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320732(20)

B. E. (Seventh Semester) Examination, April-May 2020/NOV-DEC2020

(New Scheme)

(Civil Engg. Branch)

WATER RESOURCES ENGINEERING-I

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : *Attempt any* ***three*** *parts of each question. Part (a) is compulsory. Assume suitable data wherever necessary.*

1. (a) Explain the differences in the duty at watercourse and canal head, give the reason also. 2

(b) (i) Describe point wise the precise method of the determining required channel capacity for any

command area. Illustrate it with the help of a table.

(ii) In order to determine the quantity of water at head of canal knowing the quantity of water at root of soil, what the different efficiency which are to be taken into account explain in sequence. 7

(c) Explain how frequency of irrigation is determined on the basis of soil moisture? 7

(d) The base period, intensity of irrigation and duty of various crops under a canal system are given in the table below. Find the reservoir capacities if the canal losses are 20% and reservoir losses are 12%. 7

Crop	Base period	Duty at the field	Area under crop (ha)
Wheat	120	1800	4800
Sugar-cane	360	800	5600
Cotton	200	1400	2400
Rice	120	900	3200
Vegetables	120	700	1400

2. (a) Explain how capacity factor affect the discharge capacity of a channel. 2

(b) Design a distributary canal making use of Garret's diagram for the data given below full supply discharge = 2·26 cumecs, bed slope = 1 in 5000, Kutter's N = 0·0225, CVR = 1 : side slope = ½ : 1 (Horizontal : Vertical). 7

(c) Design an irrigation channel section for the following data :

Discharge = 30

Silt factor = 1·0

Side slope = 1/2 : 1

Draw the complete channel section assuming it to be in part cutting and part filling. 7

(d) An alluvial irrigation canal has been excavated with 1 : 1 side slopes in cutting and 1·5 : 1 (H : V) in filling. At a given cross section of this canal, the cutting depth is found to be D, and water depth up to full supply level as 1·2 D. The berm width left originally is D/2, find the berm width when canal attains regime. 7

3. (a) Explain how lining of canal increases its commanded area? 2

(b) Give point wise justification of lining in existing canal and lined canal in new project. Illustrates suitably. 7

(c) How the discharge passes thorough any outlet can be calculated, explain it for non modular, flexible and rigid outlets. 7

(d) Compare the brick, concrete and boulder lining with respect to their hydraulic efficiency, economy, durability and reparability. 7

4. (a) Write down the ill effects of embankment construction for flood control. 2

(b) The following data pertain to a bridge site of river, Maximum discharge = 6200 cumecs, highest flood level = 104.00 m; river bed level = 99.00 m, average diameter of river bed material = 0.12 mm. Design and sketch Bell's Bunds including the launching apron to train the river. 7

(c) Explain how do the following assist in river control (i) Spurs and (ii) Guide bunds. 7

(d) How cut off are artificially induced? What are their advantages and disadvantages? 7

5. (a) Define maximum reservior level and how it affects height of a dam. 2

(b) The lowest portion of the capacity-elevation curve of a proposal irrigation reservoir draining 20 km^2 of catchment, is represented by the following data :

Elevation in m	Capacity in ha.m
600	24·2
602	26·2
604	30·3
606	36·8

The rate of silting for the catchment has been assessed to be 300 m^3/km^2/year. Assuming the life of reservoir to be 50 years, (a) compute the dead storage and the lowest sill level, if the main canal is 6 km long with a bed slope of 1 in 1500, and the canal bed level at the tail end is at RL 594.5 m. The FSD of the canal at the head is 80 cm. The crop water requirement is assessed as 320 ha m. 7

(c) The hydrograph of inflow to a reservoir is given in the table below :

Time in days	0	2	4	6	8	10	12	14	16	18	20
Flow (m^3/s)	60	120	420	545	420	310	250	190	150	110	60

The reservoir is full at the start of the flood inflow. The storage S of the reservoir above the spillway crest is givent in million cubic meter by $S = 8{\cdot}64\ h^{0{\cdot}97}$. where h is the head in meters above the crest. The discharge over the spillway is given in cumecs by $Q = 61\ h^{0{\cdot}96}$. Find the head over the spillway crest at the end of 8^{th} day of the flood. 7

(d) Explain the procedure of determining the life of reservoir based on silting of reservoir. 7