ANNA UNIVERSITY (UNIVERSITY DEPARTMENTS)
B.E. (Full Time) END SEMESTER EXAMINATIONS, Nov / Dec 2024
CIVIL ENGINEERING
7th Semester
CE 5054 Watershed Management
(Regulation 2019)

Time: 3hrs   Max.Marks: 100

CO 1	Recognize and interpret the concepts of a watershed and describe the land capability classification of watershed management.
CO 2	Able to prepare watershed development plan.
CO 3	Describe the runoff management concepts, state, design and sketch the soil conservation structures.
CO 4	Illustrate the application of water conservation principle and practices.
CO 5	Describe the watershed development programme, use of remote sensing in watershed management.

BL – Bloom's Taxonomy Levels
(L1 - Remembering, L2 - Understanding, L3 - Applying, L4 - Analysing, L5 - Evaluating, L6 - Creating)

PART- A (10 x 2 = 20 Marks)
(Answer all Questions)

Q. No.	Questions	Marks	CO	BL
1	List the factors influencing prioritisation of a watershed.	2	1	L1
2	Differentiate *Administration* and *Management* in a watershed through an example.	2	1	L2
3	List any four categories of Land use with examples.	2	2	L1
4	What are included in indirect costs? Give examples.	2	2	L1
5	Calculate the terminal velocity and kinetic energy of a rain drop of 2mm dia., if the drag coefficient is 0.517, density of water is 998 kg/m^3 at 20°C and density of air is 1.20 kg/m^3 at 101.3 kpa.	2	3	L3
6	How can the gully be stabilised?	2	3	L2
7	Write the Prismoidal formula to compute the volume of a farm pond from the contours.	2	4	L1
8	Calculate the ratio of catchment to cultivated area for design of water harvesting structure for the following information. Crop – Maize, Water requirement: 500 mm, Design rainfall: 373 mm, Runoff coefficient: 0.15, Efficiency factor: 0.50. What is your interpretation on the same?	2	4	L3
9	Expand MGNREGA, DPAP	2	5	L1
10	Name any four NGOs taking up watershed management activities.	2	5	L1

PART- B (5 x 13 = 65 Marks)

Q. No.	Questions	Marks	CO	BL
11 (a)	Explain the different land resource regions of India. Discuss their features and land use.	13	1	L1
	OR			
11 (b) (i)	Define a watershed with a neat sketch and explain how the order of a stream is fixed.	5	1	L2
(ii)	The details of river basins are given below. Establish the area-length relationship.	8	1	L5

Sl. No.	Name of the Basin	Length (km)	Area (sq.km)
1	A	410	135
2	B	603	215
3	C	557	340
4	D	852	75

12 (a)	How will do the financial analysis of a watershed considering costs and benefits?	13	2	L4
	OR			
12 (b) (i)	Explain the various key principles of watershed planning and the actions to be taken to ensure holistic and integrated management of the resources.	13	2	L1
13 (a)	Design a straight inlet type of drop structure for controlling a gully, which is 1.25m deep and 2.5m wide. The peak discharge likely to flow through the gully is $1.2 m^3/s$. The longitudinal slope of the gully is 0.003 and the structure has a straight apron outlet of Morris and Johnson type. Assume any other relevant data if necessary.	13	3	L5
	OR			
13 (b) (i)	Calculate the time of concentration and peak rate of runoff from a watershed of 750 ha area. The watershed is divided into 3 parts based on its land use and soil texture. The first part is 250 ha with 1% slope under cultivation (C=0.50), second part is 300 ha with 7% slope under pasture (C=0.36) and third part is 200 ha with 12% slope under farm forestry (C=0.50). The maximum length of flow path is 10000 m upto the outlet. The average slope of the channel is 5%. Assume the rainfall intensity for the time of concentration as 5 cm/h.	5	3	L3
(ii)	Explain in detail the factors affecting runoff	8	3	L2
14 (a)	It is proposed to construct a percolation pond with earthen embankment under MGNREGA. Design and check the safety of the pond for the following data. Catchment area – 15 ha.; intensity of rainfall – 12 cm/hr; RL of ground – 100 m; RL of HFL – 102 m; runoff coefficient – 0.3; soil type - sandy loam; slope of saturation line – 4:1. Assume a fetch of 400 m. Sketch the pond. Assume any other relevant data if required.	13	4	L5
	OR			
14 (b)	A farmer with 4 members (135 lpcd) in his family has 4 cows (20 lpcd), 10 sheep (5 lpcd) and cultivated area of 2 ha. out of which 1ha. is irrigated. The area is semi-arid having red soil and a dugout pond is to be constructed to hold water for a requirement of 150 days. It is proposed to give one supplemental irrigation of 6 cm depth including losses. Assume 20% of storage losses for evaporation and seepage. Assume suitable dimensions and design the pond lined with stone slab and estimate the cost. Take the cost of earthwork as Rs.200/m^3 and cost of lining with stone slab as Rs.500/m^2.	13	4	L5
15 (a)	Explain (i) RIDF of NABARD and (ii) role of TAWDEVA in watershed management.	13	5	L3
	OR			
15 (b)	Discuss the need of Aerial photography and Remote Sensing in watershed management through a case study.	13	5	L3

PART- C (1 x 15 = 15 Marks)
(Q.No.16 is compulsory)

Q. No.	Questions	Marks	CO	BL
16. (i)	You are appointed as an engineer to take up watershed conservation and management activities for a watershed of 1000 ha. through funds from NABARD. How will you prepare a proposal for the same?	15	2	L3