

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad -500 043

CIVIL ENGINEERING

TUTORIAL QUESTION BANK

Course Name	:	WATER RESOURCE ENGINEERING - I
Course Code	:	A50122
Class	:	III B. Tech I Semester
Branch	:	Civil Engineering
Year	:	2017 - 2018
Course Coordinator	:	Dr.G.V.Ramana, Professor, Department of Civil Engineering
Course Faculty : Dr.G.V.Ramana, Professor, Ms.B.Navya Assistant Professor, Department of		Dr.G.V.Ramana, Professor, Ms.B.Navya Assistant Professor, Department of Civil
		Engineering

OBJECTIVES

This course address the concept of present science of the practice of irrigation engineering which comprising partially all the modern developments which occurs in irrigation purpose. In this mainly the units are taken as metric unit which covers the total area which need for irrigation. In this we can know about water requirement of crops by hydrology, ground water, reservoir water and rain water storing. By this water recourses engineering we can know about design of irrigation structures and planning of reservoir as for flood control

- 1. Apply concepts of hydrologic cycle and precipitation and its applications
- 2. Learn how to measure rainwater, Infiltration, evaporation and runoff.
- 3. Learn how to measure base flow and find the analysis of base flow separation
- 4. Understand the unit, S, SUH and synthetic hydrograph.
- 5. Design the discharge of flood frequency

S.No	QUESTION	Blooms	Course
		taxonomy level	Outcom
			es
	UNIT - I		
	HYDROLOGY		
Part -	A (Short Answer Questions)		
1	Draw the hydrological cycle?	Understand	1
2	What are the reasons for error in measurement of precipitation?	Understand	1
3	Define Readily available soil moisture?	Understand	1
4	How can we reduce the water usage?	Understand & Remember	1
5	What do mean by term 'HYDROLOGY'	Remember	1
6	Write the applications of hydrology.	Understand	1
7	Name the types of rain-gauges?	Understand & Remember	1

8	How will you select the site for rain gauge?	Understand	1
9	What do mean by catchment area?	Remember	1
10	Define permanent wilting point?	Understand	2
11	Define rainfall double mass curve?	Understand & Remember	2
12	How will you calculate optimum number of rain gauge??	Understand	2
13	How can you measure the infiltration?	Understand	2
14	What is evapotranspiration and evaporation?	Remember	2
15	What is transpiration? Define.	Remember	2
16	How will you consider the adjustment of record of rainfall data?	Understand	2
17	How will you measure flow in stream and rainfall?	Understand	2
18	Define Runoff? What are the types of Runoff?	Understand & Remember	2
19	Name the methods used for measuring evapotranspiration.	Understand	2
20	What are infiltration indices?	Remember	2
Part -	B (Long Answer Questions)		
1	Explain the methods of estimating missing rainfall data at a station in a basin.	Remember &Understand	1
2.	Explain step by step procedure you would adopt to prepare the depth- area duration curves for a particular storm for a basin having a number of rain-gauges, most of which are recording.	Remember & Understand	1
2	Explain the following in brief. (a) Probable maximum precipitation (b) Rain gauge density.	Remember & Understand	1
3	Discuss the analysis of rainfall data with respect to time, space, frequency and intensity.	Remember & Understand	1
4	Explain the balanced equation for precipitation.	Remember	1
5	Describe the terms i Interception and ii Depression storage.	Remember	1
6	Describe with the help of sketch various forms of soil moisture. Which of these soil moistures is mainly available for utilization by the plants?	Remember	1
7	Write short notes on: (i) Double-mass curve (ii) Cold and warm fronts (iii) Cyclones and anticyclones.	Remember	2
6	Write short notes on: (i) Pan Co-efficient (ii) \$\overline{0}\$-index (iii) Evaporation opportunity.	Creating	2
7	Evaporation is indirectly a cooling process. Justify the statement. Discuss the factors affecting evaporation.	Remember & Understand	2
8	Discuss the various factors affecting evapotranspiration.	Remember & Understand	2
9	Distinguish between the potential evapotranspiration and the actual evapo- transpiration.	Remember & Understand	2
10	Bring out the difference between evaporation, transpiration, evapotranspiration and consumptive use.	Remember & Understand	2
11	Write notes on the following: (i). Permanent Wilting point (ii). Temporary Wilting point (iii). Readily available soil moisture	Remember	1

