain in detail about flooding and recharge well methods, recharge mounds and induced recharge. [15]

7 Discuss the structure of fresh – salt water interference and Ghyben- Herzberg relation between fresh and saline water? [15]

8 Define the principle of the seismic refraction method, distinguish between the intercept time and cross over distance methods for estimating the thickness of an aquifer and derive equations for these determinations. [15]

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Code No: **R42013** **R10** **Set No.3**

IV B.Tech II Semester Regular/Supplementary Examinations, April/May – 2016

GROUND WATER DEVELOPMENT AND MANAGEMENT

(Civil Engineering)

Time: 3 hours **Max. Marks: 75**

Answer any FIVE Questions

All Questions carry equal marks

*****

1. a) What is permeability? Derive Darcy's law and discuss the same.
   b) Derive the differential equation governing ground water flow in three dimensions. [7+8]

2. A production well penetrating fully into a confined aquifer of thickness 9.15m discharges at a rate of 1200 m3/d. An observation well is located at a discharge of 95 m from the production well and the following time drawdown data are observed.

Drawdown(m)	35	150	202	255	305
Time(minutes)	100	180	300	500	800

   Compute the aquifer parameters T and S respectively using Jacobs drawdown method. [15]

3. a) Explain the detailed procedure of Electrical resistivity method to investigate for the occurrence of ground water.
   b) What are the uses of aerial photogrammety in groundwater explorations? [7+8]

4. a) What is the reason for partial screening? indicate some good screening materials and how you would make a choice

   b) A sample of aquifer material has the grain size distribution given in the following table. If the overlaying material is fairly firm, determine the proper slot size. [7+8]

Size of sieve opening(mm)	Weight retained (gms)
1.15	55
0.82	51
0.57	87
0.40	73
0.30	46
0.20	45

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5. Write short notes on the following with neat sketches
   i) Well completion ii) Well maintenance iii) Well disinfection [15]

6. a) What is artificial recharge of ground water? How do you decide sites for artificial recharge of groundwater?
   b) What are the methods of artificial recharge of groundwater? [7+8]

7. a) Explain the Gayben–Herzberg relation between saline water and Freshwater
   b) The height of a point R on a fresh/salt water interface above the datum is 12m in a coastal confined aquifer of thickness 40m and hydraulic conductivity k=3m/d. A well (A) 12.25m away from the toe bottoming at R measures a piezometric head of 52m above the datum, whereas the head is 52m in another well (B) located 22.25m from the toe. Assuming a uniform hydraulic gradient compute the interface length L within the confined aquifer .Given pf=1000kg/m^3, ps = 1025kg/m^3. [7+8]

8. a) Write short notes on information required for assessing development potentiality of an aquifer.
   b) Describe the various measures to be adopted for control and prevention of water logging and salinity under an irrigation regime. [7+8]

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Code No: **R42013** **R10** **Set No.4**

IV B.Tech II Semester Regular/Supplementary Examinations, April/May – 2016

GROUND WATER DEVELOPMENT AND MANAGEMENT

(Civil Engineering)

Time: 3 hours **Max. Marks: 75**

Answer any FIVE Questions

All Questions carry equal marks

*****

1. What are Dupit's assumptions? Derive basic governing differential equation for the steady one dimensional unconfined groundwater flow. [15]

2. The diameter of a pumping well is 10cm, location of the observation well is 16m and rate of pumping is 2500 lpm. Find the parameters S and T of a confined aquifer where test pumping gave the following information.
   Drawdown after one hour of pumping=3m
   Drawdown after four hours of pumping=4m. [15]

3. In a Schlumberger electrical resistivity investigation, the spacing of the current and potential electrodes was as follows:

Current electrode pacing (m)	5	100	500
Potential electrode spacing(m)	0.5	1.5	24

   If the amount of current passed in the ground was 628mA and the corresponding voltage difference readings were 969,2.175, and 895 milli-volts, for the respective spacing, compute the apparent resistivity values for the three sets. Discuss why they are different. What qualitative inference can you draw from it? What type of master curve will be used to interpret the field VES curve with the above data? [15]

4. a) Explain the criteria of design for i) artificially gravel packed wells
   ii) naturally developed wells
   b) How do you determine the length and no of laterals for a proposed radial collector well? [7+8]

5. Write short notes on following methods of well development
   i) Mechanical surging using compressed air ii) High velocity jetting of water
   iii) Over pumping and back washing iv) Dispersing agents [15]

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6. Examine the formation of mounds beneath the square, hexagonal, circular, triangular and rectangular recharge basins, having equal areas and equal recharge rates. Discuss the influence of lateral variation of hydraulic conductivity under a rectangular recharge basin. [15]

7. The product of a steady discharge Q to the sea and length L of the salt/fresh water interface in confined aquifer is 114 m^3d/meter length of seacoast. The thickness of the confined aquifer is 70m. If two observations wells, very close to each other, just before the toe region measure a hydraulic gradient of $1.67*10^{-3}$,compute the height of the interface above datum 100m away from the seacoast.pf=1000kg/m^3; ps=1025kg/m^3 : draw a neat sketch. [15]

8. a) What is overdraft? Explain how land subsidence is related to over draft.
   b) Write short notes on groundwater development in relation to stream flow. [7+8]

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