



P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belagavi)

Sixth Semester, B.E. - Civil Engineering

Semester End Examination; June - 2017

Irrigation Engineering and Hydraulic Structures

Time: 3 hrs

Max. Marks: 100

*Note: i) Answer FIVE full questions, selecting ONE full question from each unit.
ii) Missing data may suitably be assumed.*

UNIT - I

- 1 a. With neat sketches explain any two methods of surface irrigation. 6
- b. Write a short note on quality of irrigation water. 6
- c. For border strip method of irrigation, determine the time required to irrigate strip of land of 0.04 hectare in area from tube well with a discharge of 0.02 cumec. The Infiltration capacity of the soil may be taken in 5 cm/hr and the average depth of flow on the field in 10 cm. Also determine the maximum area that can be irrigated from this tube well. 8
- 2 a. Explain the terms 'duty' and 'delta'. Derive the relationship between the two. 6
- b. Explain the factors affecting duty. 6
- c. A certain crop is grown in an area of 3000 hectares which is fed by a Canal system. The data given is as follows : 8
- Field capacity of Soil = 26% Optimum Moisture = 12% Permanent wilting point = 10%
- Effective depth of root zone = 80 cm Relative density of soil = 1.4
- If the frequency of irrigation is 10 days and overall efficiency is 23%, find;
- (i) The daily consumptive use (ii) The water discharge in m³/s required in the canal.

UNIT - II

- 3 a. Explain various types of canals, according to different classification system. 6
- b. What are the general considerations for alignment of a canal? 6
- c. Design a channel section for the following data using lacey's theory. Discharge, 8
- $Q = 30$ cumecs, Silt factor $f = 1.00$, Side slope = $\frac{1}{2} : 1$. Also find the longitudinal slope.
- 4 a. What are the advantages and disadvantages of Canal Lining? 6
- b. What are the purposes of constructing cross-drainage works? With a neat sketch explain aqueduct as a C.D. work. 8
- c. Describe the functions of head regulator and cross regulator in a canal project 6

UNIT - III

- 5 a. Explain the function of three types of reservoirs normally used in practice. 6
- b. Explain the governing factors responsible for selection of suitable site for reservoir. 6

- c. Explain the graphical procedure of determining safe yield from a reservoir of a given capacity. 8
- 6 a. With a neat sketch, explain the various storage zones of a reservoir. 8
- b. The amount of water flowing from a certain catchment area at the proposed dam site is tabulated below. Determine;
 - (i) The minimum capacity of the reservoir if water is to be used to feed the turbines of a hydropower plant at an uniform rate and no water is to be spilled over 12
 - (ii) What is the initial storage required to maintain the uniform demand.

Months	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
(x10 ⁵ m ³) Inflow	2.83	4.25	5.66	18.4	22.64	22.64	19.81	8.49	7.1	7.1	5.66	5.66

UNIT - IV

- 7 a. Explain, how the dams are classified based on, 6
 - (i) Purpose it serves
 - (ii) Materials used for its construction.
- b. Mention the various stabilizing and destabilizing forces acting on the solid concrete gravity dams. 6
- c. A gravity dam (elementary profile) with base width 75 m and height 100 m is assumed to filled with water on one side and the other side is empty. If the coefficient of friction against sliding is 0.75, check whether the dam is safe against sliding. Assume weight density of concrete in 2.4 tonnes/m³. 6
- 8 a. What are the drainage galleries? List the functions served by these galleries in the concrete dam. 6
- b. Explain the concept of energy dissipation below spillways by means of hydraulic jump. 6
- c. With a neat sketch, briefly explain the components of USBR stilling basin Type - II. 8

UNIT - V

- 9 a. With a neat sketch mention the various parts of a zoned embankment type earthen dam. 6
- b. List the various structural failures possible in case of an earthen dam. 6
- c. With a neat sketch describe the functions of typical surplus escape weir. 8
- 10 a. Briefly explain the structural failure of earthen dams. 6
- b. Define tank irrigation. Differentiate between isolated tanks and group of tanks. 8
- c. A waste weir of a isolated tank has the following details (Assume C_d = 0.9)
 - (i) Total catchment area = 100 km² (ii) Ryve's coefficient = 8
 - (iii) FTL = +112.50 m (iv) MWL over spillway crest = +115.00 m
 - (v) R.L. of base = +10.00 m

Design the length of the waste weir.