

Seat
No.

--	--	--	--	--	--



DAI1367

Water Resources Engineering - II (New) (1300)

P. Pages : 3

Time : Three Hours

Max. Marks : 100

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answersheet should be written with blue ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Answer **any two** sub question from each unit.
5. Use of Non-programmable calculator is allowed.
6. Figures to the right indicate full marks.
7. Assume suitable data if necessary.

UNIT - I

1. a) Design an elementary profile of a gravity dam to store water upto a depth of 60m assuming the following data :
 - i) Uplift factor = 0.83.
 - ii) Sp. gravity of dam material = 2.24.
 - iii) Coefficient of function = 0.75Also calculate shear stress and principal stress by assuming $e = \frac{b}{\sigma}$. **10**
- b) A gravity dam of elementary profile has a height of 75m. The unit weight of the material of the dam is 25 kN/m^3 and the uplift factor is 0.6. Calculate the minimum base width for no sliding condition, if the coefficient of friction is 0.75. Also derive the equation used in solving above problem. **10**
- c) Discuss the various points to be considered in selecting a suitable dam site ? State the various investigations for locating suitable dam site. **10**

UNIT - II

2. a) Design an overflow section of a gravity dam by USWEs method using following data:
 - i) Max. discharge = 3500 cumecs.
 - ii) Net length or over flow section = 170m
 - iii) Max water level = 526m
 - iv) Bed level of river = 465m
 - v) U/S face vertical.
 - vi) Slope of D/S face 0.75H:1V.Neglect end contractions and velocity of approach sketch the dimensional section of spillway.

- b) i) What is meant by an "Energy dissipater" ? Discuss any one method used for energy dissipation below spillways. 5
- ii) State the various types of spillways and suitability of each type. 5
- c) i) Explain with sketch the Tainter gate. 3
- ii) A saddle siphon spillway has following data : 7
- a) Full reservoir level = 100.000m
- b) Level of centre of siphon outlet = 88.000m
- c) High flood level = 101.000m
- d) High flood discharge = $800 \text{ m}^3 / \text{s}$
- e) Dimensions of throat - 4m width, 2m height.
- f) Coefficient of discharge = 0.65.
- Determine the number of siphon units required to pass the flood safely. The siphon discharges freely in the air.

UNIT - III

3. a) i) Explain the causes of failure of weirs on permeable foundations. 5
- ii) Explain piping failure of an earth dam and its causes. 5
- b) i) A Weir to be constructed on a coarse sand to retain water to a depth of 7.0m. If the D/S sheet pile has a depth of 9.0m. What shall be the length of apron to attain safe exit gradient of 1/5. 5
- ii) Find the factor of safety of d/s slope of an earth dam (homogeneous section) from following data of a trial slip circle : 5
- a) Scale of figure $\Rightarrow 1 \text{ cm} = 10\text{m}$
- b) Area of N-diagram = 13.00 sq.cm.
- c) Area of T diagram = 6.00 sq. cm
- d) Area of U diagram = 4.50 sq.cm.
- e) Length of arc = 12.50 cm.
- f) Effective angle of friction = 25° .
- g) Unit cohesion, $C = 20 \text{ kN/sq.m}$
- h) Unit wt of soil = 23 kN/m^3
- c) i) Explain sudden draw down condition & sloughing. 5
- ii) What are the requirements of good filter material for earth dam ? 5

UNIT - IV

4. a) Design a trapezoidal shaped concrete lined channel to carry a discharge of 100 cumecs at a slope of 27 cm/km. The side slopes of channel are 1.4:1. The value of N may be taken as 0.016. Assume limiting velocity as 1.5 m/s. 10
- b) Design an Irrigation canal by Lacey's theory for the following data :
- i) Full supply discharge = $14 \text{ m}^3 / \text{sec}$.
 - ii) $f = 1$.
 - iii) Side slope = 1/2 H:1V
 - iv) Coeff. of rugosity, $N = 0.0225$. 10
- c) i) Derive the equation of benefit cost ratio for canal lining. 5
- ii) What are the different types of bed forms ? Explain shield's expression for critical tractive force. 5

UNIT - V

5. a) What do you mean by canal fall ? Discuss necessity location and development of canal falls. 10
- b) i) Give classification of river training works. 5
- ii) Give a note on Bank protection. 5
- c) A run - off river plant with an installed capacity of 19MW operates at 25% load factor when it serves as a peak load station. The overall efficiency of the plant may be assumed to be 72% and the average head is 19m. 10
- i) Calculate the minimum discharge in the stream so that the plant may serve as a base load station.
 - ii) Calculate the maximum load factor of the plant when the discharge in the stream is $30 \text{ m}^3 / \text{s}$.
