

IV B.Tech I Semester Regular Examinations, November 2005
HYDROLOGY
(Civil Engineering)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. (a) What are different forms of presenting a hydrological cycle? Explain briefly about their features. [8]
(b) Enumerate what are studied in two branches of hydrology namely surface water hydrology and ground water hydrology. [8]
2. (a) Rain gauge station D was inoperative for part of a month during which a storm occurred. The storm rainfalls recorded in the three surrounding stations A, B, and C were 8.5, 6.7 and 9.3 cm respectively. If the average annual rainfalls for the stations are 75, 84, 70 and 90 cm respectively, estimate the storm rainfall at station D. [8]
(b) What do you understand by rain gauge net work density? How do you fix the same? [8]
3. (a) What do you mean by leaky aquifer? Is perched aquifer a leaky aquifer? [6]
(b) Define aquifer properties of [10]
 - i. porosity.
 - ii. specific yield.
 - iii. storage coefficient and
 - iv. permeability.
4. (a) Explain how the yield of an open well can be determined using recuperation test. [8]
(b) What are the assumptions in Dupuit's theory to determine the flow from a wells made in a confined aquifer? What do you mean by interference among wells? [8]
5. (a) Bring out the differences among evaporation, transpiration, evapotranspiration and consumptive use. [8]
(b) What are the evaporation pans? Explain pan coefficient. [8]
6. (a) What are different infiltration indices? Describe their use. [6]
(b) Differentiate between infiltration process and percolation process. [6]
(c) What is the general shape of Horton's curve to find infiltration? [4]
7. (a) Explain the runoff process in relation to the hydrological cycle. [6+10]

- (b) Draw a flow duration curve from the following data on mean monthly discharge in m^3/sec . Determine the flow which can be expected 80% of the time. What is the % of time that a flow of magnitude $80 \text{ m}^3/\text{sec}$ can be expected ?
- Month, Jan, Feb, Mar, Apr, May, Jun, July, Aug, Sep, Oct, Nov, Dec
Year I, 62.5, 58, 55, 48, 40, 35, 25.5, 38, 46, 76, 116, 80
Year II, 102, 67, 50, 45, 32, 30, 27, 20, 34, 43, 56, 72
8. (a) What are the components of a hydrograph ? Explain the significance of each component clearly and elaborately. [6+10]
- (b) Given below are the observed flows resulting from a storm of 6hour duration occurring over drainage basin area of 316 Sq Km. Assume a constant base flow of 17 Cumecs. Derive 6 hour unit hydrograph.
- Time (hrs), 0, 6, 12, 18, 24, 30, 36, 42, 48, 54, 60, 66, 72
Flow(Cumecs), 17, 113, 254, 198, 150, 113, 87, 67, 54, 43, 32, 22, 17

IV B.Tech I Semester Regular Examinations, November 2005
HYDROLOGY
(Civil Engineering)

Time: 3 hours**Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

1. (a) What are different forms of presenting a hydrological cycle? Explain briefly about their features. [8]
(b) Enumerate what are studied in two branches of hydrology namely surface water hydrology and ground water hydrology. [8]
2. (a) What are non recording type of rain gauges? [8]
(b) What are different forms of precipitation? [8]
3. (a) Bring out difference between non flowing artesian well and flowing artesian well, with the help of a neat sketch. [8]
(b) What are the factors influencing ground water table variation. [8]
4. (a) Explain how the yield of an open well can be determined using recuperation test. [8]
(b) What are the assumptions in Dupuit's theory to determine the flow from a wells made in a confined aquife ?What do you mean by interference among wells ? [8]
5. (a) What are the measures and methods to reduce evaporation from large water bodies by surface films. [8]
(b) Explain the water budget method of estimating evapo transpiration. [8]
6. (a) What are the factors influencing k in Horton's equation ? Sketch the infiltration curve for small and large values of k. [8]
(b) Explain how the infiltration is measured ? What are the units of measurement ? [8]
7. (a) Describe the run off process and list the factors influencing the process. [6]
(b) The two year monthly runoff of a river in million m³ are given below. Find the reservoir capacity to meet a uniform demand of 20 million m³ per month.
Month, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Year I, 58, 66, 29, 33, 37, 25, 10, 2, 2, 3, 4, 8
Year II, 10, 31, 50, 53, 39, 39, 36, 12, 12, 14, 18, 20 [10]
8. (a) What is the base flow ? Explain about the source of the base flow. [6+10]

- (b) The ordinates of a 3hr unit hydrograph are given below. Find the ordinates of 6 hr unit hydrograph for the same basin.

