INDIAN INSTITUTE OF TECHNOLOGY KHARAGPUR

Mid-Spring Semester Examination 2022-23

Question 1. 05

A soil sample of 126 kg of wet silty-clay soil was taken from the field and the following data were obtained in the laboratory-

Water content of soil = 15%,   Wet density of soil = 2.1 g/cc,   Particle density = 2.7 g/cc

What will be the dry density, porosity, void ratio and degree of saturation of this soil?

Question 2 04

Saturated hydraulic conductivity of soil sample, collected in soil sampling core of size 5 cm long and 5 cm diameter, is measured in laboratory by using falling head permeameter method. What will be the saturated hydraulic conductivity of soil (in cm/h) if the falling head of water is observed in a 5 mm diameter supply tube from 25 cm head to 8 cm in 60 seconds?

Question 3. 04

The relationship for cumulative infiltration for a soil is given as $I_c = 0.35 \, t^{0.8} + 0.2$ where I_c is cumulative infiltration in cm for time t in min. What will be the average rate of infiltration at 1 hour time for this soil?

Question 4. 04

The field capacity and permanent wilting point of a soil depth profile of 0-25 cm were measured and found to be 25% and 10%, respectively. Laboratory estimates of the bulk density of soil showed a value of 1.60 g/cc. What will be the available water content (in depth unit) in the soil profile?

Question 5. 05

A reservoir has an area of 8.5 ha and is provided with a rectangular weir of 4.5 m long to discharge water to irrigation canal. If the coefficient of discharge (Cd) of the weir is 0.6, find out how much time will it take to relies water and empty the reservoir from the water head initially 0.6 m above the wear crest to 0.3 m?

Question 6. 04

The root zone depth of crop is 90 cm and its available water holding capacity is 15 cm/m. Irrigation is to be applied at 40% deficit of available water in the root zone. If daily consumptive use of crop is 3 mm, what will be the amount and frequency (in days) of irrigation to the crop?

Question 7. 04

Two parallel pipes- P and Q of identical diameter and length, are connected to discharge water from a reservoir. If the friction of pipe P is 4 times that of Q, what will be the ratio of discharge in P to that of in Q?