12	Explain energy budget method of computing lake evaporation. What are its limitations?	Remember & Understand	2
13	What factors are considered while locating a gauge-discharge site?	Remember & Understand	1
14	Write short notes on: (i)Isochrones (ii)Time of concentration	Remember & Understand	1
15	Explain the following in brief. (a) Isohyet (b) Average Annual Rainfall	Remember & Understand	1
16	Explain any one method used for finding evapotranspiration?	Remember & Understand	2
17	What are the factors affecting infiltration?	Remember & Understand	2
18	How do you measure the evaporation?	Remember & Understand	2
19	Explain rational formulae for runoff over catchment area.	Remember & Understand	2
20	Differentiate between: infiltration rate and infiltration capacity.	Remember	2
Part -	C (Problem Solving and Critical Thinking Questions)		
1	A basin has the area in the form of a pentagon with each side of length 20Km. The five raingauges loc ted at the corners A, B, C, D and E have recorded 60, 81, 73, 59 and 45 mm of rainfall respectively. Compute average depth of rainfall over the basin using arithmetic mean and Theissen polygon methods.	Understand	1
2	The annual rainfalls at 7 raingauge stations in a basin are 58, 94, 60, 45, 20, 88 and 68cm respectively. What is the percentage accuracy of the existing network in the estimation of average depth of rainfall over the basin. How many addit ional gauges are required, if it is desired to limit the error to only 10%.	Understand	1
3	An outlet is to be designed for a town covering 25 km2, of which road area is 30%, residential area 40% and rest industrial area. The slope of the catchment is 0.004 and maximum length of the town measured in map is 3 km. From depth duration analysis the following information is obtained. Rainfall Duration (min) 30 45 60 Rainfall Depth (mm) 15 20 30 Calculate the peak discharge. The coefficients for road is 0.80, residential area 0.40 and industrial area is 0.20.	Understand	1
4	The ordinates of a 4-hour unit hydrograph are given below. Derive the ordinates of a 8-hour unit hydrograph by the S-curve method.Time (hr)4-hr UGO (cumec)Time (hr)4-hr UGO (cumec)0024103424286488232361215936171618440620151440	Understand	1

	The average rainfall over 45 ha of watershed for a particular storm was as follows: The volume of runoff from this storm was determined as 2.25 ha-m. Establish the ϕ -index		
5	Time (hr): 0 1 2 3 4 5 6 7	Understand	1
	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		
	Cumulative rainfall during a storm are:		
	$\begin{array}{cccccccccccccccccccccccccccccccccccc$		
6	Rainfall (mm)	Understand	1
	Assume an initial abstraction loss of 10 mm and a constant infiltration loss rate		
	of 5.0 mm/ h. Calculate the storm runoff volume from the catchment of 122 sq.		
	The rate of rainfall for the successive 30 min period of a 3-hour storm is: 1.6,		
7	3.6, 5.0, 2.8, 2.2, 1.0 cm/hr. The corresponding surface runoff is estimated to	Remember	1
	UNIT - Π		
Dort	HYDROGRAPH ANALYSIS		
Part -	A (Short Answer Questions)	TT 1 1	
1	What do you mean by base flow?	Understand	4
2	What do you understand about flood hydrograph?	Understand	3
3	Define return period and exceedence probability?	Understand	
4	Define Unit hydrograph?	Understand &	4
5		Remember	4
6	Define S- hydrograph?	Understand	4
7	Define Maximum probable flood?	Understand	4
8	Define Design flood?	Understand & Remember	3
9	Define Annual series?	Remember	3
10	Define Partial series?	Understand &	3
11	Write the formulae used to calculate unit hydrograph.	Understand	4
12	Expand S-Hydrograph?	Understand	4
13	Who introduced unit hydrograph theory.	Understand &	
15	Exploin instantaneous hydrograph	Remember	+
14	What is recession time?	Understand	4
15	Write Dicken's formula for flood discharge	Remember Understand &	3
16	Whe Dieken's formula for nood discharge.	Remember	4
17	What is flood frequency?	Remember	4
18	What is basin lag?show in the graph?	Understand & Remember	4
19	What are ungauged rivers?	Remember	3
20	What do mean by complex storm?	Remember	4
Part -	B (Long Answer Questions)		
1	Define unit hydrograph. What are the assumptions underlying the unit hydrograph theory.	Understand	4

