Course No.: CAF- SWCE -476   Course Title: Advance Surface Hydrology
Credit: 3 (2+1)
Theory:

Measurement and Analysis of precipitation data, Precipitation Variability, Meteorological Homogenity, Design of Rain gauge Networks, consistency of Rainfall records, filling of Missing records, Extension of a Point- Rainfall records, Mean Area Precipitation, Graphical Representation of Rainfall data.

Hydrologic Losses: Evaporation process, lake effect , application of evaporation in Hydrology, measurement of evaporation, Determination of evaporation from water surfaces, transpiration, measurement of transpiration, Evapotranspiration , measurement of evapotranspiration, Estimation of evapotranspiration, interception, factors affecting interception, estimation of interception, depression storage, factors affecting depression storage, infiltration, Ø and W - indices, f-curve for small watersheds.

Stream flow hydrograph: Components of a hydrograph, factors affecting hydrograph, characteristics, Base flow separation, complex hydrograph, effective rainfall.

Precipitation Runoff Relation : Estimation of surface runoff volume, unit Hydrograph method, Empirical synthesis of unit hydrograph, Conceptual models of unit hydrograph, Estimation peak Discharge, Reservoir flow routing Channel flow routing ,Watershed simulation Stream flow simulation.

Practical

Checking the consistency of rainfall data by double mass curve , Study of various methods for extension of point rainfall record (Station, year, Average, Normal ratio and NWs Method) , Graphical representation of rainfall data by chronological charts and moving averages, Estimation of evapotranspiration by Blancy Criddle, Modified Penman and Hargreaves and Samani Methods, Determination of O and W indices, Study of water balance method in a watershed, Development of DRH from complex hydrograph, Development of UH from DRH, To develop total runoff hydrograph from given UH, Changing UH duration by S-curve method, Hydrologic channel routing by Muskingham method, Study of watershed simulation models.

Lect. No.	Topic	Book No.	Article No.	Page No.
1 to 4	Measurement and analysis of	1	5.3 to 5.8	169 to 228

Lect. No.	Topic	Book No.	Article No.	Page No.
	precipitation data. Precipitation variability, meteorological homogeneity, design of rainguage network. Filling of missing records. Mean areal precipitation.			
5 to 12	Hydrologic losses-evaporation process, lake effect. Application of evaporation in hydrology. Measurement of evaporation-methods. Transpiration Evapo-transpiration. Measurement & estimation of evapo-transpiration. Interception, factors affecting interception, estimation of interception. Depression storage, factors affecting depression storage. Infiltration, Infiltration indices & f-curve for small watersheds.	1	8.2 to 8.7	290-371
13 & 14	Rainfall runoff relation, Estimation of surface runoff volume and Estimation of peak discharge.	1	13.2 to 13.5	668-701
15 & 16	Stream flow Hydrograph-components factors affecting hydrograph. Hydrograph characteristics, base flow separation, complex hydrograph.	1 1 1	6.1 to 6.6 6.7 10.6	231-249 249-252 489-506
17 to 23	Synthesis of Unit hydrograph, limitations of unit hydrograph theory, S-hydrograph, Changing UH duration by S-curve method. Conceptual models of UH-Instantaneous unit hydrograph- Clark model, Nash model, Synthetic unit hydrograph, Dimensionless UH	1 1	10.7 to 10.10 10.11 and 10.12	506-533 533-554
24 to 26	Flood routing, Hydrological channel routing by Muskingham method, Hydrologic reservoir routing.	1	11.1 to 11.5	573-610
27 & 28	Watershed simulation	1	12.1 to 12.5	613-627
29	Simulation techniques	1	12.6	627-628
30 & 31	Hydrological simulation models	1	12.7	629-648
32	Applications of simulation.	1	12.11	663-666

PRACTICAL:

1. Numerical on checking the consistency of rainfall data by double mass curve technique.
2. Numerical on methods of extension of point rainfall record.

3. Graphical representation of rainfall data-chronological charts and moving averages.
4. Numerical on estimation of ET by different methods, Blaney Criddle, modified Penman, Hargreaves and Samani method.
5. Numerical on determination of φ and w indices for watershed.
6. Numerical on water balance in a watershed.
7. Development of DRH from complex hydrograph.
8. Development of UH from DRH.
9. Development of total runoff hydrograph from given UH.
10. Numerical on changing UH duration by S-hydrograph method.
11. Numerical on hydrologic reservoir flood routing.
12. Numerical on hydrologic channel routing.
13. Study of watershed simulation model.

BOOKS:

1. Applied Hydrology by K.N.Mutreja, Tata Mc-Graw Hill Book Co., New Delhi. 1985.

REFERENCE BOOKS:
2. Hydrology and Soil Conservation Engineering 2nd Edition. By Ghanshyam Das, Prentice Hall of India Pvt. Ltd. New Delhi. 2009.
3. Engineering Hydrology. By K. Subramanya, Tata McGraw-Hill Book Co., New Delhi. 1984.
4. Handbook of Applied Hydrology. Edited by V.T. Chow, McGraw-Hill Book Co., New York. 1964.