B. Tech. Sem – VIII (Civil Engg.) (2014 COURSE) (CBCS) :
SUMMER - 2019
SUBJECT: WATER RESOURCES ENGINEERING

Day: Saturday
Date: 25/05/2019

S-2019-2875

Time: 02.30 PM TO 05.30 PM
Max Marks. 60

N.B. :

1) All questions are **COMPULSORY**.
2) Figures to the right indicate **FULL** marks.
3) Assume suitable data, if necessary.
4) Use of non programmable calculator is **ALLOWED**.
5) Draw neat and labeled diagrams **WHEREVER** necessary.

Q.1 **a)** Explain with neat sketch working of tipping bucket type of recording rain gauge. **(04)**

b) Analysis of data on maximum one day rainfall depth at Pune indicated that a depth of 30 cm had a return period of 50 years. Determine the probability of a one day rainfall depth equal to or greater than 30 cm at Pune occuring **(06)**
i) Once in 20 successive years. ii) At least once in 20 successive years.

OR

a) Explain in brief maximum intensity duration frequency relationship and its use. **(05)**

b) State various methods of estimation of average rainfall over the catchment and explain isohyetal method in detail. **(05)**

Q.2 **a)** What is evapotranspiration? What is the significance of evapotranspiration in irrigation scheduling? **(05)**

b) Explain ϕ index and w index. **(05)**

OR

a) State different methods of measurement of infiltration rate of soil and explain use of rainfall simulator in detail. **(05)**

b) The rainfall in five successive days on a catchment was 3, 6, 10, 5, 2 cm respectively, If the ϕ index for the storm is assumed to be 3 cm/day. Calculate the total runoff from the catchment due to this storm. **(05)**

Q.3 **a)** Explain the use of rational formula for estimation of flood magnitude. **(04)**

b) The following are the ordinates of the hydrograph of flow from a catchment area of 700 km^2 due to a 6 hr rainfall. Derive the ordinates of 6 hr unit hydrograph; Assume base flow equal to 15 m^3/s. **(06)**

Time from beginning of storm (hr)	0	6	12	18	24	30	36	42
Discharge m^3/s	15	35	60	150	120	90	60	15

P.T.O

OR

a) Explain dilution method of stream flow measurement. **(04)**

b) The ordinates of 6 hr. unit hydrograph are as given below: **(06)**

Time (hr)	0	6	12	18	24	30	36	42	48	54	60	66
Ordinates of 6 hr UH m^3/s	0	20	60	150	120	90	66	50	32	20	10	0

If two storms each 2 cm rainfall excess and 6 hr duration occur in succession, calculate the resulting hydrograph of flow. Assume uniform base flow of 12 m^3/s.

Q.4 **a)** What is elementary profile of gravity dam? Derive the formula for base width for no tension and no sliding condition. **(05)**

b) Explain the procedure of estimation of reservoir capacity by inflow mass curve. **(05)**

OR

a) State various forces acting on gravity dam and explain in detail computation of water pressure. **(05)**

b) Explain use of colgroute masonry for construction of gravity dam and state its merits over UCR masonry. **(05)**

Q.5 **a)** Give classification of earth dams and explain rolled fill method of construction of earth dam. **(05)**

b) State and explain causes of failure of earth dam. **(05)**

OR

a) Explain with sketches various measures adopted for reducing seepage through body earth dam and its foundation. **(05)**

b) Explain with a neat sketch procedure of drawing a phreatic line for a homogeneous section of earth dam with rock toe. **(05)**

Q.6 **a)** Explain USWES method of hydraulic design of ogee spillway. **(05)**

b) What is the necessity of providing energy dissipation arrangement below spillway? Explain hydraulic jump type of energy dissipater. **(05)**

OR

a) Explain with sketch radial gates provided over ogee spillway. **(05)**

b) Draw a typical layout of high head hydropower plant. **(05)**

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