AI3404 HYDROLOGY AND WATER RESOURCES ENGINEERING
Important Questions - Civil 7th Semester

UNIT I: PRECIPITATION AND ABSTRACTIONS

Part -A

1. What are the data required for any hydrological studies?
2. What are the different forms of precipitation?
3. What is meant by Probable Maximum Precipitation (PMP) over a basin?
4. List the methods of computing average rainfall over a basin
5. Define hydrology.
6. List the different types of precipitation.
7. State the importance of ocean in Hydrologic cycle?
8. The recession curve of a hydrograph is sometimes called the depletion curve, why?
9. Define precipitation
10. Define orographic precipitation
11. What are the disadvantages of weighing bucket type?

Part -B

1. Describe the working principle of a non-recording type rain gauge with neat sketch, Mentioning its advantages and disadvantages.
2. Explain the different methods of determining the average rainfall over catchment due to a storm. Discuss the relative merits and demerits of the various methods
3. Explain with the help of a neat sketch about the hydrological cycle with its various components
4. How is precipitation measured? Discuss the three methods which convert the point precipitation to areal precipitation and comment on the best method
5. The average annual rainfall of 5 rain gauges in a basin 890, 540,450,410 and 550 mm respectively How many additional gauges are required if it is desired to limit the error to only I0%?
6. Describe the working principle of a topping bucket type rain gauge with neat sketch Mentioning its advantages and disadvantages
7. What are the precautions to be taken in selection a site for the location of a rain gauge? Explain.

8. Describe the methods of determining the average depth of rainfall over an area.
9. (a) What is an optimum rain gauge network design?

   (b) The normal annual rain fall depths of 6 rain gauge station are 55,77,40,57,85 and 23cms respectively. If the error in the estimation of basin mean rainfall should not exceed 15% how many additional rain gauge should be installed in the basin
10. Describe the working principle of a recording type rain gauge with neat sketch Mentioning its advantages and disadvantages.
11. Explain briefly with neat sketches of „Hydrologic cycle"

UNIT II: RUNOFF

Part -A

1. What is meant by infiltration index?
2. What are the factors affecting evaporation?
3. Define evapotranspiration.
4. State Darcy"s law
5. Why should consistency analysis be carried out?
6. Define Isohyet.
7. Distinguish between steam flow and runoff
8. Define infiltration capacity rate.
9. Define storage coefficient
10. Two lake P-with surface evaporation 32.4m and Q -with surface evaporation 28.4m 1400m away are separated by land lying on an impervious layer with an elevation of 24.4m.determine the flow between the lakes taking the permeability as 34.4 m/day. Neglect the infiltration loss.
11. Why Rainfall-Runoff relationship is necessary? Justify
12. What is effective rainfall to an hydrologist?
13. Why should consistency analysis be carried out for rainfall data?
14. State Darcy's law and its limitations.
15. Sketch the stage discharge relationship and state its purpose.

Part -B

1. Explain the step by step procedure involved to adjust the rainfall record at a suspicious station through the double mass curve technique.
2. What are the factors should be considered in selecting a site for a stream gauging station? Explain the dilution method of flow measurement.
3. State the Horton's equation for infiltration capacity curve and sketch with salient components of the curve
4. Explain briefly about the O - Index and W - Index.
5. Explain with neat sketch the various methods of estimation of Evaporation
6. Differentiate the reservoir evaporation from the agricultural field Evaporation
7. Define infiltration. Describe how infiltration capacity rate can be measured using double ring infiltrometre. How is better than a tube infiltrometre.
8. Explain with neat sketches how to evaporation is measured using evaporation pan
9. Elaborate on the factor affecting infiltration and different methods of infiltration
10. Write short notes on the various methods of reducing evaporation losses from reservoirs

UNIT III: HYDROLOGICAL EXTREMES

Part -A

1. What is a synthetic unit hydrograph?
2. The recession curve of a hydrograph is sometimes called the depletion curve
3. Define unit hydrograph
4. Write short notes on return flow
5. Define base flow
6. Define S curve hydrograph
7. Distinguish between hyetograph and hydrograph
8. Define time of concentration
9. What is meant by base flow in a stream
10. List any four factors which affect the hydrograph
11. List out the uses of unit hydrograph
12. Compare the hygrographs obtain from a watershed and rural watershed.

Part -B

1. What are the physiographic factors affecting the flood hydrograph. Discuss the role of these factors.
2. Explain a procedure of deriving a synthetic unit hydrograph for a catchment by using Snyder"s method.
3. The effective rainfall hyetograph of a complex storm ha s a duration of 12hours, with rainfall intensities of 1.5.0.5 and 5 cm/ hr respectively in successive 4hour period. The ordinates of the corresponding direct runoff hydrograph read at 4 hour intervals are 150,250,520,313,394,212,102and 45 m^3/sec respectively. Determine the ordinates of the 4-hour unit hydrograph.
4. The ordinates of a 4h unit hydrograph are given below. Determine the ordinates of a 8h unit hydrograph

   (Nov/Dec2009)

Time (hour)	0	4	8	12	16	20	24	28	32	36	40	44
Ordinate in m^3/sec	0	24	84	159	184	151	103	64	36	17	6	0

5. What are the diffident procedures used for the base flow separation?
6. What do you understand by unit hydrograph? How is it derived? Explain its use in construction of flood hydrograph resulting from two or more periods of rainfall
7. A runoff data at a stream gauge station for a flood are given below in the table; Drainage area is 42 krn2. If the duration of rainfall is 3 hours, derive a 3 hours unit hydrograph for the basin

Time (hrs)	0	3	6	9	12	15	18	21
Total Runoff (m3/s)	50	47	75	120	225	290	270	145
Base flow (m3/s)	50	47	46	45	45	45	46	48
Time (hrs)	24	27	30	33	36	39	42	45
Total Runoff (m3/s)	110	90	80	70	60	55	51	50
Base flow (m3/s)	50	53	54	57	60	55	51	50

8. Explain a procedure of deriving a synthetic unit hydrograph for a catchment by using Snyder's method
9. The effective rainfall hyetograph of a complex storm has duration of 12 hours, with rainfall intensities of 1.5, 0.5 and 5.0 cm/hr respectively in successive 4 hour period. The ordinates of the corresponding direct runoff hydrograph read at 4 hour intervals are 150, 250,529,313,394, 212,102 and 45 m^3/sec respectively. Determine the ordinates of the 4 - hour unit hydrograph.

