(OR)

9. (a) Explain classification of storage of a reservoir into various zones. (7M) CO4
   (b) Explain the following, (7M) CO4
   (i) Classification of turbines
   (ii) Surge tank
   (iii) Classification of hydel schemes

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CE323 (R20)

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Hall Ticket Number:

CE323 (R20)

B.TECH. DEGREE EXAMINATION, SEPTEMBER-2024

Semester VI [Third Year] (Supplementary)

HYDROLOGY & IRRIGATION ENGINEERING

Time: Three hours Maximum Marks: 70

Answer Question No.1 compulsorily. (14 x 1 = 14)
Answer One Question from each unit. (4 x 14 = 56)

1. Answer the following:
   (a) How to determine optimal number of rain gauges required? CO1
   (b) Draw infiltration capacity curve. CO1
   (c) Define time of concentration. CO1
   (d) What is effective rainfall hyetograph? CO1
   (e) Define Dupuit's theorem. CO2
   (f) Define coefficient of permeability. CO2
   (g) Write the expression to measure the discharge by chemical method. CO2
   (h) When do you choose diversion irrigation scheme? CO3
   (i) Distinguish between saturation capacity and field capacity of soil. CO3
   (j) Write any two methods to improve duty. CO3
   (k) What is flood routing? CO4
   (l) What are factors effecting reservoir sedimentation? CO4
   (m) What is load duration curve? CO4
   (n) What is the function of draft tube? CO4

UNIT – I

2. (a) Explain various types of precipitation. (7M) CO1
   (b) Determine the minimum no. of rain gauge stations required for a catchment area for estimating mean rainfall with an allowable error of 5%, if the annual rainfalls recorded by the six rain gauge stations already existing in the catchment are as follows: (7M) CO1

Station	P	Q	R	S	T	U
Rainfall (cm)	130	142	118	108	165	102

(OR)

3. (a) Explain the step-wise procedure for the derivation of unit hydrograph of specified duration for a catchment. (7M) CO1
   (b) The following are the rates of rainfall for successive 1hour periods of a storm: 2.0, 4.5, 12.0, 10.5, 8.0, 5.0, 2.5, 2.25, cm/hr. Taking the value of Φ-index as 3.0 cm/hr, determine the net run-off in cm, the total rainfall and the value of W-index. (7M) CO1

UNIT – II

4. (a) Derive an equation for finding the yield from a tube well fully penetrating into confined aquifer. (7M) CO2
   (b) Explain various methods of measuring velocity of a stream. (7M) CO2

(OR)

5. (a) Explain the following methods of stream gauging: (7M) CO2
   (i) Area-Velocity method
   (ii) Ultra sonic method
   (iii) Chemical method
   (b) During a recuperation test conducted on an open well in a region, the water level in the well was depressed by 3 m and it was observed to rise by 1.5 m in 60 minutes. Determine the specific yield of open well in that region and what could be the yield from a well of 5 m diameter under a depression head of 2.5 m? (7M) CO2

UNIT – III

6. (a) Illustrate various surface irrigation methods with neat sketches. (7M) CO3
   (b) After how many days will you supply water to the field in order to get efficient irrigation, if field capacity of soil is 25%, permanent wilting point is 10%, dry density of soil = 1.5g/cc, effective depth of root zone is 80 cm and daily consumptive use of water for the crop is 10mm? (7M) CO3

(OR)

7. (a) Derive the relation between duty and delta. Also mention how to improve the duty? (7M) CO3
   (b) A water course has a culturable command area of 2000 Ha. The intensity of irrigation for crop A is 40% and for B 35%, both crops being Rabi crops. Crop A and B has kor period of 25 days and 15 days respectively. Kor depth for crop A and B has 20 cm and 15 cm respectively. Determine the discharge required in the water course if the canal losses are 20%. (7M) CO3

UNIT – IV

8. (a) Explain step by step procedure of Inflow – Storage – Discharge method (graphical method) of reservoir flood routing. (7M) CO4
   (b) Three turbo generators each of capacity 10000 kW have been installed at a Hydel power station. During a certain period, the load on the plant varies from 5000 kW to 25000 kW. Calculate (7M) CO4
   (i) Total installed capacity
   (ii) Load factor
   (iii) Utilization factor
   (iv) Plant capacity factor

the average annual sediment inflow is 2,00,000 tones. Assume specific weight of the sediment equal to 1.2 gm/cc. The useful life of reservoir will terminate when 80% of its initial capacity is filled with sediment. (7M) CO4

