B. Tech. Sem – VIII (Civil Engg.) (2014 COURSE) (CBCS) :
WINTER - 2018
SUBJECT: WATER RESOURCES ENGINEERING

Day: Wednesday
Date: 14/11/2018

W-2018-2610

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)** State and explain various systems for formation of precipitation. **(05)**

b) Compare between Thiessen polygon method and isohyetal method of computation of average rainfall over a catchment area. **(05)**

OR

Q.1 **a)** State applications of hydrology in civil engineering projects. **(05)**

b) Explain with a neat sketch working of siphon type of recording rain gauge. **(05)**

Q.2 **a)** State and explain a factors affecting evaporation. **(04)**

b) The mass curve of rainfall of 100 minutes duration is given below. If the catchment had an initial loss of 0.6 cm. and ϕ index of 0.6 cm/hr. Calculate the total surface runoff from the catchment. **(06)**

Time from the start of rainfall (min)	0	20	40	60	80	100
Cumulative rainfall (cm)	0	0.5	1.4	2.8	3.4	3.6

OR

Q.2 **a)** State and explain factors affecting infiltration. **(04)**

b) An isolated 3 hr storm occurred over a basin in the following fashion. **(06)**

% of Catchment Area	ϕ index cm/hr	Rainfall (cm)		
		1st hr	2st hr.	3rd hr.
20	1.0	0.8	2.4	1.4
30	0.8	0.7	2.3	1.2
50	0.6	1.2	2.6	0.9

Estimate run off from the catchment due to the storm.

Q.3 **a)** Explain slope area method of stream flow measurement. **(05)**

b) Define Unit Hydrograph. State assumptions and applications of unit hydrograph theory. **(05)**

P.T.O.

OR

Q.3 **a)** Describe the dilution method of stream flow measurement. **(04)**

b) The ordinates 6 hour unit hydrograph are as given below: **(06)**

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

If storm had 2 successive 6 hr internals of rainfall magnitudes of 2.5 cm and 4 cm respectively. Assuming ϕ index of 0.3 cm/hr and a base flow of 20 m^3/s determine the resulting flood hydrograph of the flow

Q.4 **a)** Explain investigations for reservoir planning. **(05)**

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

OR

Q.4 **a)** State various forces acting on gravity dam and explain with sketches computation of uplift pressure on gravity dam. **(05)**

b) Describe the use of colgroute masonry for construction of gravity dam. **(05)**

Q.5 **a)** With the help of neat sketch explain slip circle method of stability of side slopes of earth dam. Show various forces acting on a slice of earth dam. **(06)**

b) State causes of failure of earth dam. **(04)**

OR

Q.5 **a)** What is phreatic line? Explain with a sketch procedure of drawing a phreatic line for homogeneous section of earth dam without drainage blanket. **(06)**

b) State the criteria for design of filters in an earth dam. **(04)**

Q.6 **a)** What is function of spillway? Explain the components of spillway. **(05)**

b) Following data were recorded for an ogee spillway **(05)**

- **i)** Maximum water level = 252 m.
- **ii)** Maximum flood discharge = 4000 cumec
- **iii)** Effective length of spillway = 300m.
- **iv)** Coefficient of discharge = 2.1

Determine R.L. of crest of spillway.

OR

Q.6 **a)** Explain the USWES method of design of crest profile of an ogee spillway. **(06)**

b) What is stilling basin? Explain with a sketch USBR type I stilling basin. **(04)**

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