UNIT IV: RESERVOIRS

Part –A

1. Define flood
2. Write short notes on Gumble‟s method
3. Write short notes on reservoir routing
4. Define prism storage
5. State the types of flood routing
6. What is meant by probable maximum flood?
7. What is flood? Mention its significance in hydrologic studies.
8. Differentiate between Reservoir routing and channel routing.
9. Define flood routing
10. Differentiate between maximum probable flood and design flood
11. Flood can only be estimated and not measured –substantiate
12. What is meant by flood routing and what are its types?

Part –B

1. Describe the Muskingum method of channel routing. Assume the values of the coefficients K and X for the reach.
2. How the gumbel‟s method is used to determine the flood analysis?
3. Explain the procedure for reservoir routing
4. (a)Define the following ; (i) SPF (ii) MPF (iii) Design flood
   (b)Enumerate the methods for determining maximum flood discharge in river

5. Determination the design flood discharge(allowing an increase of one third) for a bridge site with the following data:

   Catchment area $=2x10^5$ hectares

   Duration of storm =8hours

   Storm precipitation =3m

   Time of concentration +2hours

   Gauged discharge for a part flood with average maximum daily rainfall of 18cm was 3400 cumec.
6. Explain the different methods of estimating deign floods with their limitation
7. Write short note on

   (i) Flood control methods

   (ii) Flood routing methods
8. Discuss the modified plus method of reservoir flood routing.
9. Write down the procedures for determination of flood magnitude by Gumble‟s method
10. Explain the different structural methods used for flood mitigation.
11. Describe the various empirical methods used for the estimation of peak flood
12. What are the methods of estimating design flood? What are their limitations?
13. Describe the method of estimating a T'-year flood using Gumbel‟s method of distribution.
14. What are flood control measures? Mention some of the flood control measures to mitigate the effect of floods.
15. Describe the method of estimating a T,-year flood using log-Pearson type III distribution
16. Explain how the reservoir flood routing is estimated?

UNIT V: GROUNDWATER AND MANAGEMENT

Part –A

1. Define Aquifer parameters
2. What is a perched aquifer?
3. List out Dupit‟s Assumptions
4. Define the term transmissibility co-efficient of aquifer
5. Draw a neat sketch to indicate the different types of aquifers
6. Distinguish between water table aquifer and pressure aquifer.
7. State Darcy's law and its limitations'
8. Explain the terms "storage coefficient" and "transmissibility”.
9. Distinguish between confined aquifer and unconfined aquifer
10. What are the assumptions made in driving thiem„s equibilirium equation for steady radial flow?
11. State Dalton‟s law of evaporation and its applicability in the field.

Part –B

1. Discuss the principle of recuperation test of an open well with a neat sketch
2. Describe the different types of aquifers with neat sketches.
3. At a certain point in an unconfined aquifer of $3km^2$ area the water table was at an elevation of 102m. Due to natural recharge in a wet season its level raise to 103.2m. a volume of 1.5 Mm^3 of water was then pumped out of the aquifer caving the water table to reach a level of 101.2m. Estimate specific yield and volume of recharge during wet season.
4. A 30cm diameter well completely penetrates an artesian aquifer. The thickness of strainer is 25m. Determine the discharge from the well when the draw down in the well is 4m and the coefficient of permeability is 45m/day. Assume radius of influence as 350m
5. Derive an expression for the steady state discharge of well fully percolated into a confined aquifer.
6. Write short notes on (i) pumping test (ii) recuperation test on yield of a well
7. Derive Darcy‟s equation from first principle
8. A stream flows in the approximate centre of a flat alluvial valley bounded by impermeable shale. The valley average 2000 m in width and contains an alluvial aquifer in hydraulic

connection with the stream. The hydraulic conductivity of the aquifer is 0.054 cm/s. During irrigation season recharge can be assumed to be steady and uniform over the valley. Observation, wells‟ indicate that during irrigation the water table at a distance of 150 m from the stream is 3.5 m above the impermeable shale and 1.5 m above the stream level. Make any suitable assumptions if necessary and calculate the discharge from the aquifer to the stream and find the maximum water table level.

9. Explain with neat sketches various types of aquifers.
10. State Dupuit-Forcheimer assumptions and its uses in groundwater hydrology?
11. List the various types of aquifers and explain with neat sketches about groundwater column and its characteristics.
12. In a certain area groundwater discharge into a canal. The soil has hydraulic conductivity K = 1.0 cm/s and a porosity of 0.2. The groundwater flow is practically horizontal and the gradient of the head is 1 in 100 along flow direction, in plan view, that is at 45" to line of the canal. A conservative tracer is introduced into the ground at a point "A" perpendicular distance of 6 m from the canal. If dispersion and diffusion of the tracer are assured negligible estimate how long it will take for the tracer to appear in the canal
13. How is the pump test conducted for evaluation of, aquifer parameters?