

Total No. of Questions : 12]

SEAT No. :

**P3660**

**[4959]-1014**

[Total No. of Pages : 3

**B.E.(Civil)**

**DAMS AND HYDRAULIC STRUCTURES**

**(2012 Pattern) (Semester-II)(End Sem)**

*Time :2½Hours]*

*[Max. Marks : 70*

*Instructions to the candidates:*

- 1) *Answer Q1 or 2,Q3or 4, Q5 or 6 , Q 7 or 8, Q 9 or 10 and Q11 or Q12.*
- 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)** Classify dams on the basis of function, hydraulic design, material of construction, structural design (with one example of each) and purpose. **[6]**

OR

**Q2)** What is a piezometer? Briefly explain following types of piezometers: **[6]**

- a) Pneumatic piezometer
- b) vibrating wire piezometer

**Q3)** Find the base width of an elementary profile of a gravity dam for 'no tension' and 'no sliding' criteria for following data.

- a) Height = 50m.
- b) Unit weight of construction material = 24 kN/m<sup>3</sup>.
- c) Unit weight of water = 10 kN/m<sup>3</sup>.
- d) Coefficient of uplift = 0.8
- e) Coefficient of friction = 0.75

Out of these two base widths, which one will you recommend? **[6+2]**

OR

- Q4) a)** State middle third rule. How it ensures no tension at base. **[4]**
- b) Differentiate between arch dam and buttress dam. **[4]**

**P.T.O.**

**Q5) a)** Give USBR recommendations for types of stilling basins to develop hydraulic jump. [4]

b) With the help of load curve explain 'load factor'. [2]

OR

**Q6) a)** Write a note on ski jump type energy dissipator. [3]

b) Why hydropower is treated as clean and cheap source of power generation [3]

**Q7) a)** Define phreatic line. [2]

b) Determine the phreatic line through homogeneous earthen dam section with following details.

i) Slope of upstream face = 3:1.

ii) Slope of downstream face = 2.5:1

iii) Top width = 10 m

iv) Height of dam = 23m

v) Free board = 3 m

vi) Length of horizontal drainage blanket = 30m

Note : (For calculation, consider interval of 'x' coordinates as 10m).[8]

c) Draw a labeled sketch of diversion headwork. Also enumerate the function of each component. [4+4]

OR

**Q8) a)** Define exit gradient. [2]

b) A weir of height 4 m is constructed on permeable foundation on horizontal floor of thickness 1m. Pile number-1 of 5m depth(measured from floor bottom) is provided on upstream of weir. Pile number-2 of 6m depth (measured from floor bottom) is provided on downstream of weir. The distance between piles is 20 m and total length of floor is 23 m. Determine the correction in magnitude and nature at key point CI due to mutual interference of pile number-2. The weir retains water upto full height.[8]

c) Draw a labeled section of zoned type earthen dam. Also enumerate the function of each component. [4+4]

**Q9) a)** Design an unlined alluvial trapezoidal canal section to carry a discharge of  $8 \text{ m}^3/\text{s}$ . The longitudinal slope is 1 in 3500 and the side slope is 0.5 H : 1 V. Use Lacey's theory and take silt factor  $f = 0.9$ . [8]

b) What is meant by canal lining. What are its advantages? [8]

OR

**Q10)a)** Write short note on: [8]

i) Canal escapes

ii) Ogee fall

b) Design an irrigation channel by Kennedy's theory to carry a discharge of 36 cumec. Take rugosity coefficient  $N = 0.0225$  and critical velocity ratio  $m = 1.05$ . The channel has a bed slope of 1 in 5000 and side slope of 0.5H : 1V. Take initial trial depth as 2m. [8]

**Q11)a)** Write short notes on: [8]

i) Super passage

ii) Level crossing

b) State objectives of river training. Briefly explain different methods of river training. [8]

OR

**Q12)a)** Write short notes on : [8]

i) Levees

ii) Spurs

b) Explain need and types of cross drainage works. Explain in detail siphon aqueduct. [8]