Time (hrs), 0, 3, 6, 9, 12, 15, 18, 21, 24, 27, 30

Ordinate (m^3/sec), 0, 10, 25, 20, 16, 12, 9, 7, 5, 3, 0

IV B.Tech I Semester Regular Examinations, November 2005
HYDROLOGY
(Civil Engineering)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. (a) List out different processes constituting the hydrological cycle. Explain their role in the circulation of water continuously. [8]
(b) Hydrology is mostly interdisciplinary in nature. Justify the statement . [8]
2. (a) Rain gauge station D was inoperative for part of a month during which a storm occurred. The storm rainfalls recorded in the three surrounding stations A, B, and C were 8.5, 6.7 and 9.3 cm respectively. If the average annual rainfalls for the stations are 75, 84, 70 and 90 cm respectively, estimate the storm rainfall at station D. [8]
(b) What do understand by rain gauge net work density ? How do you fix the same ? [8]
3. (a) What is ground water table ? How is it known or measured ? [6]
(b) What properties of aquifer influence the retention and movement of ground water. [6]
(c) Define specific yield of an aquifer . [4]
4. (a) What are the assumptions in Dupuit's theory for steady flow in a well dug in an unconfined aquifer ? [4]
(b) A well of radius 0.5m, completely penetrates an unconfined aquifer of thickness 50m. The coefficient of permeability is 30m / day. The well is pumped so that the water level in the well remains at 40m above the bottom. Assuming that pumping has essentially no effect on the water table at a radius of 500m , find the steady state discharge. [12]
5. (a) Explain the process of transpiration and what are the factors affecting it ? [8]
(b) Explain how the change in water quality can influence the evaporation process. [8]
6. (a) What are the initial losses ? How does the interception loss vary with magnitude of rainfall ? [8]
(b) Explain how the shape of infiltration curve varies if rainfall occurs on dry soil and moist soil. [8]
7. (a) Bring out the relation and difference among overland flow , interflow, direct run off and precipitation on the channel. [8]

- (b) Describe the catchment characteristics of stream density and drainage density. Explain their influence on runoff. [8]
8. (a) Differentiate between total run off hydrograph and direct run off hydrograph. How is the latter obtained from the former. Explain with neat sketches. [6+10]
- (b) What is synthetic unit hydrograph ? What are its uses and how is it obtained ?

★ ★ ★ ★ ★

IV B.Tech I Semester Regular Examinations, November 2005
HYDROLOGY
(Civil Engineering)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. (a) How will the study of hydrology be useful in design of hydraulic structures ? Discuss with examples. [8]
(b) What meteorological factors influence the evaporation, runoff and infiltration processes of hydrological cycle. [8]
2. (a) The average annual rainfall of five rain gauges in a basin are 89, 54, 45, 49 and 55 cm. If the error in the estimation of basin mean rainfall should not exceed 10%, how many additional gauges should be installed in the basin. [8]
(b) What are the ISI guide lines for fixing minimum number of rain gauges for different types of basins ? [8]
3. (a) What is an aquiclude ? What are its water bearing properties ? [6]
(b) What is the relation between coefficient of permeability and transmissibility? [6]
(c) Define water table. How does it fluctuate ? [4]
4. (a) Explain how the yield of an open well can be determined using recuperation test. [8]
(b) What are the assumptions in Dupuit's theory to determine the flow from a wells made in a confined aquife ?What do you mean by interference among wells ? [8]
5. (a) What meteorological parameters are incorporated in Blaney Criddle equation to estimate evapo transpiration ? Describe them. [8]
(b) In a field test to determine the evaporation the details are as given below. Estimate the evaporation in mm for the day.
Diameter of the pan = 120cm
Water added to bring the water level to stipulated level at the end of the day = 6 litres
Rain fall in the locality = 4mm. [8]
6. (a) A storm during a dry weather has rainfall intensities of [10]
8,12,40,38,30,26,28,5,16,32,36,24,14 and 4 mm /hour at half an hour intervals. What is the runoff volume from the basin of 600 Km², if the initial abstractions are 10mm and ϕ index for the basin is 10mm / hour.
(b) Show in a sketch how the infiltration curves vary for dry soil and wet soil conditions. [6]

7. (a) Compare the uses and features of flow duration curve and flow mass curve. [8]
(b) List all storm characteristics influencing runoff and describe their influence. [8]
8. (a) What are the components of a hydrograph ? Explain the significance of each component clearly and elaborately. [6+10]
(b) Given below are the observed flows resulting from a storm of 6hour duration occurring over drainage basin area of 316 Sq Km. Assume a constant base flow of 17 Cumecs. Derive 6 hour unit hydrograph.
Time (hrs), 0, 6, 12, 18, 24, 30, 36, 42, 48, 54, 60, 66, 72
Flow(Cumecs), 17, 113, 254, 198, 150, 113, 87, 67, 54, 43, 32, 22, 17
