VTU-QUESTION PAPERS

UNIT 1: INTRODUCTION & PRECIPITATION

1. Define precipitation. What is cyclonic precipitation? Distinguish between cold front and warm front (June2011, July 2012, Dec2013, July 2014)   .
2. Differentiate between recording and non - recording type of rain gauges (Dec2013,July 2014)
3. With a neat sketch, explain the working of a self recording rain gauge.(Dec2012)
4. Define hydrology. With a neat sketch, explain the Horton's qualitative representation of the hydrologic cycle.(June 2011, July 2012, Jan 2013)
5. Define precipitation. Explain different forms of precipitation. (June2011, july 2013)
6. Critically compare recording rain gauge (self) with non recording type raingauge.(June2011, 2012)
7. Briefly explain optimum number of rain gauge stations in a catchment.(Jan2012, July 2013)
8. Explain the methods for the estimation of missing precipitation record(June2011, june2012)
9. During a month, a rain gauge went out of order while the other four gauges in the basin reported rainfalls of 110, 90, 120 and 115mm. If the normal annual rainfall for these four gauges are 115, 95, 125 and 120mm respectively and the normal rainfall for the broken gauge is 98cm, estimate the monthly rainfall at the broken gauge.(June2011,2012)
10. A Lake had a water surface elevation of 103.200m above datum at the beginning of certain month. In that month the lake reserved an average inflow of 6.0cumecs from surface runoff sources. In the same period outflow from the lake have an average value of 6.5 cumecs. Further in that month the lake received a rainfall of 145mm and evaporation from lake surface was estimated at 6.10 cm.Write the water budget equation for lake & calculate the water surface elevation of the lake at end of month. The average lake surface area may be taken as 5000 hectares. Assume that there is no contribution to or from ground water storage. .(June 2011,Jan2012)
11. A small catchment area of 150hectare received a rainfall of 10.5cm in 90 min due to a storm at a the outlet of catchment draining the catchment was dry before the storm & experienced a runoff lasting for 10 hrs with average discharge of 1.5 m^3/s   the stream was dry again after runoff event. (June 2011,june2012)
    a) What is amount of water which was not available to runoff due to combine effect of infiltration evaporation?
    b) What is the ratio of runoff to precipitation.

UNIT 2: LOSSES FROM PRECIPITATION

1. With a neat sketch, explain the working of double ring infiltrometer.(June 2011)
2. Define the term infiltration capacity of a soil. Explain Horton's infiltration capacity curve, with a neat sketch. (July 2011)
3. Describe ISI standard evaporation pan, with a neat sketch. (Jan 2011, July 2012,June 2013)
4. For the given data below, Determine the evapotranspiration . The crop factor may be taken   as 0.8 (Dec 2012)

Month	Mean monthly temp. °C	Monthly % of sunshine hrs.
Nov	18.0	7.20
Dec	15.0	7.15
Jan	13.5	7.30
Feb	14.5	7.10

5. Briefly explain "Evaporation Process"   (July2011, 2012)
6. Define i) evaporation ii)   potential evapo-transpiration   iii) Actual evapo transpiration iv)   Pan   coefficient.   (July2011,Dec2012)

7. Explain any three methods for determination of lake evaporation. . (June2011,Jan 2012)
8. Define the term infiltration capacity of a soil and $\omega - index$ and $\emptyset - index$ (June2011)

UNIT 3: HYDROGRAPHS

1. What is unit hydrograph? Discuss its use and limitations. (July 2011,Dec 2012, July 2013)
2. What are the methods of estimating the runoff from a catchment? Explain any one of them. (July 2011)
3. With a neat sketch, explain the various components of a flood hydrograph. Also explain anyone method of base flow separation. (July2011, Jan 2012)
4. What are the components of unit hydrograph? Write a note on its applications.(Dec2011, June 2012)
5. Briefly explain 'schematic representation of runoff components. (June 2011)
6. Following are the ordinates of a storm hydrograph of a river draining a catchment area of 423 km^2 due to a 6h storm.. Derive the ordinates of 6h unit hydrograph & plot the same. (June 2011,2012)

