WATER RESOURCE ENGINEERING FINAL EXAMINATION

INSTRUCTIONS: ATTEMPT ALL THE QUESTIONS IN SECTION A AND ANY TWO FROM SECTION B AND ANY ONE FROM SECTION C

SECTION A – ATTEMPT ALL THE QUESTIONS – 70 Marks

1. In water resources engineering, the hydrological cycle consists of FOUR key components. Discuss them briefly. **(20 Marks)**

2. State FIVE uses of water **(10 Marks)**

3. State and explain the three MAIN supply of water. **(10 Marks)**

4. What do you understand by the following terms **(10 Marks)**
   i. Hydology
   ii. Hydrological cycle
   iii. Condensation
   iv. Evaporation
   v. Flood

5. State FIVE factors affecting infiltration rate of water into the soil **(5 Marks)**

6. State FIVE factors affecting runoff **(5 Marks)**

7. State FIVE causes of water shed deterioration. **(5 Marks)**

8. State and breifly explain FOUR categories of drought. **(5 Marks)**

SECTION B - ATTEMPT ANY TWO QUESTIONS - 20 Marks – (10 Marks each)

1. **A 12-hour storm rainfall with the following depths in cm occurred over a basin: 2.0, 2.5, 7.6, 3.8, 10.6, 5.0, 7.0, 10.0, 6.4, 3.8, 1.4 and 1.4. The surface runoff resulting from the above storm is equivalent to 25.5 cm of depth over the basin. Determine the average infiltration index (Φ-index) for the basin.**

   Solution:

2. **The rainfall intensities for the successive1-hour period for 8-hrs storm is given as20,24,30,15,35,20,10,12 mm/hr ,if the total runoff is 80mm,determine the value of Φ-index.**

   Solution:

3. **In a catchment area of 5km^2, the intensity of rainfall per hour for a 5hr duration storm are 10, 15, 20,22,5 mm. The volume of direct runoff is measured as 0.5cumec-day. Determine the Φ-index. For the catchment.**

   Solution:

SECTION C - ATTEMPT ANY ONE QUESTION - 10 Marks

1. **In a phreatic aquifer extending over 1 km^2 the watervtable was initially at 25m below ground level. Sometime after irrigation with a depth of 20cm of water, the water table rose to a depth of 24m bgl. Later 3x10^5 m^3 of water was pumped out and the water table dropped to 26.2 m bgl. Determine i) specific yield of the aquifer ii) deficit in soil moisture (below field capacity) before irrigation.**

Solution

2. **In an area of 100 ha, the water table dropped by 4.5m. if the porosity is 30% and the specific retension is 10% determine i) the specific yield of the aquifre ii) change in groundwater storage.**

Solution