

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, Q3 or 4, Q5 or 6, Q7 or 8, Q9 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/m³.
- c) Unit weight of water = 10 kN/m³.
- 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]

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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]