(b) Explain various component parts of hydro-electric power plant. (7M) CO4

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CE323 (R20)

Hall Ticket Number:

CE323 (R20)

B.TECH. DEGREE EXAMINATION, MAY-2024

Semester VI [Third Year] (Regular & Supplementary)

HYDROLOGY & IRRIGATION ENGINEERING

Time: Three hours Maximum Marks: 70

Answer Question No.1 compulsorily. (14 x 1 = 14)
Answer One Question from each unit. (4 x 14 = 56)

1. Answer the following:
   (a) Write the relation between rainfall, evaporation and runoff. CO1
   (b) What is S-curve hydrograph? CO1
   (c) What is evapo-transpiration? CO1
   (d) State the uses of unit hydrograph. CO1
   (e) Define Darcy's law. CO2
   (f) What is the difference between shallow and deep well? CO2
   (g) What is the purpose of Pitot tube? CO2
   (h) Define capacity factor. CO3
   (i) Why crop rotation is necessary? CO3
   (j) Which method of irrigation is suitable for row-crops? CO3
   (k) What is multi-purpose reservoir? CO4
   (l) Distinguish between safe and secondary yield of a reservoir. CO4
   (m) What are the methods of flood routing? CO4
   (n) Define plant capacity factor. CO4

UNIT – I

2. (a) Discuss about various rain gauges with neat sketches. (7M) CO1
   (b) Develop 3h-Unit Hydrograph for the basin from the following 6h-Unit Hydrograph of the same basin. (7M) CO1

Time (hrs)	0	3	6	9	12	15	18
Ordinates of 6h-UH	0	10	20	30	20	10	0

(OR)

3. (a) Explain the procedure of determining different duration unit hydrograph from known duration unit hydrograph. (7M) CO1

   (b) Determine the ordinates of S-curve for the given 3hr-Unit hydrograph of the basin. (7M) CO1

Time (hrs)	0	3	6	9	12	15	18
Ordinates of 6h-UH	0	10	20	30	20	10	0

UNIT – II

4. (a) Derive an equation for finding the yield from a tube well fully penetrating into Un-confined aquifer. (7M) CO2

   (b) Explain various methods of measuring discharge of a stream. (7M) CO2

(OR)

5. (a) Derive the discharge equation in an open well by constant level pumping out test and recuperation method. (7M) CO2

   (b) Explain various methods by which depth and stage of a stream can be determined. (7M) CO2

UNIT – III

6. (a) Explain drip irrigation with a neat diagram and mention its advantages. (7M) CO3

   (b) Explain various irrigation efficiencies and their importance. (7M) CO3

(OR)

7. (a) Explain the following: (7M) CO3
   (i) Field capacity
   (ii) Permanent wilting point
   (iii) Ultimate wilting point
   (iv) Optimum moisture content

(b) The base period, intensity of irrigation and duty of water for various crops under a canal system are given below. Determine the reservoir capacity if the culturable command area is 5000 hectares, canal losses are 20% and reservoir losses are 20%. (7M) CO3

Crop	Base period (days)	Duty at field (Ha/cumec)	Intensity of irrigation
Wheat	120	1800	20%
Sugar cane	360	1600	20%
Cotton	180	1400	10%
Rice	120	800	30%
Vegetables	120	700	20%

UNIT – IV

8. (a) Explain the step-by-step procedure of estimating minimum reservoir capacity required and also safe yield of an existing reservoir by mass inflow curve. (7M) CO4

   (b) Discuss the following: (7M) CO4
   (i) flow duration curve
   (ii) load duration curve
   (iii) power duration curve
   (iv) estimation of hydro-power potential

(OR)

9. (a) The following information is available regarding the relationship between trap efficiency and capacity-inflow ratio.

