Code No: **R1641012**

R16

Set No. 1

IV B.Tech I Semester Advanced Supplementary Examinations, May – 2022
WATER RESOURCES ENGINEERING - II
(Civil Engineering)

Time: 3 hours   Max. Marks: 70

Question paper consists of Part-A and Part-B
Answer ALL sub questions from Part-A
Answer any FOUR questions from Part-B
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PART–A *(14 Marks)*

1. a) Describe the importance of irrigation. [2]
   b) Explain the procedure of design of non-erodible canals. [3]
   c) Write down the design principles of Head regulators. [2]
   d) Explain Khosla's theory. [2]
   e) Write a short note on Reservoir sedimentation. [2]
   f) Write down the design principles of Ogee spillways. [3]

PART–B *(4x14 = 56 Marks)*

2. a) Explain the irrigation efficiencies with necessary derivations. [7]
   b) For a given crop, determine the field irrigation requirement for each month [7]
   assuming irrigation efficiency to be 60 per cent. Use the data from the following
   table.

Month	Crop factor, K	Pan evaporation, E_p (mm)	Effective rain-fall, $D_p – D_{pl}$ (mm)
November	0.20	118.0	6.0
December	0.36	96.0	16.0
January	0.75	90.0	20.0
February	0.90	105.0	15.0
March	0.80	140.0	2.0

3. a) An irrigation channel is to be designed for a discharge of 50 m³/s. The bed slope [8]
   of the channel is adopted as 1.5×10^{-4}. The river bed material has a median size
   of 2.00 mm. Design the channel and recommends the size of coarser material to
   be excluded or ejected from the channel for its efficient functioning.
   b) With neat sketches, explain the economics of canal lining with suitable [6]
   examples.

4. a) Design a straight glacis fall for a drop of 2.25 m in the water surface level of [9]
   irrigation channel carrying water at the rate of 60 m³/s. Consider the bed width
   and depth of flow in the channel are 30 m and 2.20 m, respectively.
   b) Explain the objectives and approaches of river training works. [5]

5. a) Explain the Bligh's creep theory with suitable examples and sketches, wherever [7]
   required.
   b) Explain the design procedure of impervious floors for subsurface flow. [7]

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6. a) A proposed reservoir has a capacity of 500 ha-m. The catchment area is 125 km^2, [7]
        and the annual streamflow averages 12 cm of runoff. If the annual sedimentation
        is 0.03 ha.m/km^2, what is the probable life of the reservoir before its capacity is
        reduced by 10% of its initial capacity by sedimentation? The relationship
        between trap efficiency η (%) and capacity inflow ratio (*C/I*) is given in the
        following table.

C/I	0.01	0.02	0.04	0.06	0.08	0.10	0.20	0.30	0.50	0.70
η (%)	43	60	74	80	84	87	93	95	96	97

    b) Draw a neat sketch of Gravity dam and locate various forces acting on it. Explain [7]
        any two forces acting on the gravity dam.

7. a) Describe the methods to prevent seepage failures in Earth dams.   [7]
    b) Determine the head over crest of a Chute spillway using the following data: [7]
        i.   Spillway crest level   = 200.00 m.
        ii.   Level of the bottom of flank at which the low Ogee weir is to be
                constructed   = 192.0 m.
        iii.   Design discharge   = 5000 m^3/s.
        iv.   D/S tail water level corresponding to design discharge = 103.00 m.
        v.   The spillway length consists of 5 spans of 10.0 m clear width each.
        vi.   Consider the thickness of each spillway pier as 3.00 m. Assume any
                other necessary data.

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