2	What does the word unit refer to in the unit hydrograph? Explain with sketches what do you understand by the principle of linearity and principle of time invariance in the unit hydrograph theory?	Understand	4
3	Describe how recession constants of direct runoff and base flow curves are obtained from a semi log arithmetic plot.	Understand	4
4	Describe with the help of neat sketches any three methods of separation of base flow from the hydrograph of runoff (i.e. stream flow hydrograph) indicating the situation under which you advocate them	Understand	4
5	How is runoff estimated using Strange's tables and Barlow's tables	Understand & Remember	4
6	Describe SCS method in detail.	Understand & Remember	4
7	What do you understand by the principle of linearity and time invariance in unit hydrograph?	Understand & Remember	4
8	What are the applications of unit hydrograph?	Remember	4
9	Explain the terms: (i). Recurrence interval (ii). Probable maximum precipitation.	Understand	4
10	What are the limitations of unit hydrograph?	Understand & Remember	4
11	Explain in detail about synthetic unit hydrograph?	Remember	4
12	What are the uses of unit hydrograph.	Understand & Remember	4
13	Explain the terms: (i)Annual series (ii). Partial duration series	Understand & Remember	4
14	Describe how unit hydrograph can be used to predict the runoff from a storm.	Understand & Remember	4
15	List out and explain various physiographic factors affecting runoff.	Remember	3
16	What are the various components of runoff? Describe how each component is derived in the runoff process.	Understand	3
17	State the significance of inflection point on recession side of the hydrograph. Also explain the different factors that effect the shape of the hydrograph.	Remember	3
18	Describe the method of deriving unit hydrograph from complex storms .	Remember	4
19	Discuss a method to obtain UH from complex storms.	Understand	4
20	What do you mean by Antecedent precipitation index? Explain.	Understand & Remember	3
Part –	C (Problem Solving and Critical Thinking)		
1	A drainage basin has the following characteristics. Basin area = 2500 sq. km. Length of the main stream $L = 110$ km Distance from the centroid of the basin to outlet = 7 0 k m. Constuct the 4 hour synthetic unit hydrograph for the basin if Ct = 1 .5 0 and Cp = 0 .6	Understand	3
2	A 4h hydrograph for a project site in Mahanadi Basin is given below. Calculate 2 -h UH by S-hydrograph approach. Time (h) 0 2 4 6 8 10 12 14 16 18 20 22 24 26 UH ordinates 0 30 10 17 21 18 12 80 40 35 68 20 15 50 (m3 / sec)	Understand	3

	For a river reach K is hydrograph. Take $O1 =$ attenuation and translation	28 h and X is I1 for the beginn n of the peak.	0.25. Route the ning step. Deter	e following mine the v	g inflow values of		
3	Time(h) = 0	0 6 12	18 24 30	36 42	48 54	Understand	3
	$\frac{1}{1} \frac{1}{1} \frac{1}$	0 0 12	10 24 50 114 70 EC	44 20	24 20		
	1 mow (m [*] /sec) 30	02 242 170	114 (8 00	44 38	34 30		
	Compute the runoff vol	lume from a ca	tchment of 120	0 Sq.km f	rom the		
	following data. Use Khoshla's metho	d and assume that	the area belong	to Andhra	Pradesh.		
	Months	Jan Feb	Mar Apr	May	June		
	Rainfall (mm)	8.5 10	6 50	34	150		
4	Temp ⁰ C	24 26	35 38	36	32	Understand	4
	Months	July Aug	Sept Oct	Nov	Dec		
	Rainfall(mm)	180 220	110 80	50	15		
	Temp ⁶ C	30 31	27 23	21	20		
	The peak discharge and	time to peak in a	3 h unit hydro	graph deriv	ved for a		
	basin of area 250 km2 w	ith $L = 30$ km an	Lc = 14 km a	are $50m3 / s$	and 9 h		
5	respectively. Assuming	that Snyder's s	synthetic unit h	nydrograph	applies	Understand	3
	upper 180 km ² of the same	t and Cp. Determine watershed which	the $2 h$ unit $2 h$ unit $2 h$ unit $2 h$ bas $L = 20 \text{ km}$	and $L_{c} = 11$	n for the		
	A drainage basin has an ar	rea of 3800 km2.	Determine :				
	i. lag period						2
6	ii. Peak discharge	e of a 9-hour unit hy	vdrograph from t	he followin	o data:	Remember	3
	$L = 320 \text{ km}, L_{ca} = 200 \text{ km},$	$C_t = 0.9, C_p = 4.0$	0.	ne tonowin	5 uata.		
	A water shed of 3130 sq.	. km was subjected	ed to a storm of	4 hr durat	ion from		
	Time (h) 3 6 9	12 15 18 21	24 3 6	9 12 1	5 18 21		
7	Discharge 20 16 175 2	70 230 200 170	150 130 115	100 90 8	NO 70 60	Understand	3
	(cumecs)	10 200 200 110	100 100 110	100 00 0			
	Obtain an UH for the wate	ershed					
	A 4h hydrograph for a pro	oject site in Mahar	nadi Basin is giv	en below. (Calculate		
	2 -h UH by S-hydrograph	approach.					
8	Time (h) 0 2	$4 \ 6 \ 8 \ 1$	0 12 14 16	18 20	22 24 2	Understand	4
0	UH ordinates 0 30 1	10 170 210 18	80 120 80 40	35 20	15 5	Understand	+
	(m^3/sec)				-• •		
	The ordinates of a 12- hr	unit hydrograph a	are given below.	Compute a	a 6- hour		
0	unit hydrograph ordinates					TT 1 . 1	
9	Time (h) 0	6 12 18 24	30 36 42	48 54 60	06672	Understand	4
	12-hr UCO (cumec) 0	1 4 8 16	10 15 12	8 5 3	2 1		
		1 4 0 10	UNIT-III	0 0 0	<u> </u>		
Deert		G	ROUND WATI	ER			
Part -	A (Short Answer Questio	ons)					
1	Define aquifer?					Understand	5
2	What are the different typ	es of aquifers?				Understand	5
3	Define porosity?					Understand	5
4	Define Specific yield?					Understand	6

