III B. Tech II Semester Regular Examinations, June-2022
WATER RESOURCES ENGINEERING-II
(Civil Engineering)

Time: 3 hours　　　　　　　　　　　　　　　　　　　　Max. Marks: 75

Answer any **FIVE** Questions **ONE** Question from **Each unit**
All Questions Carry Equal Marks
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UNIT-I

1. a) Explain in detail about various factors affecting Duty. [8M]
   b) The base period, intensity of irrigation and duty of water for various crops under the canal system are given. Determine the reservoir capacity if the culturable command area is 4000 hectares, canal losses are 20% and reservoir losses are 10%. [7M]

Crop	Base period (days)	Duty at field (Ha/cumec)	Intensity of irrigation
Wheat	120	1800	20%
Sugar cane	360	1600	20%
Cotton	180	1400	15%
Rice	120	800	20%
Vegetable	120	700	20%

(OR)

2. a) Discuss about various crops and crop seasons in India. [8M]
   b) Explain drip irrigation with neat sketch and also mention its advantages over conventional methods. [7M]

UNIT-II

3. a) Explain various types of canals. [8M]
   b) Design an unlined irrigation canal to carry a discharge of 1.5 m^3/sec, assume N = 0.0225, critical velocity ratio (m) = 1 and B/D = 5.0. [7M]

(OR)

4. a) Explain the design procedure of straight glacis fall. [8M]
   b) Design an irrigation canal based on Lacey's theory for the following data:
   Design discharge (Q) = 50 m³/sec, Silt factor (f) = 1.0, Side slope = 0.5H: 1V [7M]

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UNIT-III

5. a) Describe the functions of various component parts of a Diversion head work. [8M]

    b) Write the types of diversion head works. Explain any two types. [7M]

(OR)

6. a) Explain Khosla's theory for seepage flow below a weir. [8M]

    b) Explain the causes and failures of weirs on permeable foundation. [7M]

UNIT-IV

7. a) Explain the calculation of various forces acting on a gravity dam. [8M]

    b) Explain about the causes of failure of a gravity dam. [7M]

(OR)

8. a) Explain various factors that govern the selection of site for a dam. [8M]

    b) The top width of gravity dam = 6 m; Height of dam = 84 m; Free board = 4 m; D/s battering starts from a point 9 m below the top of dam with a side slope of 2H:3V. U/s face is vertical. Assume no tail water. Assume specific weight of concrete as 23.5 kN/m^3. Allowable stress in concrete may be taken 2,500 kN/m^2. Check the stability of dam for reservoir full condition. [7M]

UNIT-V

9. a) Discuss about various failures of Earth dams. [8M]
    b) Explain various types of spillways with neat sketches. [7M]

(OR)

10. a) Discuss about classification of earth dams. [8M]
    b) Explain energy dissipation arrangements at the toe of the spillway for various relative cases of jump height curve and tail water curve. [7M]

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SET - 2

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UNIT-I

1. a) Explain with neat sketches various types of irrigation. [8M]
    b) After how many days will you supply water to field in order to get efficient irrigation, if the field capacity of soil is 50%, permanent wilting point is 10%, dry density of soil is 1.5 g/cc, effective depth of root zone is 80 cm, and daily consumptive use of water for the crop is 10 mm? [7M]

(OR)

2. a) Discuss about various soil moisture constants. [8M]
    b) A water course has culturable command area of 2500 Ha, out of which the intensities of irrigation for perennial sugarcane and rice crops are 25% and 50% respectively. The duty for these crops at the head of the water course is 1000 Ha/cumec and 1500 Ha/cumec respectively. Determine the discharge required at the head of the water course if the peak demand is 120% of the average requirement. [7M]

UNIT-II

3. a) Discuss in detail about Kennedy's silt theory. [8M]
    b) Design an unlined irrigation canal to carry a discharge of $2 \text{ m}^3/\text{sec}$, assume   N = 0.0225, critical velocity ratio (m) = 1 and bed slope is 1 in 2000. [7M]

(OR)

4. a) Discuss about the design principles of cross regulator. [8M]
    b) Design a trapezoidal shaped lined concrete channel to carry a discharge of 100 cumecs at a slope of 25 cm/km. The side slopes of the channel are 1.5:1. The value of N may be taken as 0.016. Assume the limiting velocity as 1.5 m/sec. [7M]

UNIT-III

5. a) Sketch the layout of a Diversion head work and also explain the functions of various components. [8M]
    b) Explain Bligh's creep theory for seepage flow below a weir. [7M]

(OR)

6. a) Classify different types of Diversion Head works and also give examples for them. [8M]
    b) Write step by step design procedure of impervious floor below the weir and also discuss about Exit gradient. [7M]

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UNIT-IV

7.   a)   Explain about drainage galleries grouting.   [8M]
    b)   Discuss about the yield and storage capacity of a reservoir.   [7M]

(OR)

8.   a)   Describe classification of storage of a reservoir into various zones.   [8M]
    b)   Derive the expression for base width of elementary profile of a gravity dam.   [7M]

UNIT-V

9.   a)   Discuss the criteria for safe design of earth dams.   [8M]
    b)   What is an ogee spillway and explain its design procedure?   [7M]

(OR)

