

**College of Engineering, Pune**  
**END SEMESTER EXAM**  
**B.Tech (Civil)**  
**(CE402) WATER RESOURCES ENGINEERING-II**

Day & Date-Monday 24/11/2012  
Timing- 2 to 5pm

Max. Marks-50  
Duration – 3 hours

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Instructions:

1. Draw neat figures wherever required.
2. Assume suitable data if necessary.
3. Use of scientific calculator is allowed.
4. Figures to the right indicate full marks.

**Q.1** Attempt any **FIVE**. **10**

- a) Calculate the balancing depth of cutting for the cross-section of the canal. The bed width of the channel is 5 m and top width of banks are 2 m. Side slope of excavation is 1:1 and of bank 1.5:1. Height of top of banks from the bed of canal is 2.92 m throughout.
- b) What is surge tank? Explain its functions.
- c) Write a note on the selection of suitable type of turbine for a hydroelectric system.
- d) State any four limitations of Bligh's theory.
- e) Explain the working of a siphon spillway with the help of a neat sketch.
- f) Compute the discharge over an ogee spillway with coefficient of discharge equal to 2.4 at a head of 2m. The length of the spillway is 100m. The spillway crest is 8m above the bottom of the approach channel having the same width as that of the spillway.

**Q.2** Attempt any **TWO** **10**

- a) A bridge is to be constructed across a river having Maximum flood discharge of 8000 cumecs. It is required to undertake a river training works to ensure safe and expeditious disposal of flood and to avoid outflanking of bridge. Suggest a suitable method of river training; determine its dimensions, and draw a plan.
- b) Using Lacey's theory, design an irrigation channel in alluvial soil for the following data :  
Discharge  $Q = 15$  cumecs, Silt factor  $f = 1.0$ , and side slopes =  $\frac{1}{2} H : 1 V$
- c) Discuss various modes of failure of a gravity dam.

**Q.3** Attempt any **TWO**

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- a) A run-of-the-river plant is to be constructed across a river at a site where a net head of 22m is available on the turbines. The river carries a sustained minimum flow of 26 cumecs as dry weather flow. Behind the power station sufficient water pondage has been provided to supply daily peak load of demand with a load factor of 70%. Assuming the plant efficiency of 58%, determine
- (i) The maximum generating capacity of the generator to be installed at the power house
  - (ii) The volume of pondage to be created to supply the daily demand assuming that the daily load pattern consists of average load for 21 hrs and peak load for 3 hrs.
- b) Explain how the stability of earthen dam slopes is checked by the slip circle method.
- c) Suggest and justify a suitable cross-drainage work, given the following data at the crossing of a canal and drainage; and draw a neat sketch of it.

**Canal**

Full supply discharge = 32 cumecs  
Full supply level = R.L. 213.5m  
Canal bed level = R.L. 212.0m  
Canal water depth = 1.5 m  
Canal bed width = 20 m  
Trapezoidal canal section with 1.5 H: 1V slopes

**Drainage**

High flood discharge = 300 cumecs  
High flood level = R.L. 210.0 m  
High flood depth = 2.5m  
General ground level = R.L. 212.5 m

**Q.4** Attempt any **TWO**

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- a) Describe Kennedy's theory for the design of irrigation channel in alluvial soil.
- b) Design a trapezoidal shaped concrete lined channel to carry a discharge of 200 cumecs at a slope of 30cm/km. The side slopes of the channel are 1.5H: 1V. The value of N may be taken as 0.017. Assume limiting velocity in the channel as 2m/s.
- c) What do you understand by a fall in a canal? State the necessity of fall and criteria for its location.

**Q.5** Write short notes on the following:

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- a) Joints in a gravity dam
- b) Cavitation
- c) Tainter /Radial Gate
- d) Economics of canal lining

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