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

P.T.O.

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]**

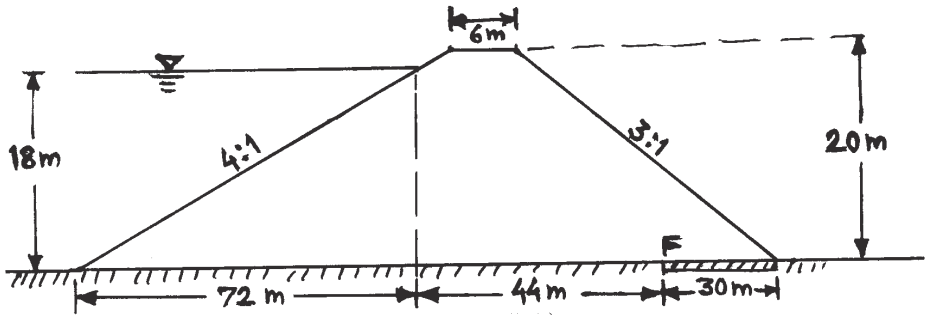

Fig.1 (Q.7-a)

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.

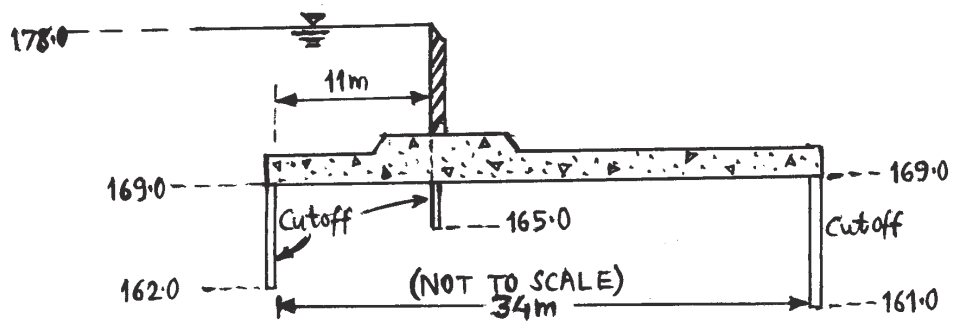

Fig.2 (Q.8-a)

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 m^3/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]**