C/I	0.1	0.2	0.3	0.4	0.5
Trap eff.(%)	87	93	95	95.5	96

Estimate the probable life of reservoir with an initial reservoir capacity of 30 MCM, if the average annual flood inflow is 60 MCM and

(b) A runoff river plant has an installed capacity of 15000 kW and operates at 30% load factor when it serves as a peak load station. What should be the minimum discharge in the stream so that it may serve as a peak load station? The plant efficiency may be taken as 82% when working under a head of 25 m. Also calculate the maximum load factor of the plant when the discharge in the stream is 32 cumec. (7M) CO4

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Hall Ticket Number:

CE323 (R20)

B.TECH. DEGREE EXAMINATION, NOVEMBER-2023

Semester VI [Third Year] (Supplementary)

HYDROLOGY & IRRIGATION ENGINEERING

Time: Three hours Maximum Marks: 70

Answer Question No.1 compulsorily. (14 x 1 = 14)
Answer One Question from each unit. (4 x 14 = 56)

1. Answer the following:
   (a) List rain gauges. CO1
   (b) Define runoff. CO1
   (c) Define unit hydrograph. CO1
   (d) Mention the purpose of direct runoff hydrograph. CO1
   (e) Sketch stage discharge curve. CO2
   (f) What is the purpose of float? CO2
   (g) Classify aquifers. CO2
   (h) State the formulae to calculate yield of an open well using recuperating test. CO2
   (i) Mention the necessity of irrigation. CO3
   (j) Mention the purpose of furrow irrigation. CO3
   (k) Differentiate crop period and base period. CO3
   (l) Sketch demand curve. CO4
   (m) Classify reservoirs based on purpose. CO4
   (n) Define firm power. CO4

UNIT – I

2. (a) Explain evaporation and mention various methods to estimate with a neat sketch (7M) CO1
   (b) The normal annual rainfall at the stations A, B, C and D in a basin are 80.97, 67.59, 76.28 and 92.01 cm respectively. In the year 1975, the station D was inoperative and the stations A, B and C recorded annual precipitations of 91.11, 75.23 and 79.89 cm respectively. Estimate the rainfall at station D in that year (7M) CO1

(OR)

3. (a) Explain the procedure of construction of unit hydrograph for an isolated storm. (7M) CO1

(b) Find the ordinates of a storm hydrograph resulting from a 3 hour storm with rainfall of 2, 6.75 and 3.75 cm, during subsequent 3 hours intervals. The ordinates of unit 3 hour hydrograph are given below. (7M) CO1

Hours	3	6	9	12	15	18	21	24
Ordinates of unit hydrograph (cumec)	0	110	365	500	390	310	250	0

UNIT – II

4. (a) Differentiate electromagnetic induction method and ultrasonic method. (7M) CO2

(b) Classify current meter and explain various types with a neat sketch. (7M) CO2

(OR)

5. (a) Derive an expression to determine the rate of flow through unconfined aquifer using Dupuit's equation. (7M) CO2

(b) During a recuperation test conducted on an open well in a region, the water level in the well was depressed by 3 m and it was observed to rise by 1.75 m in 75 minutes. What is the specific yield of open wells in that region? What could be the yield from a well of 5 m diameter under a depression head of 2.5 m? What should be the diameter of the well to give a yield of 12 lit/s under a depression head of 2 m. (7M) CO2

UNIT – III

6. (a) Classify crops and state different soil moisture constants. (7M) CO3

(b) Determine the field capacity of soil for the following data: (7M) CO3
Depth of root zone = 1.80 m
Existing moisture = 8%
Dry density of soil = 1450 kg/m^3
Quantity of water applied to soil = 650 m^3
Water lost due to deep percolation and Evaporation =10%
Plot area = 1000 m^2

(OR)

7. (a) Explain the terms duty and delta. Derive the relationship between Duty, Delta and Base period. (7M) CO3

(b) What is the classification of irrigation water having the following characteristics: Concentration of Na, Ca & Mg are 22, 3 & 1.5 milli-equivalent per litter respectively and the electrical conductivity is 200 micro mhos per cm at 25^0 C. (7M) CO3

UNIT – IV

8. (a) Describe zones of storage of reservoir with a neat sketch. (7M) CO4

(b) Route the following flood hydrograph through a river reach for which K = 12.0 hr, and x = 0.20. At the start of the inflow flood, the outflow discharge is 10 cumec. (7M) CO4