5	Define specific retention?	Understand	5
6	Define Permeability?	Understand	5
7	Define transmissibility?	Understand	5
8	Define Storage coefficient?	Understand &Remember	6
9	What are the types of wells?	Understand &Remember	6
10	Ground water and surface water, Which water is more pure?	Understand	5
11	Define well development?	Understand	6
12	What do mean by well construction?	Understand	6
13	Explain darcy's law.	Understand	5
14	Define aquitard and give the examples.	Understand	5
15	Define aquiclude and give the examples.	Understand	5
16	Define aquifuge and give the examples.	Understand	5
17	What are the parameters considered in aquifer .name them.	Understand &Remember	5
18	What do you mean by unconfined aquifer?	Remember	5
19	What do mean by radial flow .give an example	Understand & Remember	5
20	Which type of flow is generally considered in the aquifer.justify.	Understand& Remember	5
Part -	B (Long Answer Questions)		
1	Write short notes on: (a) Specific capacity of a well (b) specific yield of an aquifer (c) Aquifer and aquiclude	Understand & Remember	5
1	 Write short notes on: (a) Specific capacity of a well (b) specific yield of an aquifer (c) Aquifer and aquiclude Distinguish between Groundwater and Perched groundwater. 	Understand & Remember Understand	5
1 2 3	 Write short notes on: (a) Specific capacity of a well (b) specific yield of an aquifer (c) Aquifer and aquiclude Distinguish between Groundwater and Perched groundwater. Distinguish between Open wells and tube wells. 	Understand & Remember Understand Understand	5 5 6
1 2 3 4	 Write short notes on: (a) Specific capacity of a well (b) specific yield of an aquifer (c) Aquifer and aquiclude Distinguish between Groundwater and Perched groundwater. Distinguish between Open wells and tube wells. Distinguish between Water table and artesian aquifers. 	Understand & Remember Understand Understand Understand	5 5 6 5
1 2 3 4 5	 Write short notes on: (a) Specific capacity of a well (b) specific yield of an aquifer (c) Aquifer and aquiclude Distinguish between Groundwater and Perched groundwater. Distinguish between Open wells and tube wells. Distinguish between Water table and artesian aquifers. Distinguish between Confined aquifer and water table aquifer 	Understand & Remember Understand Understand Understand Understand	5 5 6 5 5 5
1 2 3 4 5 6	 Write short notes on: (a) Specific capacity of a well (b) specific yield of an aquifer (c) Aquifer and aquiclude Distinguish between Groundwater and Perched groundwater. Distinguish between Open wells and tube wells. Distinguish between Water table and artesian aquifers. Distinguish between Confined aquifer and water table aquifer Write notes on the following: i. Spherical flow in a well, ii Interference among wells 	Understand & Remember Understand Understand Understand Understand Understand & Remember	5 5 6 5 5 6
1 2 3 4 5 6 7	Write short notes on: (a) Specific capacity of a well (b) specific yield of an aquifer (c) Aquifer and aquiclude Distinguish between Groundwater and Perched groundwater. Distinguish between Open wells and tube wells. Distinguish between Water table and artesian aquifers. Distinguish between Confined aquifer and water table aquifer Write notes on the following: i. Spherical flow in a well, ii Interference among wells Distinguish between Permeability and transmissibility.	Understand & Remember Understand Understand Understand Understand Understand & Remember Understand	5 5 6 5 5 6 5
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1 2 3 4 5 6 7 8 9	 Write short notes on: (a) Specific capacity of a well (b) specific yield of an aquifer (c) Aquifer and aquiclude Distinguish between Groundwater and Perched groundwater. Distinguish between Open wells and tube wells. Distinguish between Water table and artesian aquifers. Distinguish between Confined aquifer and water table aquifer Write notes on the following: i. Spherical flow in a well, ii Interference among wells Distinguish between Permeability and transmissibility. Differentiate between shallow dug wells and deep dug wells. How the dug well is constructed? Enumerate the methods which are used for determining the yield of dug wells. Discuss briefly any one of these methods. 	Understand & Remember Understand Understand Understand Understand Understand & Remember Understand Understand Understand	5 5 6 5 6 5 6 5 6 6 6 6
1 2 3 4 5 6 7 8 9 10	 Write short notes on: (a) Specific capacity of a well (b) specific yield of an aquifer (c) Aquifer and aquiclude Distinguish between Groundwater and Perched groundwater. Distinguish between Open wells and tube wells. Distinguish between Water table and artesian aquifers. Distinguish between Confined aquifer and water table aquifer Write notes on the following: i. Spherical flow in a well, ii Interference among wells Distinguish between Permeability and transmissibility. Differentiate between shallow dug wells and deep dug wells. How the dug well is constructed? Enumerate the methods which are used for determining the yield of dug wells. Distinguish with sketches if necessary, the difference between unconfined and confined aquifer 	Understand & RememberUnderstandUnderstandUnderstandUnderstandUnderstandUnderstand & RememberUnderstandUnderstandUnderstandUnderstandUnderstandUnderstandUnderstandUnderstandUnderstandUnderstandUnderstandUnderstandUnderstandUnderstand	5 5 6 5 5 6 5 6 6 6 5 5
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14	Define and explain the following terms as use water i. Capillary fringe, ii. Pellecular water, iii . Field capacity	ground	Remember	5		
15	Write notes on the following: i. Capillary water , ii. Hygroscopic water iii. Gravitational water		Understand	5		
16	Define the terms:i)full supply coefficient ii)root ze	one depth.			Understand	5
17	Explain in brief about the types of wells?				Remember	6
18	Draw a neat sketches of confined and unconfined	aquifers.jus	stify		Understand & Remember	5
19	Explain in details about the construction of wells?	?			Understand & Remember	6
20	Define: i) outlet factor ii) capacity factor				Understand	5
Part -	C (Problem Solving and Critical Thinking)			•		•
1	A Flood of 1000 cumec exceeded 60 times during of 3500 cumes exceeded twice. Determine the ar recurrence interval for both the floods	g a period o nnual proba	f 30years. bility and	A flood average	Understand	5
2	Design a tube well for the following data : Yield required = 0.2 cumec Thickness of confined aquifer = Radius of circle of influence = 3 Permeability coefficient =80m/ Drawdown= 6m	-40 m 30 0m day			Remember & Understand	5
3	The following data are observed in a stream by a Distance from bank (m) Depth (m) No.of Revolutions at 0.6d Time Seconds Distance from bank (m) Depth (m) No.of Revolutions at 0.6d Time Seconds The current meter rating equation is given as V = is No. of Revolutions per second. Calculate the ri	Price currer 0 0 0 15 1.90 115 125 0.33 + 0.03 ver discharg	tt meter. 3 0.6 90 184 18 1.6 110 125 N m/sec. v	5 1.2 95 125 21 1.4 95 125 vhere N	Understand	5
4	A well with a radius of 0.5m penetrates completely a confined aquifer of thickness 40 m and permeability 30m /day. The well is pumped so that the water level in the well remains at 7.5m below the original piezometric surface. Assuming that the radius of influence is 500m compute the steady state discharge from the well				Understand	5
5	A 20 cm well penetrates 30 m below static water pumping at a rate of 1800 lpm, the drawdowns in and 36 m from the pumped well are 1.2 m and 0 the i. Transmissibility of the aquifer ii Drawdown in the pumped well assum m iii. Specific capacity of the well.	level. After the observa 0.5 m respecting radius of	er a long pe attion wells tively. De f influence	eriod of at 12 m termine as 300	Remember	5

