

Total No. of Questions : 12]

SEAT No. :

P2121

[Total No. of Pages : 4

[5254]-514

B.E. (Civil Engineering) (Semester - II)
DAMS AND HYDRAULIC STRUCTURES
(2012 Pattern)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, 3Q. or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.*
- 2) Figures to right indicate full marks.*
- 3) Neat labeled diagram should be drawn wherever necessary.*
- 4) Assume suitable data, if necessary and state them clearly.*
- 5) Use of non-programmable pocket size electronic calculator is allowed.*

- Q1)** a) Discuss four factors to be considered for selection of the site for a Dam with sketches. **[4]**
- b) What is a Seismograph? Explain its use with reference to the safety of a Dam. **[4]**

OR

- Q2)** a) Why is it necessary to determine the possible tilt of a Dam wall? Briefly explain one instrument-accessory used to measure the tilt. **[4]**
- b) Discuss the possible social issues associated with Dams. **[4]**

- Q3)** Explain constant angle and constant radius arch dams with the help of neat labeled plans and sections. **[6]**

OR

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Q4) Determine the maximum and minimum vertical stresses on the base of the foundation of a concrete gravity dam assuming that there is no tail water. Also calculate the major principal stress at the toe of the dam. Use following data. [6]

- Base width of dam = 60 m
- Slope of downstream face of the dam = 0.8 H: 1 V
- Total vertical force on the base = 60 MN
- Total overturning moment about the toe = 1.5×10^6 kN.m
- Total restoring moment about the toe = 3×10^6 kN.m

Q5) Sketch the graphs for the following cases and state the provision for energy dissipation in each case. [6]

- a) Jump Height Curve (JHC) lies below Tail Water Curve (TWC) for all discharges.
- b) JHC lies above the TWC for all discharges.
- c) JHC lies above the TWC for small discharges and below for large discharges.

OR

Q6) Sketch a typical high head hydropower plant and label all essential components (parts) of it. Also state use of these parts. [6]

Q7) a) Fig.1 (Q. 7-a) shows the section of homogeneous earth dam (Not to scale). Obtain the phreatic line. Take interval for 'x' as 10 m for calculations. Show the line clearly on neatly drawn section of the dam. [10]

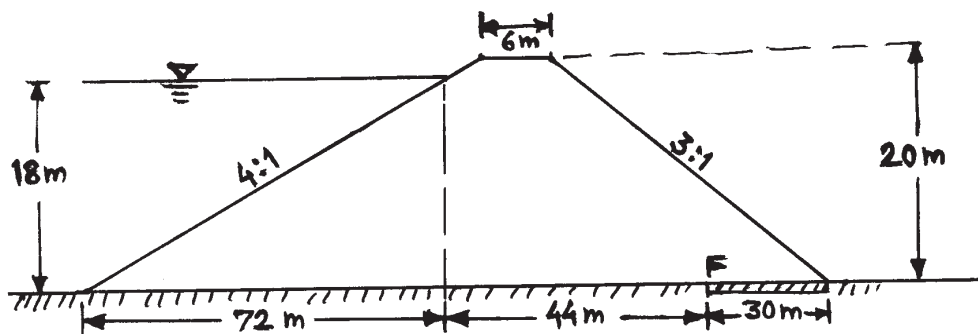


Fig.1 (Q.7-a)

- b) Draw layout plan of a typical diversion headwork and label all its parts. Write the function (purpose) of each part. [8]

OR

- Q8) a)** Compare Bligh's and Lane's Creep Theories with the help of neat sketches. [10]

Determine exit hydraulic gradient for the floor shown in Fig. 2 (Q. 8-a) using:

- (i) Bligh's Theory. and
(ii) Lane's Theory. The values in the Fig. 2 indicate the R.L. values in meters. Neglect thicknesses of cutoffs.

Comment on the safety of floor against piping if Bligh's and Lane's coefficient of creep C and C_1 are 5 and 3 respectively.

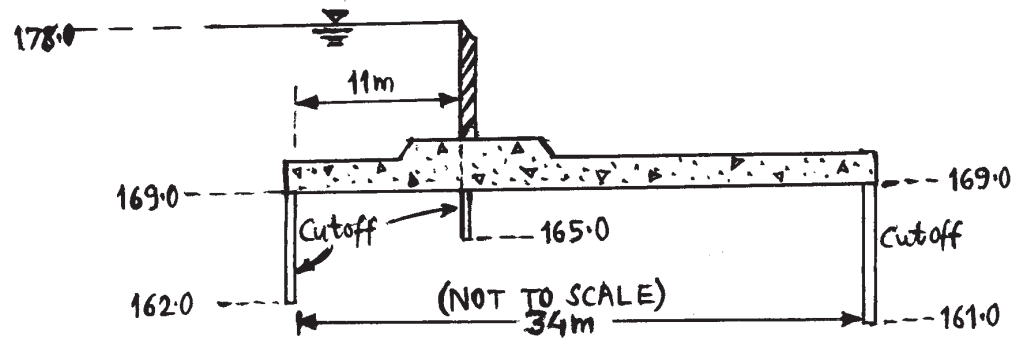


Fig.2 (Q.8-a)

- b) Discuss in detail the 'Swedish Slip Circle Method' for stability of earthen dam. Draw neat explanatory sketch/sketches. [8]

- Q9) a)** Design an irrigation canal with side slopes 1 H: 2 V and bed slope 1:5000 to carry water at the rate $14 \text{ m}^3/\text{s}$. Take 1.3 m as first (initial) trial depth of water. Assume critical velocity Ratio (m) = 1.0 and value of Kutter's $N = 0.0225$ [8]

- b) What is meant by 'Canal Fall'? When/why is it necessary? Enlist all known types of Canal Falls. [4]

- c) Classify canals based on their alignment. Briefly explain these types with the help of neat sketch/sketches. [4]

OR

- Q10)a)** Design a regime channel of trapezoidal section for carrying water at the rate 10 cumecs having side slopes 1 H: 2 V, if Lacey's silt factor is 0.90. [8]
- b) Write a note on 'Canal Modules (Outlets)' with sketches. [4]
- c) State the functions of Head Regulator and Cross Regulator. [4]
- Q11)a)** What is meant by 'C.D. Works'? Classify C.D. Works. Explain any one type with relevant plan and section. [8]
- b) Enlist the objectives of river training works. State and define three basic classes of river training work. [4]
- c) Briefly explain with sketches: Artificial Cut-off, Pitched Island. [4]

OR

- Q12)a)** Draw neat sketches and explain different types of 'Groynes (Spurs)'. [8]
- b) Discuss guide banks as river training works. Draw relevant sketch/sketches. [4]
- c) What is meant by 'Levees (Embankments)'? State their merits and demerits. [4]