

BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION SP/2023)

CLASS: BTECH
BRANCH: CIVIL

SEMESTER : IV
SESSION : SP/2023

SUBJECT : CE417 DESIGN OF HYDRAULIC STRUCTURES

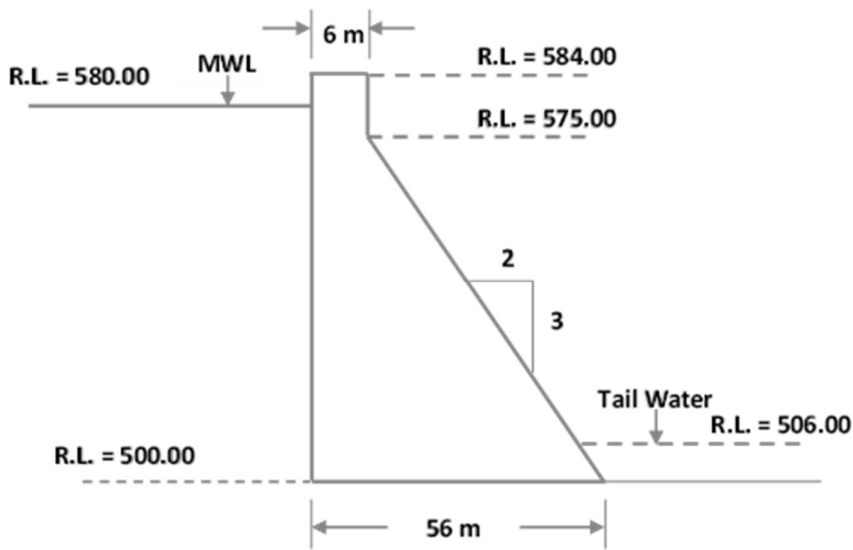
TIME: 02 Hours

FULL MARKS: 25

INSTRUCTIONS:

1. The question paper contains 5 questions each of 5 marks and total 25 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
4. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates

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| Q.1(a) | What are the different types of dams? Give classification. | [2] | 1 1 |
| Q.1(b) | Fig. 1 shows the section of non-overflow portion of the concrete gravity dam. Calculate the maximum vertical stresses at the heel and toe of the dam. Assume Weight of concrete = 24.0 kN/m ³ , and unit length of dam. Allowable stress in concrete may be taken as 2500 kN/m ² . (Neglect effects of earthquake and drainage gallery) | [3] | 2 3 |



(Fig.1)

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| | | [2] | 1 1 |
| Q.2(a) | What are the advantages and disadvantages of a gravity dam over the other types? | [2] | 1 1 |
| Q.2(b) | Calculate the major principal stress at the toe of the dam and the intensity of shear stress on a horizontal plane near the toe for the same section of non-overflow section of a concrete gravity dam as described in Fig.1. | [3] | 2 3 |
| Q.3(a) | Differentiate between a weir and a barrage. | [2] | 2 1 |
| Q.3(b) | Draw a neat layout of diversion head-works indicating the various components of the system. Briefly indicate the function of each component. | [3] | 2 2 |
| Q.4(a) | What are the main causes of failures of weirs on permeable foundations, and what remedies can be suggested as preventive measures? | [2] | 2 2 |
| Q.4(b) | Define any two: (i) Bligh's creep theory, (ii) Lane's weighted Creep theory, and (iii) Khosla's theory. | [3] | 2 1 |

PTO

- Q.5 Design a 1.5 m Sarda-type fall for a canal having a discharge of 12 cumecs with the following data (Design for crest level; u/s wing wall, u/s protection & u/s curtain wall; total impervious floor length; cistern): [5] 3 3
- u/s bed level = 103.0 m
 - d/s bed level = 101.5 m
 - side slope of the channel = 1:1
 - u/s FSL = 104.50 m
 - u/s and d/s bed with = 10 m.
 - soil = good Loam
 - Assume Bligh's coefficient = 6

.....24/02/2023.....M