

Total No. of Questions : 12]

SEAT No. :

P1949

[Total No. of Pages : 4

[5059]-514

**B.E. (Civil Engg.) (End Semester)**  
**DAMS AND HYDRAULIC STRUCTURES**  
**(2012 Pattern)**

*Time : 2 ½ Hours]*

*[Max. Marks : 70*

*Instructions to the candidates:-*

- 1) *Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8., Q.9 or Q. 10., Q.11 or Q.12.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Use of electronic pocket Calculator is allowed.*
- 5) *Assume Suitable data, if necessary.*

- Q1)** a) Discuss the possible social issues associated with dams. [4]
- b) Enlist the types of dams based on hydraulic action and briefly explain any one type with sketch / sketches. [4]

OR

- Q2)** a) State and explain four instruments used for various measurements needed with reference to safety of dams. Draw suitable sketches wherever possible / necessary. [4]
- b) Enlist the types of dams based on the purpose. Explain any one type with sketch. [4]

- Q3)** A gravity dam has base width 60m with upstream face vertical and downstream face with slope 2H:3V.

Knowing that total vertical force above the base is 63MN, overturning moment and resisting moment are  $2.2 \times 10^6$  kN.m and  $3.9 \times 10^6$  kNm; determine

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maximum and minimum vertical stresses induced on the foundation. Also find major principal stress at the toe of the dam. Is the dam safe against overturning? [6]

OR

**Q4)** State the classification of arch dams. Briefly explain the constant angle arch dam with sketch / sketches. When are the arch dams suitable? [6]

**Q5)** What is meant by 'spillway'? State its purposes. Explain any one spillway with sketch. [6]

OR

**Q6)** Enlist various spillway gates. Give the classification of hydropower plants based on various criteria (considerations). [6]

**Q7) a)** Discuss various causes or modes of failure of earthen dams. Draw relevant sketches. [4]

b) Compare Lane's and Bligh's theories of seepage with suitable sketches. [4]

c) An earthen dam of homogeneous material has top width 5m with upstream slope 3H:1V and downstream slope 2H:1V.

Knowing that coefficient of permeability of the dam material is  $0.6 \times 10^{-3}$  cm/s, determine :

i) Phreatic line for the dam, and

ii) Rate of seepage per unit length of dam.

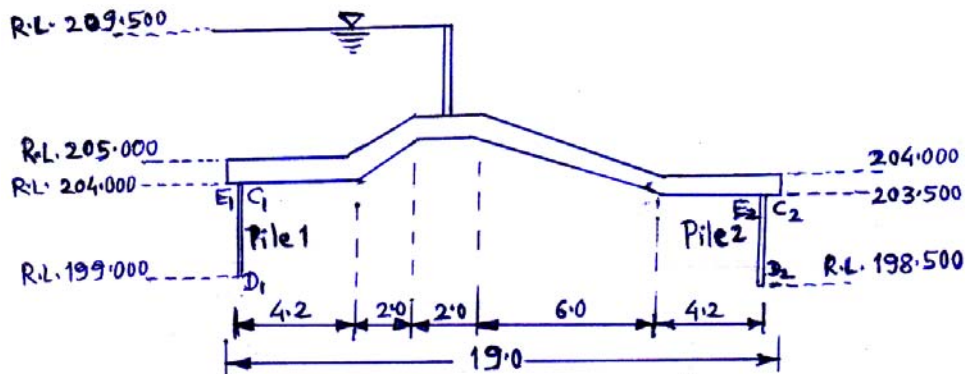
Assume various R.L.s as given below :

- R.L. of deepest river bed = 175 m
- R.L. of top of dam = 201.5 m
- H.F.L. for reservoir = 197 m

For calculating 'y' values, assume interval for 'x' as 15m [10]

OR

- Q8) a) Discuss the 'Swedish slip circle method' for examining the stability of earth slopes. [4]
- b) Explain one method each for seepage control through [4]
- i) the embankments
  - ii) the foundations. (Relevant sketch should be drawn)
- c) Figure shows section of a barrage. R.L.s of key points and horizontal distances are in meters. Calculate % pressure at points  $D_1$ ,  $C_1$ ,  $D_2$  and  $E_2$  if pressures at  $E_1$  and  $C_2$  are 100% and 0% respectively. Neglect slope corrections. [10]



(Fig. Not to scale, all dimensions in 'm')

Fig. for Q.8(c)

- Q9) a) Discuss basic three types of canal alignments with relevant sketch / sketches. [4]
- b) State two requirements of a good canal module (outlet). State four types of canal falls and draw neat sketch of weir type of canal escape. [4]
- c) Design an irrigation canal with side slopes 1H:2V to carry 40 cumecs discharge. Use Kennedy's theory. Assume B:D ratio 2.50, critical velocity ratio (m) = 1 and Kutter's rugosity coefficient = 0.023 Assume  $s = \frac{1}{4000}$  for first trial. Take two trials. [8]

OR

- Q10)** a) State two advantages and two drawbacks / disadvantages of canal lining. [4]
- b) What is the necessity of canal falls? Discuss various types of canal outlets (modules) briefly. [4]
- c) Design a trapezoidal regime channel to carry a discharge of 50 cumecs using Lacey's theory. Assume side slopes 1H:2V and silt factor  $f = 1.10$  [8]

- Q11)** a) State the types of cross - drainage works. Explain any one C.D. work with suitable sketch. [4]
- b) On which factors the choice of C.D. work depends? Briefly discuss. [4]
- c) Give classification of rivers based on the topography of river basin. Explain the types briefly. [4]
- d) State four objectives of river training. With neat sketch explain briefly the levee (embankment) as a river training work. [4]

OR

- Q12)** a) With suitable sketches, explain various types of spurs (groynes). [4]
- b) Briefly explain three basic types (classes) of river training. [4]
- c) Explain Aqueduct and syphon Aqueduct with sketches. [4]
- d) What is meant by 'super - passage'? Explain it clearly with sketches. [4]

