

5th Semester	RAG5C002	Hydrology, Soil and Water Conservation Engineering	L-T-P 3-0-0	3 CREDITS
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Module I**(9 hour)**

Hydrologic cycle, precipitation and its forms, rainfall measurement and estimation of mean rainfall, frequency analysis of point rainfall. Mass curve, hyetograph, depth-area-duration curves and intensity-duration-frequency relationship. Hydrologic processes-interception, infiltration -factors influencing, measurement and indices. Evaporation - estimation and measurement. Runoff - factors affecting, measurement, stage - discharge rating curve, estimation of peak runoff rate and volume, rational method, Cook's method and SCS curve number method.

Module II**(10 hour)**

Soil and water erosion – introduction, causes and types, factors affecting and effects of erosion; Soil loss estimation – universal soil loss equation (USLE) and determination of their various parameters; application and limitations of USLE; Modified soil loss equation (MUSLE) and RUSLE; Rainfall erosivity – estimation of erosivity from rainfall data by $KE > 25$ and EI_{30} methods; Soil erodibility - topography, crop management and conservation practice factors; Measurement of soil erosion by runoff plots and by soil samples; Water erosion – mechanics and factors affecting erosion; forms of water erosion, Gullies and their classification, stages of gully development; Water erosion control measures– agronomical measures, tillage practices and conservation tillage; Mulching; Engineering measures and their planning and layout, Contour stonewall and trenching and their suitability for use;

Module III**(7 Hours)**

Gully and ravine reclamation

Principles of gully control - vegetative measures, brush wood dams, loose rock fill dams; Temporary structures of gully control, permanent gully control structures; Grassed waterway Wind erosion and control measures, Land use capability classification objectives of classification, capability, limitation, land capability unit, land capability sub-classes; Land use capability classification by United States Department of Soil Conservation Service, limitations of different LUCC;

Module IV**(7 Hours)**

Sedimentation in tanks and reservoirs

Sedimentation, sources of sedimentation, factors responsible for sedimentation; effects of sedimentation, types of sediment load, sediment transportation, sediment delivery ratio, trap efficiency; Estimation of sedimentation, bed load estimation, suspended load sampling; Measurement of sedimentation - can type, bottle type, bed

load sampling, box type, pan type, pit type; Sedimentation in reservoirs - factors affecting sedimentation, rate of reservoir sedimentation, silt monitoring and storage loss in tanks and reservoirs, reservoir sedimentation control

Module V

(7 Hours)

Water Harvesting and Soil conservation Structures

Water harvesting techniques and structures- farm ponds, percolation ponds, nala bunds, tanks and sub surface dykes; soil erosion control structures - check dams, drop, chute and drop inlet spillways - design requirements, planning for design and design procedures

Books

1. Jaya Rami Reddy, P. 2011. A Text Book of Hydrology. University Science Press, New Delhi
2. Panigrahi, B. and Panigrahi, K. 2016. Engineering Hydrology. New India Publishing Agency, New Delhi
3. Mal, B.C. 2014. Introduction to Soil and Water Conservation Engineering. 2014. Kalyani Publisher
4. Suresh, R. 2014. Soil and Water Conservation Engineering. Standard Publisher Distributors, New Delhi
5. Frevert, R.K., G.O. Schwab, T.W. Edminster and K.K. Barnes. 2009. Soil and Water Conservation Engineering, 4th Edition, John Wiley and Sons, New York.
6. Singh Gurmel, C. Venkataraman, G. Sastry and B.P. Joshi. 1996. Manual of Soil and Water Conservation Practices. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
7. Mahnot, S.C. 2014. Soil and Water Conservation and Watershed Management. International Books and Periodicals Supply Service, New Delhi.
8. Norman Hudson. 1985. Soil Conservation. Cornell University Press, Ithaka, New York, USA.
9. Das, G.2000. Hydrology and Soil Conservation Engineering. Prentice Hall of India Pvt. Ltd., New Delhi.
10. Schwab, G.O., D.D. Fangmeier, W.J. Elliot, R.K. Frevert. 1993. Soil and Water Conservation Engineering.4th Edition, John Wiley and Sons Inc. New York.
11. Sharda, V.N., Juyal, G.P., Prakash, C. and Joshi, B.P.2007. Training Manual: Soil Conservation & Watershed Management (Vol.-II) – CSWCRTI Publication, Dehradun.
12. USDA.1964. Engineering Hand Book on Drop Spillways (Section-11). USDA, Soil Conservation Service.
13. Chow, V.T., D.R. Maidment and L.W. Mays. 2010. Applied Hydrology, McGraw Hill Publishing Co., New York.
14. Linsley, R.K., M.A. Kohler, and J.L.H. Paulhus. 1984. Hydrology for Engineers. McGraw-Hill Publishing Co., Japan.

- 15.** Mutreja, K.N. 1990. Applied Hydrology. Tata McGraw-Hill Publishing Co., New Delhi.
- 16.** Raghunath, H.M. 2006. Hydrology: Principles Analysis and Design. Revised 2nd Edition, New Age International (P) Limited Publishers, New Delhi.
- 17.** Subramanya, K. 2008. Engineering Hydrology. 3rd Edition, Tata McGraw-Hill Publishing Co., New Delhi.
- 18.** Suresh, R. 2005. Watershed Hydrology. Standard Publishers Distributors, Delhi.
- 19.** Varshney, R.S. 1986. Engineering Hydrology. Nem Chand and Brothers, Roorkee, U.P.
- 20.** Garg, S.K.1998. Hydrology and Water Resources Engineering. Khanna Publishers, Delhi.