6	A tube well of 30m diameter penetrates fully in an artesian aquifer. The strainer length is 15 m. Calculate the yield from the well under a drawdown of 3 m. The aquifer consists of sand of effective size of 0.2 mm having coefficient of permeability equal to 50 m/day. Assume radius of influence is equal to 150 meters	Understand	5
7	A loam soil has field capacity of 22% and wilting coefficient of 10%. The dry unit weight of soil is 1.5 g/cm 3. If the root zone depth is 70 cm, deter mine the storage capacity of the soil. Irrigation water is applied if the moisture content falls to 14%. If the water application efficiency is 75%, determine the water depth req uired to be applied in the field	Understand	5
8	The CCA for a distributory is 15000 ha. The intensity of irrigation is 40% for rabi and 10% for rice. If kor period is 4 weeks for rabi and 2.5 weeks for rice, determine the outlet discharge. Outlet factor for rabi and rice may be assumed as 1800 ha /m3 / sec and 775 ha /m3 / sec. What is design discharge of distributory head at 10% conveyance	Understand	5
9	During a recuperation test, the water in an open well was depressed by pumping by 2.5 meters and it recuperated 1 .8 meters in 0 minutes. Find i. Yield from a well of 4m diameter under a depression head of 3 meters, ii. The diameter of the well to yeild 8 litrers/second under a depression head of 2 meters.	Understand	6
10	An unconfined aquifer has an area extent of 15km2. When 9.5 million cubic metres of water was pumped out, the water table was observed to go down by 2.4m. What is the specific yield of the aquifer? If the water table of the same aquifer rises by 12.5 m during a monsoon season, what is the volume of recharge?	Understand	5
	UNIT-IV	NGUID	
Part –	A (Short Answer Questions)	JNSHIP	
1	Define Irrigation?	Understand	7
1 2	Define Irrigation? What are the different types of soils?	Understand Understand	7 8
1 2 3	Define Irrigation? What are the different types of soils? What do you understand about full supply coefficient?	Understand Understand Understand	7 8 7
1 2 3 4	Define Irrigation? What are the different types of soils? What do you understand about full supply coefficient? What are the ill effects of irrigation?	Understand Understand Understand Understand	7 8 7 7 7
1 2 3 4 5	Define Irrigation? What are the different types of soils? What do you understand about full supply coefficient? What are the ill effects of irrigation? What standards required for Irrigation water?	Understand Understand Understand Understand Understand	7 8 7 7 7 7
$ \begin{array}{c} 1\\ 2\\ 3\\ 4\\ 5\\ 6 \end{array} $	Define Irrigation? What are the different types of soils? What do you understand about full supply coefficient? What are the ill effects of irrigation? What standards required for Irrigation water? Define Duty and Delta?	Understand Understand Understand Understand Understand Understand	7 8 7 7 7 7 8
$ \begin{array}{c} 1 \\ 2 \\ 3 \\ 4 \\ 5 \\ 6 \\ 7 \\ 7 \end{array} $	Define Irrigation? What are the different types of soils? What do you understand about full supply coefficient? What are the ill effects of irrigation? What standards required for Irrigation water? Define Duty and Delta? What do you know about the water conveyance efficiency?	Understand Understand Understand Understand Understand Understand Understand	7 8 7 7 7 7 8 7
$ \begin{array}{c} 1 \\ 2 \\ 3 \\ 4 \\ 5 \\ 6 \\ 7 \\ 8 \\ \end{array} $	Define Irrigation? What are the different types of soils? What do you understand about full supply coefficient? What are the ill effects of irrigation? What standards required for Irrigation water? Define Duty and Delta? What do you know about the water conveyance efficiency? What do you understand about vertical distribution of soil moisture?	Understand Understand Understand Understand Understand Understand Understand Understand	7 8 7 7 7 7 8 8 7 8
$ \begin{array}{c} 1 \\ 2 \\ 3 \\ 4 \\ 5 \\ 6 \\ 7 \\ 8 \\ 9 \\ \end{array} $	Define Irrigation? What are the different types of soils? What do you understand about full supply coefficient? What are the ill effects of irrigation? What standards required for Irrigation water? Define Duty and Delta? What do you know about the water conveyance efficiency? What do you understand about vertical distribution of soil moisture? Define water logging?	Understand Understand Understand Understand Understand Understand Understand Understand Understand	7 8 7 7 7 7 8 7 8 7 8 7
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$ \begin{array}{c} 1\\ 2\\ 3\\ 4\\ 5\\ 6\\ 7\\ 8\\ 9\\ 10\\ 11\\ 12\\ 13\\ 14\\ 15\\ \end{array} $	Define Irrigation?What are the different types of soils?What do you understand about full supply coefficient?What are the ill effects of irrigation?What standards required for Irrigation water?Define Duty and Delta?What do you know about the water conveyance efficiency?What do you understand about vertical distribution of soil moisture?Define mater logging?Define field capacity?What do mean by irrigation efficiency?What do you understand by the term 'Water Course'?What is the type of soil present in india for irrigation?What do mean by artificial irrigation .give an example	Understand Understand Understand Understand Understand Understand Understand Understand Understand Understand Understand Remember Remember Remember	7 8 7 7 7 8 7 8 7 8 7 8 7 8 7 8 7 <td< td=""></td<>
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20	What is the formula used for finding frequency of irrigation?	Understand	7		
Part –	Part – B (Long Answer Questions)				
1	Discuss various methods of irrigation and state the advantages of each method.	Understand	7		
2	Describe the step by step procedure for preparation of land for irrigation	Understand & Remember	7		
3	Discuss in brief, various methods of surface irrigation.	Understand & Remember	7		
4	What is meant by C2-S2 water?. Discuss its usefulness for irrigating fine textured soils.	Understand	8		
5	Write short notes on: i. Applicability of lift irrigation ii. Mixed cropping	Understand	7		
6	Explain in detail about the ill-effects of irrigation	Understand	7		
7	What is meant by `Border flooding' How does it differ from `Check flooding' and `free flooding'?	Remember	7		
8	What is meant by Check flooding'	Remember	7		
9	(a) What is meant by Furrow irrigation and Sprinkler irrigation? Which one is preferred in India and Why.	Understand & Remember	7		
10	Define Irrigation. What is the necessity of irrigation?	Understand	7		
11	Describe in brief some of the important irrigation projects and multipurpose river valley projects under taken or completed after independence of our country.	Understand & Remember	8		
12	Explain as how the following factors effect the duty of a crop. i. soil and sub soil condition ii. Stage of growth iii. Temperature iv. Rainfall	Understand	8		
13	What is meant by flow duty and quantity duty?	Remember	8		
14	Define the terms Duty, Delta and base period and also derive the relation between them	Understand	8		
15	Explain the following terms: i. Field capacity ii. Moisture equivalent iii. Available moisture	Understand & Remember	8		
16	Define irrigation efficiency. List out different types of irrigation efficiencies. Explain any two of them.	Understand	7		
17	Define Consumptive use of water? List out various methods used for the assessment of consumptive use of water? Explain any one method in detail for the estimation of consumptive use	Understand & Remember	7		
18	(a) Why soil is necessary for plant life. Explain the classification of soils based on geological process of formation.	Understand	8		
19	Write down the classification of irrigation water based on sodium absorption ratio and its suitability for irrigation.	Understand	7		
20	What is meant by duty and delta of canal water? Derive a relation between duty and delta for a given base period.	Understand	8		
Part -	Part – C (Problem Solving and Critical Thinking)				

