Lwre 3107   **Water Harvesting and Soil Conservation Structures (2+1)**   **Marks: 50**
Time: 2 hours

I   **Fill up the following**   **(10x1=10)**
1. Chute structures are for gully head control upto a drop of _____.
2. For safety against overturning, the ratio of limiting balancing moment to overturning moment is _____.
3. The main function of permanent structures is to halt the advance of _____at a gully head.
4. A Water course of highly variable discharge is called _____.
5. The retaining wall is a _____ structure used in conjunction with straight drop structure.

State True/False
6. Tension on a structure develops because of structural weight.
7. Permissible velocity can be increased by increasing the bed slope.
8. The terms watershed, catchment area and command area are synonymous.
9. Drop-inlet structures are used in gullies towards the upstream part to create water ponds.
10. Longitudinal sills in a spillway basin are provided to strengthen the structure.

II   **Write Short notes on ANY FIVE of the following**   **(5x2=10)**
1. Design components of Permanent gully control structures.
2. Uses of Farm ponds.
3. Types of Water Harvesting.
4. Hydraulic Jump.
5. Froude Number.
6. Diversions.
7. Hydraulic Design.

III   **Answer ANY FIVE of the following.**   **(5x4=20)**
1. Describe the functions of each of its components of chute spillway.
2. Describe in detail different checks for structural design for drop spillway due to overturning, sliding and piping.
3. List the advantages and disadvantages of drop spillway.
4. Determine the depth of flow in a rectangular channel before the occurrence of hydraulic jump, when then velocity of flow and the depth of flow after the hydraulic jump are recorded as 1.0 m/s and 1.50 m respectively. Also, determine the loss of energy owing to occurrence of hydraulic jump.
5. Derive an equation of hydraulic jump as an energy dissipater.
6. Determine the size of concrete pipe needed in a drop inlet spillway for a peak flow of 3 cu.m per second and a total head of 3 m. Determine the slope to be given to the pipe to flow full. Length of pipe = 12 m, entrance loss coefficient Ke = 0.5 and friction loss coefficient Kc = 0.03

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7. Describe the constructional feature of drop inlet spillway with diagram.

IV   Write an essay on ANY ONE of the following   (1x10=10)

1.   a) Define farm pond. Describe various types of farm ponds.
        b) Calculate capacity of a pond for the given area enclosed by different contours at the
            site following trapezoidal as well as Simpson's rule. Contour interval = 100 cm.

S. No.	1	2	3	4	5	6	7
Contour Value (cm)	25000	25100	25200	25300	25400	25500	25600
Area Enclosed (m^2)	220	290	340	370	480	550	620

2. Design a drop structure which is to be constructed across the gully. The catchment area of
    the gully is 50 ha. The maximum rainfall intensity was recorded as 12 cm/h once in 50 -
    years return period, for the period equal to Tc. The drop of bed is 2 m. (Assume necessary
    data required).

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