10.   a)   Discuss various seepage control measures to be adopted in Earth dam.   [8M]
    b)   Write the various measures for control of seepage in earth dams.   [7M]

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UNIT-I

1. a) What is duty and delta? And also derive the relation between them. [8M]

   b) The culturable command area for a distributary is 15,000 Ha. The intensity of irrigation for Rabi (wheat) is 40% and for Kharif (rice) is 15%. If the total water requirements of the two crops are 37.5 cm and 120 cm and their periods of growth are 160 days and 140 days respectively. Determine the outlet discharge from average demand considerations. [7M]

(OR)

2. a) Explain with neat sketches various methods of applying water to the field. [8M]

   b) Discuss in detail about various irrigation efficiencies with expressions. [7M]

UNIT-II

3. a) Compare Kennedy's and Lacey's silt theories. [8M]

   b) Design a concrete lined channel of trapezoidal section to carry a discharge of 250 cumecs at a slope of 1 in 6000. The side slopes of the channel are to be made as 1.5:1 and a limiting depth of 3m is to be maintained. Take N for the lining material as 0.015. [7M]

(OR)

4. a) Explain various types of canal outlets with neat sketches. [8M]

   b) Classify Aqueducts and explain under what circumstances each one is used. [7M]

UNIT-III

5. a) Explain the design of impervious floors for subsurface flow. [8M]

   b) Discuss various types of Diversion head works. [7M]

(OR)

6. a) Write about weir and barrages with a neat sketch. And also explain its importance. [8M]

   b) What are the various causes of failure of weirs and mention their remedies? [7M]

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UNIT-IV

7.　a)　Explain about reservoir sedimentation.　　　　[8M]

　　b)　Design the practical profile of a low gravity dam with the　[7M]
　　　　following data:
　　　　Height of wave = 2 m
　　　　RL of Maximum Water Level =+150 m
　　　　RL of Bed level = +100 m
　　　　Specific gravity of concrete = 2.4

(OR)

8.　a)　Discuss about various causes of failures of gravity dam and their　[8M]
　　　　remedies.

　　b)　The yield of water in Mm^3 from a catchment area during each　[7M]
　　　　successive month is given in the following table:

1.4	2.1	2.8	8.4	11.9	11.9
7.7	2.8	2.52	2.24	1.96	1.68

　　　　Determine the minimum capacity of a reservoir required to allow
　　　　the above volume of water to be drawn off at a uniform rate,
　　　　assuming that there is no loss of water over the spillway.

UNIT-V

9.　a)　Explain stability of downstream slope during steady seepage　[8M]
　　　　with neat sketch.

　　b)　Discuss about various spillway crest gates with neat sketches.　[7M]

(OR)

10.　a)　Explain stability of upstream slope during sudden drawdown　[8M]
　　　　with neat sketch.

　　b)　Discuss about stilling basin and their appurtenances.　[7M]

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UNIT-I

1. a) What is consumptive use and explain various methods to estimate the consumptive use?   [8M]
    b) Discuss about the causes, effects and remedial measures of water logging.   [7M]

(OR)

2. a) What is the necessity and importance of irrigation? And also explain the standards of quality required for irrigation water.   [8M]
    b) Discuss about depth and frequency of irrigation with diagram.   [7M]

UNIT-II

3. a) Discuss about the design procedure of channel by Kennedy's theory.   [8M]
    b) Determine the economical depth of cutting for the following cross section of canal: [7M]
       The bed width of the channel = 5 m
       Top width of the banks = 2 m
       Side slopes of excavation = 1:1
       Side slopes of the bank = 1.5:1
       Height of banks from the canal bed = 3 m throughout.

(OR)

4. a) Discuss about the design procedure of sarda type fall.   [8M]
    b) Describe various types of cross drainage works and explain selection criteria of each.   [7M]

UNIT-III

5. a) Explain Khosla's theory for seepage flow below a weir.   [8M]
    b) Describe the functions of various component parts of a Diversion head work.   [7M]

(OR)

6. a) Distinguish between weir and barrage and classify various types of weirs.   [8M]
    b) What are the various causes of failure of weirs and mention their remedies?   [7M]

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UNIT-IV

7. a) Explain various factors that govern the selection of site for a dam. [8M]
   b) The top width of gravity dam = 6 m; Height of dam = 84 m; depth of water in the reservoir = 80 m; D/s battering starts from a point 9m below the top of dam with a side slope of 2H:3V. U/s face is vertical. Assume no tail water. Assume specific weight of concrete as 23.5 kN/m^3. Allowable stress in concrete may be taken 2,500 kN/m^2. Take coefficient of friction (μ) = 0.65, shear strength of the joint = 1400 kN/m^2. Check the stability of dam for reservoir full condition. [7M]

(OR)

8. a) Write about the forces acting on a gravity dam. And draw elementary and practical profile of a gravity dam. [8M]
   b) Derive the expression for minimum base width required for elementary profile for (i) no tension development (ii) no sliding. [7M]

UNIT-V

9. a) Explain stability of upstream slope during sudden drawdown with a neat sketch. [8M]
   b) What is a spillway? What are its functions? And enumerate various types of spillways. [7M]

(OR)

10. a) Discuss about various failures of Earth dams. [8M]
    b) Explain various protection works to be made for energy dissipation below spillways. [7M]

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