1	Determine the storage capacity of soil from the following data: Field Capacity = 30% Wilting point = 14% Depth of Root zone = 1.20 m Dry Unit weight of soil = 1.7 g/cc Also determine the depth of water required in the field if irrigation water is supplied when the moisture content falls to 20% and the field application efficiency is 80%. If the conveyance losses in the water courses and field channels are 16% of the outlet discharge, calculate the depth of water needed at the canal outlet.	Understand	7
2	What is the classification of irrigation water having the following characteristics? Concentration of Na , Ca and Mg are 22 ,3 and 2.5 milli- equivalents per liter respectively and the electrical conductivity is 200 micro mhos percm at 250C ? What problems may rise in using this water on fine textured soils? What remedies do you suggest to overcome this trouble?	Understand	7
3	A watercourse has a culturable command area of 1200 ha. The intensity of irrigation for crop A is 40% and for B is 35%, both the crops being Rabi crops. Crop A has a kor period of 20 days and crop B has a kor period of 15 days. Calculate the discharge of the watercourse if the depth for crop A is 10 cm and for B is 16 cm.	Understand	7
4	An outlet has 600 ha, out of which only 75% is cultivable. The intensity of irrigation for Rabi and Kharief seasons are 70% and 30% respectively. Assuming losses in conveyance system as 10% of the outlet discharge, determine the discharge at the head of the irrigation channel. Take outlet discharge factor for Rabi season as 1500 ha/cumecs and for Kharief season as 750 ha/cumecs.	Remember	7
5	Determine the storage capacity of soil from the following data: Field Capacity = 30% Wilting point = 14% Depth of Root zone = 1.20 m Dry Unit weight of soil = 1.7 g/cc Also determine the depth of water required in the field if irrigation water is supplied when the moisture content falls to 20% and the field application efficiency is 80%. If the conveyance losses in the water courses and field channels are 16% of the outlet discharge, calculate the depth of water needed at the canal outlet.	Understand	8
6	After how many days the farmer should apply water to his field to ensure efficient use of irrigation water, if the field capacity is 27%, permanent wilting point is 14%, density of soil is 1500 kg/m3, effective root zone depth 0.75 m and daily consumptive use of water is 11 mm.	Understand	8
7	In a certain area paddy crop requires 14 cm of depth of water at an interval of 10 days for a base period of 110 days; Whereas wheat crop requires 9.0 cm of depth of water after 35 days with a base period of 140 days. Determine the delta of paddy crop and duty of wheat crop of that area.	Remember	8
8	800 m3 of water is applied to a farmer's rice field of 0.6 hectares. When the moisture content in the soil falls to 40% of the available water between the field capacity of 36% of soil and permanent wilting point is 15% of the soil crop combination, determine the filed application efficiency. The root zone depth of rice is 60cm. Assume porosity as 0.4.	Remember	7
9	The base period of Paddy is 120 days. If the duty for this is 900 hectares/cumecs. find the value of delta.	Remember	7

