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III B.Tech. I Semester Supplementary Examinations, November/December - 2012 WATER RESOURCES ENGINEERING - I (Civil Engineering)

Time: 3 Hours

Code No: V3103

Max Marks: 80

Answer any FIVE Questions All Questions carry equal marks ****

- 1. Discuss with a neat sketch various methods used to compute average rainfall over a basin. (16M)
- 2. (a) An infiltration capacity curve prepared for a catchment indicated an initial infiltration capacity of 2.5 cm/hr and attains a constant value of 0.5 cm/hr after 10 hours of rainfall with the Horton's constant k = 6 day-1. Determine the total infiltration loss.

(b) Describe any two methods of separating the base flow from the total runoff. (8+8)

3. (a)A watershed of 3130 sq. km was subjected to a storm of 4 hr duration from which the following are recorded.

Time (h)	3	6	9	12	15	18	21	24	3	6	9	12	15	18	21
Discharge	22	18	185	290	230	210	170	155	135	115	100	90	80	70	60
(cumecs)															
Obtain a	Obtain an UH for the watershed.														

Obtain an UH for the watershed.

(b) Describe how unit hydrograph can be used to predict the runoff from a storm? What are the uses of unit hydrograph? (8+8)

- 4. (a) How does 'stream flow routing' differ from reservoir flood routing? (b) Differentiate between channel routing and reservoir routing. (8+8)
- 5. (a) An aquifer has an average thickness of 50 m and an aerial extent of 150 ha. Estimate the available ground water storage if the aquifer is unconfined and fluctuation in GWT is observed as 10 m. (b)State Darcy's law and its limitations. (8+8)
- 6. (a) Describe in detail the border strip method of irrigation. (b) Discuss the factors affecting the choice of method of irrigation. (8+8)
- 7. (a) Explain various irrigation efficiencies. (b) What are the factors affecting duty? How can duty be improved? (8+8)
- 8. (a) Compare Kennedy's and Lacey's silt theories. Why is Lacey's conception superior to that of Kennedy's? (b)Design an irrigation canal to carry a discharge of 6 cumec. Assume N = 0.0225, m = 1.0 and (B/D) = 3.20(8+8)*****

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Time: 3 Hours

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Max Marks: 80

Answer any FIVE Questions All Questions carry equal marks ****

1. (a)What are the different forms of precipitation ? Which of them are of significance to a civil engineer?

(b) Distinguish between recording and non-recording rain-gauges, giving examples of such gauges used in India. (8+8)

2. (a) The average rainfall over 45 ha of watershed for a particular storm was as follows:

Time (hr):	0	1	2	3	4	5	6	7
Rainfall (cm):	0	0.5	1.0	3.25	2.5	1.5	0.5	0

The volume of runoff from this storm was determined as 2.25 ha-m. Establish the ϕ -index.

(b) Explain various factors affecting runoff.

(8+8)

3. (a) The ordinates of a 4-h UH are given below. If there is a 4 cm effective rainfall occurring uniformly for 4-h, calculate the DRH resulting from the storm. (16M)

Time (h)	0	2	4	6	8	10	12	14	16	18	20	22	24
4 h UH ordinate	0	9	24	50	66	72	65	53	28	20	11	6	0
(cumecs)			X										

- 4. Describe the method of estimating a T_r year flood using Log-Pearson's type III distribution. (16M)
- 5. (a) A well penetrates into an unconfined aquifer having a saturated depth of 50 m. The discharge is 250 1pm at 8 m drawdown. What would be the discharge at 10 m Drawdown? The radius of influence in both the cases may be taken as same.
 (b) Distinguish between
 - (i) Aquifer and Aquifuge
 - (ii) darcy velocity and actual velocity
 - (iii) Aquiclude and Aquitard
 - (iv) Groundwater and perched groundwater (8+8)
- 6. (a) Explain various advantages and disadvantages of drip irrigation?(b) Explain zig-zag method of irrigation along with a neat sketch (8+8)
- 7. (a) Explain the terms 'duty' and 'delta' of canal water. Derive a relationship between the two.

(b) A field channel has culturable commanded area of 2000 hectares. The intensity of irrigation for gram is 30 % and for wheat is 50%. Gram has a kor period of 18 days and kor depth of 12 cm, while wheat has a kor period of 15 days and kor depth of 15 cm. Calculate the discharge of the field channel. . (8+8)

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Set No: 2

- 8. (a) What are the different ways in which the irrigation canal can be aligned?
 (b) Design an irrigation channel in alluvial soil according to Lacey's silt theory, given in the following data:
 - (i) Full supply discharge = 16 m^3 /sec; Lacey's silt factor = 1.0;
 - (ii) Channel side slopes = $\frac{1}{2}$: 1 (8+8)

