

Irrigation Engineering

P. Pages : 3

NRJ/KW/17/4667

Time : Three Hours



Max. Marks : 80

- Notes :
1. All questions carry marks as indicated.
 2. Solve Question 1 OR Questions No. 2.
 3. Solve Question 3 OR Questions No. 4.
 4. Solve Question 5 OR Questions No. 6.
 5. Solve Question 7 OR Questions No. 8.
 6. Solve Question 9 OR Questions No. 10.
 7. Solve Question 11 OR Questions No. 12.
 8. Due credit will be given to neatness and adequate dimensions.
 9. Assume suitable data whenever necessary.
 10. Illustrate your answers whenever necessary with the help of neat sketches.
 11. Use of non programmable calculator is permitted.

1. a) Define the following. 6
- i) Wilting point.
 - ii) Gross commanded area.
 - iii) Crop rotation.
 - iv) Time factor.
 - v) Kor Period.
 - vi) Capacity factor.
- b) The base period, intensity of irrigation & 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 25% and reservoir losses are 15%. 7

Crop.	Base Period (days)	Duty at field (hec/cumec)	Intensity of Irrigation
Wheat	120	1800	20%
Sugarcane	360	1700	20%
Cotton	180	1400	10%
Rice	120	800	15%
Vegetables	120	700	15%

OR

2. a) Define Duty & Delta and derive the relationship between them. 6
- b) After how many days will you supply water to soil, in order to ensure efficient irrigation of the given crop if; 7
- i) Field capacity of soil = 27 %
 - ii) Permanent wilting point = 14 %
 - iii) Dry density of soil = 15 kN/m³.
 - iv) Effective depth of root zone = 75cm.
 - v) Daily consumptive use of water for the given crop = 11mm.

3. a) Explain Brune's Method of estimation of useful life of a reservoir. **6**
- b) Find the probable life of a reservoir from following data; **8**
- Initial reservoir capacity = 30 Mm³.
 - Annual flood inflow = 60 Mm³.
 - Average annual sediment inflow = 36,00000kN
 - Specific weight of sediment = 12 kN / m³.
 - The useful life of reservoir will terminate when 80%. of initial capacity is filled with sediments.
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Capacity Inflow	Trap efficiency (%)
0.1	87
0.2	93
0.3	95
0.4	95.5
0.5	96
0.6	96.5

OR

4. a) Explain the Reservoir storage Zones and water levels with neat sketch. **7**
- b) What is mean by mass curve? Explain the method of determining the reservoir capacity by mass curve. **7**
5. a) Explain the elementary Profile of a gravity dam. Derive $B = \frac{H}{\sqrt{\rho - c}}$ **6**
- b) From the analysis of gravity dam, the following results were obtained; **7**
- Summation of resisting moments = 1548000 kNm.
 - Summation of overturning moment = 1208050 kN-m.
 - Summation of vertical forces = 32550 kN.
 - Summation of Horizontal forces = 31340 kN.
 - Base width of dam = 55m
 - Coefficient of friction of dam Material = 0.7
 - Shear strength of joints = 1.4 N/mm².
- Calculate Normal stresses at toe and Heel, factor of safety against overturning & shear friction factor.

OR

6. a) What are the Modes of failure of gravity dam? **6**
- b) Define Phreatic line. explain the procedure for drawing phreatic line by Casagrande method. **7**
7. a) Explain salient features of Bligh's creep theory? **7**
- b) Explain with neat sketch – **any two**. **6**
- Still excluder.
 - Divide wall.
 - Energy dissipater.

8. a) Explain the corrections in Khosla's theory. 7
- b) Explain 'Ogee spillway' with labeled diagram. 6

OR

9. a) Derive an expression for Balancing depth of a canal with neat sketch. 6
- b) Design a concrete lined canal to carry a discharge of $45 \text{ m}^3/\text{s}$ with side slopes of 1.25 : 1 and Manning's N of 0.016, The Maximum permissible velocity is 1.8 m/s. & section is triangular. 8

OR

10. a) Differentiate between Kennedy's & Lacey's theory. 6
- b) Design an irrigation channel in alluvial soil. according to Lacey's silt theory for the following data. 8
- i) Full supply discharge = 12 cumec.
 - ii) Lacey's silt factor = 0.90
 - iii) Side slopes of channel = 1H: 2v

11. a) Explain cross drainage works with neat sketches. 7
- b) Write short notes on **any two**. 6
- i) Canal falls.
 - ii) Canal regulators.
 - iii) Components of head regulator.

OR

12. a) What is water logging? Write the causes, effects & remedial measures of water logging. 7
- b) Write short notes on **any two**. 6
- i) Land reclamation.
 - ii) Tile drain.
 - iii) Inlet and level crossing.