Time (hr)	0	6	12	18	24	30	36	42	48	54
Inflow (m^3/s)	10	20	50	60	55	45	35	27	20	15

(OR)

9. (a) Sketch and explain flow duration curve and power duration curve. (7M) CO4

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Hall Ticket Number:

CE323 (R20)

B.TECH. DEGREE EXAMINATION, JULY-2023

Semester VI [Third Year] (Regular)

HYDROLOGY & IRRIGATION ENGINEERING

Time: Three hours | Maximum Marks: 70

Answer Question No.1 compulsorily. (14 x 1 = 14)
Answer One Question from each unit. (4 x 14 = 56)

1. Answer the following:
   (a) List forms of precipitation. CO1
   (b) Define design flood. CO1
   (c) Define hydrograph. CO1
   (d) Mention the purpose of S-Curve hydrograph. CO1
   (e) Sketch stage discharge curve. CO2
   (f) What is the purpose of current meter? CO2
   (g) State Darcy's law. CO2
   (h) Differentiate specific yield and specific retention. CO2
   (i) Define irrigation. CO3
   (j) Mention the purpose of drip irrigation. CO3
   (k) Differentiate duty and delta. CO3
   (l) Sketch mass curve. CO4
   (m) Classify life of reservoir. CO4
   (n) State the purpose of flow duration curve. CO4

UNIT – I

2. (a) Explain hydrologic cycle with a neat sketch. (7M) CO1
   (b) For a drainage basin of 600 sq km, isohyets for a given storm having the following data. Calculate the average depth of precipitation over an area. (7M) CO1

Isohyets (cm)	15-12	12-9	9-6	6-3	3-1
Area (sq km)	92	128	120	175	85

(OR)

3. (a) Sketch components of hydrograph and explain base flow separation. (7M) CO1

(b) Given below are observed flows from a storm of 6-h duration on a stream with a catchment area of 500 sq.km. Assuming zero base flow and derive the ordinates of 6–h unit hydrograph. (7M) CO1

Time (h)	0	6	12	18	24	36	42	48	54
Observed Flow (cumec)	0	100	250	200	150	100	70	50	0

UNIT – II

4. (a) Discuss necessity and selection of gauging sties for stream gauging. (7M) CO2

(b) Explain various methods of determining velocity of a stream. (7M) CO2

(OR)

5. (a) Classify aquifer parameters and explain the occurrence of groundwater in various geological formations. (7M) CO2

(b) A tube well penetrates fully in an unconfined aquifer. Calculate the discharge from the tube well under the following conditions. Diameter of well is 300 mm, drawdown is 3 m, effective length of strainer under the above drawdown is 10.5 m, coefficient of permeability is 0.5 m/s and radius of zero drawdown is 300 m. (7M) CO2

UNIT – III

6. (a) Discuss benefits of irrigation and explain types of irrigation. (7M) CO3

(b) List various methods of irrigation and explain any one. (7M) CO3

(OR)

7. (a) Sketch and explain the relationship between soil, water and plant. (7M) CO3

(b) The left branch canal carrying a discharge of 20 cumecs has culturable commanded area of 20,000 hectares. The intensity of Rabi crop is 80 percent and the base period is 120 days. The right branch canal carrying discharge of 8 cumecs has culturable commanded area of 12,000 hectares, intensity of irrigation of Rabi crop is 50 percent and the base period is 120 days. Compare the efficiencies of the two canal systems (7M) CO3

UNIT – IV

8. (a) Describe the various investigations for reservoir planning. (7M) CO4

(b) Route the following flood hydrograph through a river reach for which K = 12.0 hr, and x = 0.20. At the start of the inflow flood, the outflow discharge is 10 cumec. (7M) CO4

Time (hr)	0	6	12	18	24	30	36	42	48	54
Inflow (m^3/s)	10	20	50	60	55	45	35	27	20	15

(OR)

9. (a) Sketch and explain different components of hydropower plant. (7M) CO4

(b) Three turbo generators each of capacity 10000 kW have been installed at a hydel power station. During a certain period of load, the load on the plant varies from 12000 kW to 26000 kW. Calculate total installed capacity, load factor, plant factor and utilization factor. (7M) CO4

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