CIVIL ENGINEERING – PAPER - II

Time : 3 Hours **Max. Marks : 200**

Note : 1. Attempt any five (05) questions. All questions carry equal marks.

Q.1 A 30 cm diameter tube will completely penetrates an unconfirmed aquifer of depth 40 m. After a long period of pumping at a steady rate of 1500 lpm, the drawdown in two observation wells, 25 m and 75 m form pumping well were found to be 3.5 m and 2.0 m respectively. Determine the transmissivity of aquifer. What is drawdown at pumping well? **(40)**

Q.2 250 litters/sec. of water is flowing in a pipe having a diameter of 300 mm. If the pipe is bent by a 135 °, find the magnitude and direction of the resultant force on the bend. The pressure of water flowing is 39.24 N/cm^2. **(40)**

Q.3 In a formation of cohesionless soil, the water table is at a depth of 3m. The degree of saturation may be taken as 0.5 on the average void ratio 0.5; grain specific gravity 2.70; angle of internal friction = 30°. Calculate the potential shear strength on a horizontal plane at a depth of 2.5m below the surface. Also calculate the modified value of the shear strength if the table reaches the ground surface. **(40)**

Q.4 A strip footing 1 m wide at its base is located at a depth of 0.8 m below the ground surface. The properties of the foundation soil are γ= 18 kN/m^3, c = 30 kN/m^2, and $\phi = 20^\circ$. Determine the safe bearing capacity, using factor of safety 3.0. If the water table is located at the base of the footing. Considering saturated unit weight of soil as 19.5 kN/m^3. Find safe bearing capacity using Terzaghi's analysis and assuming that the soil fails by local shear. (Nc′ = 11.8, Nq′ = 3.9 and Nγ′= 1.7) **(40)**

Q.5 Explain in detail California Bearing Ratio (CBR) method for the design of Flexible Pavement. **(40)**

Q.6 Write the physical, chemical and biological properties of wastewater/sewage and in detail explain with the help of a flow sheet the various units and their role in a basic aerobic wastewater treatment plant. **(40)**

Q.7 The network shown in Fig. 1 has the estimated duration for each activity marked. Determine the total float for each activity and establish the critical path. Also determine free float and independent float for each activity. **(40)**

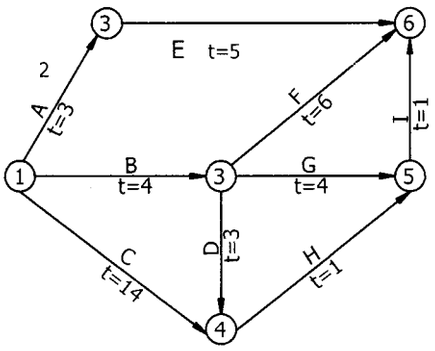

Fig. 1