

M. TECH. CIVIL (WATER RESOURCE ENGINEERING)
M. Tech. Civil (Water Resource Engineering) Sem-II :SUMMER- 2022
SUBJECT : HYDRAULIC STRUCTURES

Day : Thursday
Date : 28-07-2022

S-23658-2022

Time : 10:00 AM-01:00 PM
Max. Marks : 60

N.B.

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Answers to both the sections should be written in **SEPARATE** answer book.
- 4) Use of non-programmable calculator is allowed.

SECTION – I

- Q.1** a) With the help of flow net, derive the equation for the rate of seepage and (05)
show that $q = k.h.\frac{N_f}{N_d}$.

- b) Explain the construction method for roller compacted concrete dam. (05)

OR

- a) Explain the assessment procedure for seismic forces in the gravity dam with (05)
the help of equation under different conditions of storage of water.
- b) Explain the piping through foundations and measures to be taken to control (05)
the leakage.
- Q.2** a) Explain the types of structural failure of earth dam. (05)
- b) Explain the functions and design criteria for the filters in the earth dam. (05)

OR

- a) Explain the adverse effect on stability of earth dam due to sudden drawn (05)
down conditions.
- b) What is colgrout masonry? Brief the procedures/specifications and method (05)
of preparing colgrout mixture.
- Q.3** Describe the measures to be taken to reduce seepage through the body and (10)
foundation of earth dam.

OR

- Differentiate between: (10)
- a) Rock fill dam and roller compacted concrete dam.
- b) Consolidations grouting and curtain grouting

P.T.O.

SECTION - II

Q.4 a) Explain with a sketch protection measures for upstream and downstream slope of an earth dam. (05)

b) State the important design principles of concrete face rock fill dam. (05)

OR

a) Explain the method of construction of rock fill dams. (05)

b) What is pore water pressure? How it is evaluated using flow net? (05)

Q.5 a) The crest level of an ogee shaped spillway is at R.L. 210 m and maximum reservoir level is 215 m . Calculate the maximum discharge when the flow takes place through 5 gates of effective span 10 m each. Assume $C = 2.2$. (05)

b) Explain with neat sketch USBR type - II stilling basin used for energy dissipation below spill way. (05)

OR

a) Describe the procedure of hydraulic design of crest profile of an ogee spillway. (05)

b) Explain with a neat sketch ski jump type energy dissipation system below spillway. (05)

Q.6 a) Explain with a sketch working of drum gates over spillway. (05)

b) Describe the instrument used for measurement of uplift pressure in a gravity dam. (05)

OR

a) What precautions are taken in design of barrage against seepage and uplift forces. (05)

b) State various instruments used in monitoring of gravity dam and state functions of each. (05)

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