Time in hr	-6	0	6	12	18	24	30	36	42	48
Stream flow m^3/s	10	10	30	87.5	115.5	102.5	85	71	59	475

Time in hr	54	60	66	72	78	84	90	96	102
Stream flow m³/s	39	31.5	26	21.5	17.5	15	12.5	12	12

7. Given below are the ordinates of 6h unit hydrograh for a catchment. Calculaate the ordinates of direct runoff hydrograph due to a rainfall excess of 3.5cm occurring in 6-h. (June2011,2012)

Time in hr	0	3	6	9	12	15	18	24	30	36	42	48	54	60	69
Unit ordinate m³/s	0	25	50	85	125	160	185	160	110	60	36	25	116	8	0

8. Rainfall of magnitude 3.8cm and 2.8cm occurring on two consecutive 4-h durations on a catchment of area 27km² produced the following hydrograph of flow at the outlet of the catchment. Estimate the rainfall excess and ∅- index (June2011)

UNIT – 4: ESTIMATION OF FLOOD & FLOOD ROUTING

1. What do you mean by the term flood? Mention any two factors affecting flood? (July 2013)
2. Mention any two empirical formulae for estimating flood? (July 2013)
3. What do you mean by flood control? Explain any two methods of flood control. (July 2013)

UNIT – 5: INTRODUCTION TO IRRIGATION

1. Define Irrigation. What are the types of flow irrigation? Explain any two flow irrigation systems. (July 2013)
2. What are the benefits and ill effects of irrigation? (July2011, July 2012,2013)
3. Explain Flow irrigation with the help of neat sketches. (July2011, 2012,2013)
4. List the methods of irrigation and explain any three methods. (July 2013)
5. What are the primary objectives of an irrigation method? List the various methods of irrigation adopted for distribution of water in the field.   (July 2013)
6. What are the methods of applying water to crops? Explain any two surface irrigation methods. (July 2013)
7. List out the various methods of application of irrigation water. (including subgroups) (July 2011, Jan 2012, 2013)

8. List the advantages of sprinkler irrigation, with its limitations. (July2011)
9. Explain drip irrigation. List its advantages and disadvantages. (July2011)

10. Write short notes on supplemental irrigation. (July2011, Jan2012)
11. Write a short note on infiltration galleries. (July 2012)

UNIT – 6: SOIL-WATER-CROP RELATIONSHIP

1. Give brief classification of Indian soils.(July 2013)
2. What are the functions of irrigation soils? Explain briefly. (July 2013)
3. What are the physical properties of soil? .(July 2013)
4. Explain frequency of irrigation and irrigation efficiency. (June 2011,2012)
5. Define crop rotation. What are its advantages? List some crop rotations. (July2011,June2012)
6. How do you estimate the frequency of irrigation on the basis of soil moisture basis?(June 2011)
7. Write a note on crop rotation? (June2011, 2012)
8. The root zone of a certain soil has a field capacity of 30% and permanent wilting percentage is 10% (i) What is the depth of moisture in the root zone at field capacity and permanent wilting point? ii) How much water is available if the root zone depth is 1.2 m . The dry weight of the soil is 13.73kN/m^3 (June 2011)
9. The field capacity of a certain soils is 18.3% and its specific gravity is 1.25. A wet sample of the soil taken before irrigation weighs 153gm and weight after drying in the oven is 138gm. What depth of water must be applied to irrigate the soil to a depth of 1.2m (June2011)
10. The field capacity of a certain soil is 12.6% and its specific gravity is 1.42. If the moisture content of present in the soil before irrigation is 8.2%. How deep the soil profile will be welted with an application of 50mm of irrigation water. (June2011,2012)
11. Determine the area which can be irrigated using surface method of irrigation with a source of water having a discharge of 10000 litres per minute. The available moisture holding capacity of the soil is 180mm per metre and depth of root zone is 1.1m. Irrigation is done when 40% of available moisture is used. The total losses during irrigation are 35% and peak daily moisture use is 4.5mm.   (June2011,2012)
12. The following data pertains to healthy growth of crop. (June2011,Jan2012)
i.   Field capacity = 30%
ii.   Permanent wilting percentage = 11%
iii.   Density of soil=1300kg/m^3
iv.   Effective depth of soil= 700mm
v.   Daily consumptive use of water for given crop= 12mm

For healthy growth moisture content must not fall below25% of the water holding capacity between the field capacity and permanent wilting point. Determine the watering intervals in days.

