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ET-532(B)

B.Tech. Civil (Water Resources Engineering)
Term-End Examination
December, 2015

ET-532(B) : GROUND WATER DEVELOPMENT

Time : 3 hours *Maximum Marks : 70*

Note : *Attempt any **five** questions. All questions carry equal marks. Diagrams / sketches should be neat and well labelled.*

1. (a) What is an aquifer ? How many types of aquifers are there ? Give a neat sketch of Leaky or semi-confined aquifer. 7

(b) At a certain time the bulk density of the soil layer 20 – 30 cm from the surface was 1·25 g/cm^3. After 5 years of continuous cultivation, the bulk density increased to 1·4 g/cm^3. Calculate the change in porosity (n) of the soil, if the particle density is 2·7 g/cm^3. 7

2. (a) What is well development ? Explain in detail any one method of well development. 7

(b) Graphically show the following in a well pumping system in a partially penetrating well : 7

(i) Potentiometric Water Level (PWL)

(ii) Static Water Level (SWL)

(iii) Drawdown Curve.

Give a neat sketch.

3. (a) Define the phenomenon of interference of wells. Explain in brief, why, in mines and the foundations, dewatering wells are very closely spaced. 7

(b) Three closely spaced wells are pumped simultaneously. Using a schematic diagram, show their composite drawdown curve, if the wells are laid in an unconfined aquifer. 7

4. (a) What is Hypsometric analysis ? Explain its use in watershed management. What is meant by monadnock phase ? 7

(b) Explain the working principles of Electrical Resistivity Survey method of ground water investigation. 7

5. (a) Define any ***two*** of the following : 7

(i) Kelly's Ratio

(ii) Permeability Index

(iii) Soluble Sodium Percentage

(iv) Residual Sodium Carbonate

(b) What is SAR (Sodium Adsorption Ratio) ? Discuss the ground water classification based on SAR of the samples. 7

6. (a) What is Hydraulic conductivity ? Discuss the procedure of laboratory determination of the hydraulic conductivity with constant head. 7

(b) Discuss the conditions for which the Darcy law is valid. 7

7. (a) Explain the storativity property of the confined and unconfined aquifers. 7

(b) Discuss the role of tracers for obtaining information about ground water flow, ground water recharge and aquifer properties. 7

8. (a) What is meant by Ground water Recharge and Discharge ? List the components of Ground water Balance. 7

(b) Explain any ***one*** of the following basic approaches of recharge : 7

(i) Artificial Injection Method

(ii) Environmental Tritium Method
