Code No: **RT41014**

R13

Set No. 1

IV B.Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2018

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 THREE questions from Part-B
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PART–A *(22 Marks)*

1. a) What are the standards of irrigation water? [3]
   b) What do you understand by (i) regime channel, (ii) initial and permanent regime of channels? [4]
   c) What do you understand by a fall in a canal? Why it is necessary? [3]
   d) What are the main causes of failures of weirs on permeable foundations? [4]
   e) Explain how the practical dam is different from elementary profile. [4]
   f) Explain with the help of a sketch, the components of a zoned embankment dam. [4]

PART–B *(3x16 = 48 Marks)*

2. a) Name any two methods used for estimating consumptive use of water for a particular crop at a particular place. Explain in details the one which is most widely used in your region and the reason for preferring that particular method. [8]
   b) The left canal of a tank irrigation scheme carries a discharge of 12 cumecs and has a culturable commanded area of 820 hectares. The intensity of Rabi crop is 65% and the base period is 120 days. The right canal of the scheme carries a discharge of 28cumecs and has a culturable commanded area of 14450 hectares. The intensity of Rabi crop is 78% and the base period is 120 days. Compare the efficiency of the two canal systems. [8]

3. a) What do you understand by balancing depth? Derive an expression for the same. [8]
   b) With the help of basic regime equations given by Lacey, derive the perimeter-discharge relationship. [8]

4. a) Explain the procedure for designing the head regulator of a distributary. [8]
   b) Name the important types of river training methods indicating the purpose for which each type is adopted. [8]

5. a) Draw a neat sectional view of a weir showing the various parts. What is exit gradient? How does it affect the design of a weir? [8]
   b) Following data refer to a weir;
      Total number of vertical gates = 51
      Span of each gate = 10 m
      Full reservoir level (u/s) = 110 m
      Crest level = 106 m
      Coefficient of end contraction for piers = 0.02
      Coefficient of discharge (in Francis formula) $C_d = 1.70\ m^{1/2}/sec$
   Compute the max. Flood discharge which can safely pass over the weir without exceeding the full reservoir level .Neglect velocity of approach. [8]

6. a) Define the following: (i) surcharge storage (ii) valley storage (iii) safe yield and (iv) secondary yield. [8]
   b) Explain the method of determining the principal and shear stresses in a gravity dam. [8]

7. a) Discuss the recommendations for the section of an earth dam. [8]
   b) What is a 'spillway gate' and what are the merits and demerits of installing such gates? [8]

Code No: **RT41014** **R13** **Set No. 2**

IV B.Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2018

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 THREE questions from Part-B
*****

PART–A *(22 Marks)*

1. a) Describe various methods adopted as anti-waterlogging measures. [4]
   b) Draw sketches to show the section of canal, (i) partly in cutting and partly in filling, (ii) wholly in cutting, (iii) wholly in filling. [4]
   c) Write short notes on:
   (i) Aqueduct (ii) Canal Syphon (iii) Level Crossing [3]
   d) What is meant by scour? What precautions do you take against it in weir design? [4]
   e) What is middle third rule? [3]
   f) Explain the importance of seepage through earthen dams. [4]

PART–B *(3x16 = 48 Marks)*

2. a) Discuss various methods of assessment of irrigation water. [8]
   b) A water course commands an irrigated area of 850 hectares. The intensity of irrigation of rice in this area is 55%. The transplantation of rice crop takes 18days and total depth of water required by the crop is 65cm on the field during the transplantation period, given that the rain falling on the field during this period is 17cm.Find the duty of irrigation water for the crop on the field during transplantation, at the head of the distributory, assuming losses of water to be 25% in the water course. Calculate the discharge required in the water course. [8]

3. a) Enumerate various types of linings used for canal. [6]
   b) For a channel the discharge (Q), rugosity (N), critical velocity ratio (m) and the bed width-depth ratio (B/D) are given. Explain how would you design the channel using Kennedy's theory? [10]

4. a) Explain the procedure of designing Sarda type fall. [8]
   b) Write short notes on the following river training works:
   (i) Levees (ii) Guide Banks
   (iii) Repelling Groynes (iv) Cut-off [8]

5. a) Write short notes on the following:
   (i) fish ladder (ii) divide wall
   (iii) Under sluices (iv) Launching apron. [8]

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b) Following corrected pressure potentials were determined underneath a barrage floor by Khosla's theory:

At junction of upstream sheet pile with floor $\emptyset_{E_1}$ = 82%

At junction of downstream sheet pile with floor $\emptyset_{C_2}$ = 35%

Calculate the minimum thickness of the cistern floor at the beginning (i.e. at the toe of the glacis), and the end of the cistern (i.e. at the junction of the downstream sheet pile with cistern)

The following data are given:

Full reservoir level = 105 m

River bed level = 100 m

Cistern floor level = 99 m

Total length of barrage between upstream and downstream sheet piles (i.e. between E_1 and C_2) =40 m; Length of cistern = 15 m(from downstream sheet pile). [8]

6. a) What are the factors on which the selection of the site for a reservoir depends? [8]

b) A concrete dam 40 m height has a top width of 6 m. The upstream face of the dam is vertical and the downstream face is sloping with 2H for 3 V from the top of the dam. The free board is 3 m. If the density of concrete is 2.4 t/m^3, determine the factor of safety against overturning. Considering only water pressure, self weight of the dam and uplift pressure. There is no tail water. [8]

7. a) Describe the various methods of construction of earth dams. [8]

b) Explain most suitable energy dissipation arrangements that you would recommend for each of following conditions:

(i) When JHC and TWC nearly coincide,

(ii) When JHC is always above TWC

(iii) When JHC is always above TWC where

JHC= Jump height curve; TWC= Tail water curve [8]

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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 THREE questions from Part-B
*****

PART–A *(22 Marks)*

1. a) What do you understand by crop rotation? What are its advantages? [4]
   b) Explain the measures adopted to remove silt from the canal. [3]
   c) What is an outlet? Write down the requirements that an outlet should fulfill. [4]
   d) Explain briefly about silt extractor and silt ejector. [4]
   e) What do you understand by galleries and what are the functions of galleries? [4]
   f) Define and explain the term phreatic line in earthen dams. [3]

PART–B *(3x16 = 48 Marks)*

2. a) Describe with the help of a diagram various forms of a soil moisture. What do you understand by the available moisture? [8]
   b) Explain as how the following factors affect the 'duty' of a crop:
      (i) Soil and sub soil condition (ii) Stage of growth
      (iii) Temperature (iv) Rainfall [8]

3. a) What is canal lining? What are its advantages? Write the requirements of good lining material. [8]
   b) Compare Kennedy's and Lacey's silt theories. Why is Lacey's conception superior to that of Kennedy's? [8]

4. a) What is meant by "canal regulation" and what are the different types of "canal regulation works"? [8]
   b) What are the different types of cross drainage works that are necessary on a canal alignment? State briefly the conditions under which each one is used. [8]

5. a) Discuss briefly the following:
      (i) Bligh's creep theory for seepage flow.
      (ii) Exit gradient and its importance. [8]
   b) An impervious floor of a weir on permeable soil is 17 m long and sheet piles at the both ends. The upstream pile is 5 m deep and the downstream pile is 6 m deep. The weir creates a net head of 3 m. neglecting the thickness of the weir floor; calculate the uplift pressures at the junction of the inner faces of the pile with the weir floor, by using Khosla's theory. [8]

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6. a) Distinguish between a low gravity dam and high gravity dam. Derive the expression used for such a distinction. [8]
   b) A reservoir has a capacity of 4 million cube meters and a drainage area of 250 sq.km. The annual inflow is equivalent to 375 mm of runoff from the given drainage area, and annual sediment production is equivalent to a weight of 12.25 million Newton per sq.k.m. of drainage area. The sediment has an average specific weight of 14715 N/m^3. Assume dead storage as 15 % of initial reservoir capacity, and an average value of trap efficiency 88 %. Determine the number of years it will take for a dead storage to be filled with sediment. [8]

7. a) Explain the method of locating centre of the critical slip circle of stability analysis of the slope of an earth dam. [8]
   b) A discharge of 2000 cumecs has to be passed over an ogee spillway. With a coefficient of discharge of 2.3 at a head of 5.5 m. what should be the effective length of the spill-way. Neglect the velocity of approach. [8]

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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 THREE questions from Part-B
*****

PART–A *(22 Marks)*

1. a) Explain the terms 'duty' and 'delta'. Derive a relationship between the two. [4]
   b) How do you control weed growth in a canal? [3]
   c) What is meant by the terms 'flexibility', 'proportionality', 'setting' and 'sensitivity' as applied to modules. [4]
   d) Differentiate between a weir and a barrage? Why does a barrage preferred to a weir in modern days? [4]
   e) What do you understand by gravity dam? Explain various forces that act on a gravity dam. [4]
   f) What are spillways and where are they provided? [3]

PART–B *(3x16 = 48 Marks)*

2. a) Write notes on the following:
   (i) Saturation capacity (ii) Field capacity
   (iii) Wilting point (iv) Optimum water [8]
   b) The discharge available from a tube well is 125 m^3/hour. Assume 3300 hours of working for a tube-well in a year, estimate the cultivable area that this tube-well can command. The intensity of irrigation is 55% and the average depth of Rabi and Kharif crops is 50cm. [8]

3. a) Write short notes on the following:
   (i) Free board in canals, (ii) Permanent land width,
   (iii) Inspection road, (iv) Dowla. [8]
   b) The slope of a channel in alluvial soil is 1/6000. Find the channel section and the maximum discharge which can be allowed to flow in it. Take Lacey's silt factor f=1.2. The channel is of trapezoidal section, having side slopes ½:1 [8]

4. a) Describe the necessity and functioning of a 'Distributary head regulator' and a 'Cross regulator' in a canal project. [8]
   b) Classify aqueducts and explain under what circumstances each one is used. [8]

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5. a) Explain with the help of diagram, the various component parts along with their functions of a diversion headwork. [8]
   b) Design a vertical drop weir, on Bligh's theory for the following data:
      (i) Maximum flood discharge = 1250 cumecs
      (ii) HFL before construction of weir = 172.5 m
      (iii) River bed level = 168 m
      (iv) FSL of canal = 171.5 m
      (v) Allowable afflux = 1 m
      (vi) Coefficient of creep = 12
      Assume any other data not given. The weir wall need not be designed and its dimensions may be taken as follows: (i) top width = 2m (ii) bottom width = 4 m. [8]

6. a) What are the factors on which selection of site for a dam depends? [8]
   b) What do you understand by the elementary profile of a gravity dam? Derive expressions for determining base width of such a dam based on (i) stress criterion and (ii) sliding criterion. [8]

7. a) Discuss in brief the causes of failure of earth dams. [8]
   b) Compute the discharge over an ogee spillway with coefficient of discharge C=2.2 at a head of 4.2 m. The effective length of the spillway is 120 m. Neglect the velocity of approach. [8]