UNIT - 7 :WATER REQUIREMENT OF CROPS

1. What do you mean by Duty and Delta? How are they expressed? (July 2013)
2. Define duty, delta and base period. Obtain the relationship between them. (July 2011, 2012)
3. Explain i) Gross command area ii) Culturable command area iii) Consumptive use(July 2013)
4. What are the factors affecting duty? (June 2012)
5. Define various irrigation efficiencies used in irrigation system. (June 2011, 2012)
6. The gross commanded area for a distributory is 20000 hectares,75% of which can be irrigated. The intensity of irrigation for Rabi season is 40% that for Kharif season is 10%. If kor period is 4 weeks for rabi and 2.5 weeks for rice, determine he outlet discharge . Outlet factors for rabi and rice may be assumed as 1800 hectares/ cumec and 775 hectares/ cumec. Also calculate delta for each crop.   (June2011)
7. The base period, duty at the field of difference crops, and area under each crop in the command area are given below. Find the required reservoir capacity to cater to the needs of the crops.   (Jan 2011, July 2012)

Crops	Base period (days)	Duty @ field (Ha/cumec)	Intensity of irrigation (%)
Wheat	120	1800	20
Sugar cane	360	1700	20
Cotton	180	1400	10
Rice	120	800	15
Vegetables	120	700	15

8. A water course has a culturable command area of 1200 hectares. 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 kor period os 15 days. Calculate the discharge of the water course if the kor depth for crop A is 10cm and for it is 16cm. (June 2011)
9. A water course commands an irrigated area of 1000 hectares. The intensity of irrigation for rice in this area is 70 %. The transplantation of rice crop takes 15days and during the Transplantation period the total depth of water required by the crop on the field is 500mm. During the transplantation period , the useful rain falling on the field is 120mm. Find the duty of irrigation water for the crop on the field during transplantation, at the head of the field is and also at the head of the water course assuming losses of water to be 20% in the water course. Also calculate the discharge required in the water course. (July 2012)

UNIT – 8: CANALS

1. With a neat sketch, explain any one type in each of cross drainage work (July2012,2013)
2. What is a Canal? Explain the general considerations for alignment of Canals. (July2011,June 2012, June2013)
3. Explain various considerations for alignment of a canal. (June2011,June 2012,)
4. Design and sketch an irrigation channel to carry 5 cumec. The channel is to be laid on a slope of 0.2m per kilometer. Assume N=0.025 and m=1 (June 2012).
5. Determine the dimensions of the irrigation canal for the following data B/D ratio = 3.7, N= 0.0225, m=1.0 and S= 1/ 4000 side slopes of the channel is ½ H : 1V. Also determine the discharge which will be flowing in the channel. (June 2011, Dec 2012)
6. Design a irrigation channel in alluvial soil according to Lace's silt theory for the following data.   (June 2012)
    Full supply discharge= 10cumecs
    Lacey's silt factor= 0.9
    Side slopes of channel= 1/2H: 1V
7. The slope of a channel in alluvium is 1/4000, Lacey's silt factor is 0.9 and side slopes are 1/2H : 1V. Find the channel section and maximum discharge which can be allowed to flow in it.   (July2011)
8. Give the classification of canals. Explain salient features of each of them. (June 2011,July 2012, july 2013)
9. What are the factors to be considered in alignment of an irrigation canal? What are the main functions of head regulator and cross regulator?   (June 2011)
10. "Lacey's conception of design of canal on an alluvial soil is superior to Kennedy's concept". Justify the statement.   (June 2011)
11. Design a channel in alluvial soil by lacey's theory for the data given.   (July 2013)
    Full supply discharge= 15m3/sec
    Lacey's soil factor= 1.0
    Channel side slope= ½ H: 1V
    Find also the bed slope of channel.