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Code N	No: V3103	Set No: 3
	III B.Tech. I Semester Supplementary Examinations, November/December WATER RESOURCES ENGINEERING - I	- 2012
Time:	(Civil Engineering) 3 Hours	Max Marks: 80
	Answer any FIVE Questions	
	All Questions carry equal marks *****	
1.	(a) Describe worlds Water Resources and Water Resources of India.(b) Describe the hydrological cycle with a neat sketch.	(8+8)
2.	(a) Describe with the help of neat sketches any two methods of separat flow from the hydrograph of runoff (i.e. stream flow hydrograph) indic the situations under which you advocate them.(b) Describe various components of runoff.	tion of base cating (8+8)
3.	(a) What is a S-curve hydrograph? How is it constructed? What are its(b) Describe any two methods of separating the baseflow from the tota	ueses? l runoff. (8+8)
4.	From the historical data of annual flood peaks of a catchment the me deviation are estimated as 20000 m ³ /sec and 10000 m ³ /sec. An exist this catchment has been designed for 40000 m ³ /sec. What could be it (Assume standard deviation and mean of the reduced extremes which sample size and taken from Gumble's table are 1.06 and 0.52).	an and standard ing structure on s return period? h depend on the (16M)
5.	 (a) Determine the diameter of an open well in coarse sand to give an a 200 lpm under a safe working depression head of 2.5 m (Hint: for cohr-1). (b) Adopting usual notation, derive an expression for the steady state well in an confined aquifer. 	average yield of arse sand $C \approx 1$ e discharge of a (8+8)
6.	(a) The sprinkler system of irigation is an excellent method but no Why? Discuss critically and briefly.(b) What are the benefits that can be accrued from irrigation projects?	t used in India, (8+8)
7.	 (a) The root zone of a certain soil has a field capacity of 25 % and percentage is 8%. (i) What is the depth of moisture in the root zone at fiel permanent wilting point? (ii) How much water is available if the root zone depth is weight of the soil is 13.75 kN/m³. 	rmanent wilting ld capacity and 1.1 m? The dry
	(b) Describe briefly the various soil groups of India	(9+7)
8.	 (a) Design an irrigation canal to carry a discharge of 5 Cumec. Assume N=0.225, m=1.0 and B/D=3.24. (b)Briefly discuss the drawbacks of Kennedy's theory in the design of ****** 1 of 1 	canals. (8+8)



III B.Tech. I Semester Supplementary Examinations, November/December - 2012 WATER RESOURCES ENGINEERING - I (Civil Engineering)

Time: 3 Hours

Code No: V3103

Max Marks: 80

Answer any FIVE Questions All Questions carry equal marks Ordinary Graph Paper Should be Supplied for 4th Question.

- (a) Describe with a neat sketch the principle of working of tipping bucket type recording rain gauge. What are its advantages and disadvantages? (8M)
 (b) What are its advantages and disadvantages? (8M)
 - (b) What are possible sources of error in the measurement of rainfall? (8M)
- 2. (a) The following were the monthly evaporation data in cm in certain year (Jan.-Dec.) in the vicinity of a lake:

Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
15.7	14.1	16.9	24.0	27.5	21.4	15.7	16.2	16.2	20.5	15.7	15.4

The water spread area in the lake in the beginning of January was 3.2 km^2 and at the end of December 2.6 km². Calculate the loss of water in million m³ due to evaporation in that year. Assume a pan coefficient of 0.71.

(b) Distinguish between: (i) Direct runoff and base flow, (ii) Depression storage and detention storage (10+6)

- 3. (a) Explain how a 2D h unit hydrograph is derived from a D h unit hydrograph.
 (b) Describe the step by step procedure of the derivation of a unit hydrograph from an isolated storm. (8+8)
- 4. (a) Deferentiate between , (i) Prism storage and Wedge storage, and (ii) Channen routing and reservoir routing.

(b) The observed annual flood peaks of a stream for the period 1939 to 1973 in m^3/s are as given below.

588, 432, 648, 396, 420, 500, 336, 900, 300, 600, 504, 396, 518, 420, 528, 384, 698, 610, 408, 372, 480, 672, 720, 912, 624, 336, 324, 360, 696, 456, 636, 684, 756, 507, 312. Construct the probability plotting of this data on an ordinary graph paper and hence estimate 50 year and 100 year flood. (6+10)

- 5. (a) Derive an expression for the steady state discharge of well fully penetrating into a confined aquifer.
 - (b) List out the assumptions made in the analysis of steady radial flow into well. (8+8)
- 6. (a) List out the advantages and ill-effects of assured irrigation.
 - (b) What is meant by surface and sub-surface irrigation?. What are their types? (8+8)

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- 7. A stream of 130 liters per second was delivered from a canal and 100 liters per second were delivered to the field. An area of 1.6 hectare was irrigated in 8 hours. The effective depth of root zone was 1.7 m. The runoff loss in the field was 420 m³. The depth of water penetration varied linearly from 1.7 m at the head end of the field to 1.1 m at the tail end. Available moisture holding capacity of the soil is 20 cm per meter depth of soil. It is required to determine the water conveyance efficiency, water application efficiency, water storage efficiency, and water distribution efficiency. Irrigation was started at a moisture extraction level of 50 % of the available moisture. (16M)
- 8. (a) Describe Lacey's theory for the design of irrigation channel in alluvial soil.
 (b) Design an irrigation channel to carry a discharge of 7 cumec. Assume N = 0.0225 and m = 1. The channel has a bed slope of 0.25 m per kilometer. (8+8)