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IV/IV. B.E. DEGREE EXAMINATION.

First Semester

Civil Engineering

WATER RESOURCE ENGINEERING — I

(Common for Civil and Civil Environmental Engineering)

(Effective from the admitted batch of 2006–2007)

Time : Three hours   Maximum : 70 marks

Question No.1 is compulsory.

Answer any FOUR from the remaining.

All parts of a question must be answered at one place.

1. (a) Briefly explain about convective precipitations.

   (b) Explain how the shape and size of catchment affects the run-off.

   (c) Define the terms of coefficient of permeability and coefficient of transmissivity.

   (d) State the advantages and disadvantages well irrigation over canal irrigation.

(e) Write the geological investigations needed for reservoir planning.

(f) Define the terms duty, delta and base period and write the relation between them.

(g) Write the concept of Kennedy's silt theory.

2. (a) Write the advantages and disadvantages of recording type rain gauges.

(b) A 12-hour storm rainfall with the following depth in cm at 1 hr intervals 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 the depth over the basin. Determine the average infiltration index for the basin.

3. (a) Write the procedure for estimation of evaporation using evaporation pan using a neat sketch.

(b) Given below are the observed flows from a storm of 6 hours duration on a stream with a drainage area of 315 sq.km. Assume base flow of 17.0 cumecs. Derive a 6 hour unit hydrograph.

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Date	Time hrs	Flow cumecs	Date	Time hrs	Flow cumec
June 1	00.00	17.0	June 2	12.00	87.7
	6.00	113.2		18.00	67.9
	12.00	254.5	June 3	0.00	53.8
	18.00	198.0		6.00	42.5
June 2	0.00	150.0		12.00	31.1
	6.00	113.2		18.00	22.6
			June 4	0.00	17.00

How many 'cm' of rainfall excess does the above storm hydrograph represent?

4. (a) Derive discharge formula for a fully penetrating tube well in an unconfined aquifer.

(b) An artesian tube well has a diameter of 20 cm. The thickness of aquifer is 30 m and its permeability is 36m/day. Find its yield under a drawdown of 4m at the well face. Use radius of influence as recommended by Sichardt.

5. (a) Explain the engineering investigations required for reservoir planning and how the reservoir capacity is determined.

(b) What is the procedure for determining reservoir capacity for a specific yield from the mass inflow curve?

6. (a) What are the micro-irrigation methods, explain briefly their advantages and disadvantages over Controlled flooding irrigation?

   (b) The soil in the root zone has dry weight of 15 kN/m³ and a field capacity of 30%. The permanent Witting point is 8%. The root zone depth of the crop is 0.8 m. Determine:

      (i) The depth of moisture in the root Zone at field capacity

      (ii) The depth of moisture at permanent witting point

      (iii) The depth of available water.

7. (a) Compare Kennedy's and Lacy's silt theories.

   (b) The slope of a channel in alluvium is $S = \dfrac{1}{5000}$; Lacey's silt factor = 0.9 and channel side slope = $\dfrac{1}{2}:1$. Find the channel section and maximum discharge which can be allowed to flow in it.

8. (a) What is a balanced section of a canal?

   (b) Define the flood routing and explain the methods of flood routing.

   (c) What is an S-hydrograph and for what purpose it is used?

   (d) What are the irrigation efficiencies?

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