	The base period canal system canal losses an	od, the intensity are given in the re 23% and rese					
	Crop	Base period	Duty at the	Area under the			
		(days)	field(ha/cumecs)	crop(ha)			
10	Wheat	120	1800	4500		Understand	7
	Sugarcane	360	800	5400			
	Cotton	200	1400	2200			
	Rice	120	900	2200			
	Vegetables	120	700	1800			
		IDDIO		IT-V		,	
Part -	A (Short Ansv	ver Questions)	ATION CANALS A	IND DESIGN DIS	CHARGE	4	
1	What is the di	fference betwee	n the lake and a canal	?		Understand	9
2	Name the two	different types	of silt theories?			Remember	9
3	What do you meant by initial and final regime of channels?					Remember & Understand	9
4	What are the merits of Lacey's theory?					Remember & Understand	9
5	Why do we ne	ed to provide si	Understand	9			
6	What do you u	inderstand abou	Understand & Remember	9			
7	What is meant	Remember	9				
8	What do you know about Gumbels method of flood frequency analysis?					Remember & Understand	9
9	What is the di	fference betwee	Remember & Understand	9			
10	Which rational formula gives the best results for flood frequency analysis?					Understand	9
11	What is meant	by detention st	Understand	9			
12	What is the IS	standards used	for canal design?			Understand	9
13	Why is the stre	eam gauging is	used?			Understand	9
14	What is kenne	dy's theory?				Remember & Understand	9
15	What is lacey's theory?					Remember & Understand	9
16	What do you r	nean by canal?				Remember	9
17	What do you r	nean by reservo	ir?			Remember	9
18	What are the types of canals?					Understand	9
19	What is flood frequency?					Understand	9
20	Name the met		Understand	9			
Part -	B (Long Answ	er Questions)	•				
1	Write short no i. free ii. Pe iii. In iv. E	tes on the follow boarding in ca rmanent land w spection road Berm	wing : nals idth			Remember	9

