FACULTY OF ENGINEERING

B.E. 4/4 (Civil)   II-Semester (**Main**) Examination, May / June 2011

Subject : **Ground Water Hydrology**   (Elective – III)

Time : 3 Hours

Max. Marks: 75

Note: Answer all questions from Part-A and
answer any **Five** questions from Part-B.

PART - A (25 Marks)

1. Write the general equation of ground water flow and explain briefly.   2

2. Discuss about the partially penetration of wells in groundwater hydrology. 2

3. Mention about the subsurface investigations and briefly explain well logging.   3

4. With the aid of sketches explain the various methods of recharge.   2

5. Derive and explain Ghyben-Herzberg relation.   3

6. Describe the groundwater models and explain in detail viscous flow models. 3

7. List out the assumptions made in the analysis of steady radial flow into a well.   2

8. With neat sketch explain the image well theory.   3

9. Define transmissibility and storage coefficient of an aquifer.   2

10. Derive an equation for a steady state flow to a well penetrating a uniformly recharged unconfined aquifer.   3

PART - B (50 Marks)

11.a) What are the different characteristics of ground water formation? Discuss them with due emphasis on the occurrence and distribution of aquifers.   5

b) In order to determine the permeability of an aquifer, a tracer is introduced in an observation well and it is traced in another down stream well 78 mts away from the first after 46.5 hrs. If the elevation of water levels in the two wells differ by 2.90 mts and the porosity of the aquifer is 18%, calculate the coefficient of permeability of the aquifer.   5

12. A pumping out test was performed in a confined homogeneous and isotropic aquifer of infinite areal extent. The constant pumping rate was 200 m^3/hr. The following drawdown were observed in an observation well located at 500 mts from the pumping one.   10

Time (hrs)	0.1	0.6	1.6	5	16	100
Draw down mts	0.40	0.50	0.90	1.35	1.66	1.71

13.a) Explain the following in respect of geophysical exploration methods by electrical resistivity method.
   i)   Wenner and Schlumberger configuration of electrodes.
   ii) Profiling and vertical electrical sounding.   6

   b) Describe magnetic and geologic methods.   4

14.a) When actually seawater intrusion takes place? How would you locate the freshwater – seawater interface. Also discuss about the various methods which are used to control seawater intrusion.   5

   b) Define artificial recharge and explain the necessity of adopting the technique of artificial recharge.   5

15.a) State the objectives of model studies also mention about the classification of models.   5

   b) Discuss in detail about the working of sand model, and electric analog models.   5

16.a) State and derive equation for steady flow with uniform recharge.   5

   b) A well with a radius of 0.15m completely penetrates in unconfined aquifer of thickness 50m and permeability of 30 m/day. The well is pumped so that the water level in the well remains at 40m above the bottom of the aquifer. Assuming that the pumping has no effect on water table at a distance of 500m from the well what is the steady state discharge.   5

17.   Write a short notes on the following :   10
   a) Multiple well systems
   b) Seismic refraction method
   c) Steady radial flow in leaky artesian aquifer

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