B. TECH. (CBCS - 2014 COURSE) SEM – VIII (CIVIL ENGG.) :
SUMMER - 2018
SUBJECT: WATER RESOURCES ENGINEERING

Day: **Tuesday** | **S-2018-4655** | Time: **02.30 PM TO 05.30 PM**
Date: **05/06/2018** | 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)** State types of precipitation. **(05)**

b) Explain with a sketch standard non-recording gauge for measurement of rainfall. **(05)**

OR

a) Explain the procedure of estimation of missing rainfall data. **(05)**

b) Describe with sketches mass curve of rainfall and rainfall hyetograph. **(05)**

Q.2 **a)** Explain with a neat sketch use of standard evaporation pan for measurement of evaporation. **(04)**

b) In a 140 minute storm the following rates of rainfall were observed in successive 20 min intervals : 6, 6, 18, 13, 2, 2 and 12 mm/hr. Assuming ϕ index as 3 mm/hr, determine the total rainfall and net runoff for the storm. **(06)**

OR

a) Explain use of ring infiltrometer for measurement of infiltration. **(05)**

b) State and explain factors affecting infiltration. **(05)**

Q.3 **a)** Explain Area-velocity method of stream flow measurement. **(04)**

b) The peak of the flood hydrograph due to a 3 hour duration isolated storm in a catchment is 250 m^3/s. The total depth of rainfall is 5.9 cm. Assuming an average infiltration loss of 0.3 cm/hr and a constant base flow of 15 m^3/s. Estimate the peak of the 3 hr. Unit hydrograph of this catchment. **(06)**

OR

a) Explain use of current meter for measurement of velocity of stream flow. **(04)**

b) Given the ordinates of 4 hr. unit hydrograph as below derive the ordinates of 12 hr unit hydrograph for the same catchment. **(06)**

Time (hr)	0	4	8	12	16	20	24	28	32	36	40	44
Ordinates of 4 hr UH m^3/s	0	20	80	130	150	130	90	52	27	15	5	0

P.T.O

Q.4 **a)** With the help of neat sketch explain various storage zones in a reservoir. **(05)**

b) Describe the procedure of computation of earthquake force in a gravity dam. **(05)**

OR

a) Explain various types of investigation for planning of reservoirs. **(05)**

b) Explain the procedure for treatment of foundation of gravity dam. **(05)**

Q.5 **a)** State basic design considerations for design of section of an earth dam. **(05)**

b) What is phreatic line? Explain procedure of drawing a phreatic line for the zoned type of earth dam. **(05)**

OR

a) State and explain classification of earth dams. **(05)**

b) State the function of the following components of an earth dam **(05)**

i) Core / hearting **ii)** Inclined sand drain
iii) Upstream pitching **iv)** Cut off trench
v) Rock toe

Q.6 **a)** State essential requirements of spillway. **(05)**

b) Explain with neat sketch various components of spillway. **(05)**

OR

a) Describe the various types of energy dissipation devices used below spillways in relation to the position of the tail water rating curve and jump height curve. **(06)**

b) Explain with a neat sketch ski jump bucket type of energy dissipater. **(04)**

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