2	Write down the classification of canals. Explain canal alignment	Remember	9
3	Write short notes on the following : i. Inspection road ii. Berm iii regime channels	Remember	9
4	Why is Lacey's conception is superior to that of Kennedy's?	Understand	9
5	What do you understand by Initial and final regime of channels?	Remember	9
6	When do you classify the channel as having attained regime condition?	Understand	9
7	Describe briefly the observations of Lacey on the regime of river.	Remember	9
8	Discuss critically the statement "The bank s of an unlined channel are more Susceptible to erosion than its bed, and hence the stability of the bank s and not of its bed is the governing factor in unlined canal designs".	Understand	9
9	Explain the following terms in detail. i. Ridge canal ii. Side slope canal	Understand & Remember	9
10	What is the necessity of drainage below the lining? Discuss the various drainage and pressure release arrangements.	Remember	9
11	Using Lacey's basic regime equations derive an expression for Lacey's scour depth.	Understand & Remember	9
12	What is meant by scour? What precautions do you take against it during the design of weirs?	Remember	9
13	Explain the mid-section method of computing the discharge in a stream.	Remember	9
14	Show in a neat sketch, the positions of velocity measurements over the cross sectional area of the stream.	Understand & Remember	9
15	Draw a typical cross section of a barrage founded on pervious foundations and explain its salient features.	Remember	9
16	Explain how Khosla's theory is modification over Bligh's theory.	Understand & Remember	9
17	What is Khosla's safe exit gradient?	Understand & Remember	9
18	Distinguish between: i. Detention storage and depression storage ii. Drainage density and drainage divide.	Understand & Remember	9
19	What do you understand by critical gradient? What will happen if the critical gradient is exceeded?	Remember	9
20	Distinguish between: i. Overland flow and interflow ii. Influent and effluent streams	Remember	9
Part	- C (Problem Solving and Critical Thinking)		
	Design a trapezoidal shaped concrete lined channel to carry a discharge of 100 cumecs at a slope of 25 cm/ km. The side slopes of the channel are 1.5:1. The value of N may be taken as 0.016. Assume the limiting velocity as 1.5 m/sec	creating	9
	Design a trapezoidal shaped concrete lined channel to carry a discharge of 100 cumecs at a slope of 25 cm/km. The side slopes of the channel are 1.5:1. The value of N may be taken as 0.016. Assume the limiting velocity as 1.5m/sec.	Understand	9
3	Design an irrigation channel section for the following data. Discharge= 40 cumecs, Silt factor=1.0, Side slopes= ¹ / ₂ : 1 Determine the longitudinal slope also	Understand	9
4	Design a channel section by Kennedy 's theory given the following data: Discharg e Q =2828 cumecs Kut ter 's N=0 .0225	Understand	9

	Critical velocity ratio 'm' =1		
	Side slop $e = 1/2$: 1		
	B/D = 7.6		
	Find also the bed slop e of the channel.		
5	Using Lacey's theory, design an irrigation channel for the following data.		
	Discharge $Q = 50$ cumecs,	I In denote a d	0
	Silt factor 'f '=1 .0,	Understand	9
	Side slopes: 1 /2 : 1		
6	Mean and standard deviation from annual peak of a river covering 80 years of		
	data are 4100 m3/sec and 1600 m3/sec respectively. Using Gumbel's method,	Understand	9
	calculate the return period of the flood of 9100 m3/sec.		
	From the historical data of annual flood peaks of a catchment, the mean and		
7	standard deviation are estimated as 20000 m ³ /s and 10000 m ³ /s. An existing		
	structure on this catchment has been designed for 40000m3/sec. What could be	Understand	9
	its return period? Assume Gumbel's extreme value distribution with $n\sigma = 1.06$		
	and $ny = 0.52$.		
	From the analysis of available data on annual flood peaks of a small stream for a		
Q	period of 35 years, the 50 year and 100 year flood have been estimated to be 660	Understand	0
0	m3 / sec a nd 740 m3 / sec; using Gumbles metho d, estimate 200 year flood for	Understand	7
	the stream. Take $\sigma n = 1.12$ 84 7, $y_n = 0.54034$.		
	The slope of channel in alluvium is $S = 1/5000$ Lacey's silt factor=0.9. channel		
9	side slope= $1/2$:1 Find the channel section and maximum discharge, which can	Understand	9
	be allowed to flow in it		
	The following data has been obtained while gauging a stream.		
1 0	Main gauge reading $(m) = 20.10$ 20.10		
	Auxiliary gauge reading $(m) = 19.82 \ 19.13$		
	Discharge (cumecs) = $5.409.35$	Understand	9
	Calculate discharge when the main gauge is 20.10 m and Auxiliary		
	gauge is 19.52 m.		

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