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B.E (Full Time) DEGREE END SEMESTER EXAMINATIONS, APRIL / MAY 2014

Agricultural and Irrigation Engineering

Semester-VIII

AI 9024 Minor Irrigation and Command Area Development

(Regulation R2008)

Time: 3 Hours | Answer ALL Questions | Max. Marks 100

PART-A (10 x 2 = 20 Marks)

1. In small and medium sized tanks, what is the usual difference between MWL and FTL? What is the maximum difference that one can allow?
2. What is the difference between Bligh's and Lane's Creep theory?
3. What is critical exit gradient? How do you compute it? If the critical exit gradient exceeds the allowable limit, what do you do?
4. a) Distinguish between soil texture and soil Structure.

   b) Draw a typical Soil Profile
5. What are the disadvantages and advantage of using Earthern and lined canals in On-Farm Works?
6. What is a non-Scouring and non-deposition velocity? Where do you use this concept in your design?
7. What is a core wall type of Earthern dam? Sketch it.
8. How do you classify the catchment as dry, damp and wet and what are the transition rules?
9. What is minor, medium and major irrigation Scheme?
10. a) What is the difference between gross irrigated area and net irrigated area?

    b) What is the difference between Irrigation potential created and utilized?

Part – B (5 x 16 = 80 marks)

11. i) Give a brief account of the Dusi-mandor tank that you visited recently (4)
    ii) Describe the structure that you have seen during your field visit.(4)
    iii) How is the water distribution carried out? What are the Institutional arrangements for managing the tank? (8)

12. a) The following Criteria have been stipulated for the safe design of a tank bund. How are these safe design criteria achieved in designing the tank bund?
    i) Must be safe against overtopping and Sliding. (6)
    ii) The saturation gradient should be well within the downstream toe of the bund. (4)
    iii) Seepage flow through the dam and foundation should be controlled and Piping should be controlled. (6)

(OR)

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b) From the Topographical survey, the area enclosed within Contour lines and along the face of a proposed tank are given below:

Description	Contour (m)	Area (m^2)
TBL	131.0	2900
MWL	130.5	2800
FTL	130.0	2700
	129.0	2100
	128.0	1850
	127.0	1350
	126.0	900
Sill Level	125.0	350
Tank bottom	124.0	100

i) Calculate the volume of water in the tank for different Contour levels.(8)
ii) Draw a graph connecting elevation of tank versus Volume. Compute the volume relating to FTL (130.0) and water level (128.5). (4)
iii) How do you use this Stage-Volume curve to manage the water for crop Production? (4)

13. a) i) What are the four types of tank surplus weir based on downstream apron? When the drop in a surplus weir is more than 2.5m, what kind of a surplus weir you would use? (4)
ii) Sketch such surplus weir indicating the various components of it. What are the two types of connection used to connect the body wall to the adjacent Earthern structure? (8)
iii) Give the empirical formulae used for the crest width of surplus weir in tanks, Length of upstream impervious Apron, Estimation of peak flood discharge for a combined catchment having an area greater than 13 sq.Km and maximum scour depth for arriving at the depth of sheet piles. (4)

(OR)

b) Design the following Components of a Surplus weir with the following data:
Area of free catchment = 1.00 sq.Km
Area of combined Catchment = 5.00 sq.Km
FTL = +27.500
MWL= +28.100
No of Fillings=2
Ground Level at the Weir Site=+26.00
TBL=+29.300
Top width of Bund=2.0m
Side Slope(Front)=1.5:1
Side Slope (Rear)=2:1
Ryves coefficient C=7.5
Small C = 1/5C
Assume that hard soil is met with at 1.0m below ground level. Compute:
i) Maximum flood discharge, Length of body wall and Height of body wall and crest width. (6)
ii) Base width of the body wall and Scour depth and Upstream and Downstream depth of sheet pile. (4)
iii) Length of Apron and thickness of Apron floor. Take C_C=5. (6)

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14. a) i) What is the abbreviation "CADA" stands for? What is the reason for genesis of CADA and the components of CAD programme? (6)
ii) What is the present coverage of CAD Programme and arrangement for CAD implementation at Central and state levels? (4)
iii) Detail the central assistance to states and the condition under which the assistance are given. (6)

(OR)

b) i) What is an 'OFD' works? What are the four types of OFD structures and describe each of them. (10)
ii) Describe the need and type of drainage structures in an OFD works. (3)
iii) What are Saline and Sodic Soils? How do you treat them? (3)

15. a) i) Sketch a typical Lift Irrigation Scheme lifting water from a river. Give the purpose and function of each one of the components present in the sketch. (6)
ii) Design a lift irrigation scheme to irrigate 30 ha with the following details:
1. Cropping pattern

Kharif	Paddy	20 ha	30 watering	10 cm each watering
	Groundnut	10 ha	20 Watering	8 cm each watering
Rabi	Groundnut	30 ha	25 watering	12 cm each watering
Summer	NIL	NIL	NIL	NIL

2. Total Static Head=75 cm
3. Length of rising main=4000m
4. No of Pumping hours=16
5. Detention time in distribution tank=3 minutes
6. Friction coefficient f= 0.006 for PVC pipes

Design the salient components of lift irrigation scheme. (10)

(OR)

b) How do you design a river lift irrigation scheme? Specifically state:
i) What should be the consideration in selecting the command area in a river lift scheme? How do you compute the design discharge? What kind of permission that you should obtain before installing a river lift scheme? (6)
ii) What type of pump and pipe that you would select for river lift? What kind of an arrangement that you would provide to take care pump or power failure? (4)
iii) How is the water distributed among farmers? Why do you need an intake well? What kind of on-farm distribution you will adopt? (6)