

Government College of Engineering, Aurangabad
(An Autonomous Institute of Government of Maharashtra)
M. E. Civil-Water Resources Engineering (Revised)
End Semester Examination 2016-17, Semester-I
CE 543: GROUND WATER ENGINEERING

Time: Three Hours

2 DEC 2016

Maximum Marks: 60

“Verify the Course Code and Check Whether You Have Got the Correct Question Paper”

N.B.:- 1. All Questions are Compulsory. 3. Assume Suitable Data if Necessary and State it clearly.
2. Figures to the Right Indicate Full Marks. 4. Use of Nonprogrammable Calculator is allowed.

- Q.1 Attempt any two 12
- i) Can you illustrate: a) permeability and transmissibility, and b) Specific yield and specific retention?
 - ii) Outline different factors governing ground water potential of a particular region.
 - iii) State in your own words the different factors on which movement/direction of ground water flow depends.
- Q.2 Attempt any two 12
- i) Illustrate and derive Dupuit's equation for unconfined aquifer case.
 - ii) A pumping test was made in a permeable soil to a depth of 20 m where a bed of impervious clayey layer was observed. The normal ground water level was at the surface. Observation holes were located at distances of 3 m and 7.5 m from the pumped well. At a discharge of 4.0 litre/second from the pumping well, a steady state was attained in about 24 hours. The drawdown at 3 m was 1.65 m and at 7.5 m was 0.36 m. Compute the coefficient of permeability of soil?
 - iii) How would you explain interference among wells with the help of sketch and equation?
- Q.3 Attempt any two 12
- i) Can you explain well losses and specific capacity?
 - ii) Can you differentiate between Cooper-Jacob method and Chow's method of solution to know 'S' and 'T'? What are the assumptions and limitations of this method?
 - iii) In a certain place in Madhya Pradesh, the average thickness of the confined aquifer is 30 m and extends over an area of 800 km². The piezometric surface fluctuates annually from 19m to 9m above the top to the aquifer. Assuming a storage coefficient of 0.0008, what ground water storage can be expected annually? Assuming an average well yield of 30 m³/hr and about 200 days of pumping in a year, how many wells can be drilled in the area?
- Q.4 Attempt any two 12
- ii) Can you write and explain ground water flow equation to deal with phreatic seepage problem for one dimensional and two dimensional cases?
 - iii) Can you illustrate Rotary percussion drilling with the help of sketch? State suitability of the same.
 - iii) Can you clarify image well theory with the help of example?
- Q.5 Attempt any two 12
- i) Write in your own words two different methods of artificial recharge of ground water.
 - ii) Write a brief outline of subsurface dams and waste water recharge.
 - iii) Illustrate estimation of ground water discharge.