**Shri Shankaracharya Institute of Professional Management & Technology, Raipur**
**Department of Civil Engineering**
**Class Test – I Session: JULY – DEC, 2022 Month – NOVEMBER**
**Semester – 7th Subject – Structural Engg. Design -III Code – D020711(020)**
Time Allowed: 2 hrs. Max Marks: 40

*Note: - Part A of each question is compulsory. Attempt any 1 from Part B, C in each question. Use of IS 800:2007 is permitted. Assume the suitable data if required and mention if clearly. Draw neat sketches wherever required.*

| Q. No. | Questions | Marks | Levels of Bloom's taxonomy | CO's |
|---|---|---|---|---|
| | **Part-I** | | | |
| **1A.** | Explain Column Bases with neat sketch | [4] | Understand | CO4 |
| **1B.** | A Column section ISHB 450 @ 907.4 N/m is subjected to following factored loads.<br>• Axial Compressive load, P=500KN<br>• Moment, M = 100 KN.m<br>Assume M30 grade of concrete for pedestal and a square base plate. design the following (a) Thickness of base plate Assume Fe410 grade of steel. | [16] | Analyze | CO3 |
| **1C.** | An ISHB 350 @ 710.2 N/m column carries a factored axial of 2000 KN. Design a gusseted base plate with bolted connections. The design bearing strength of the concrete pedestal is 9 $N/mm^2$. | [16] | Analyze | CO3 |
| | **Part-II** | | | |
| **2A.** | What is the classification of cranes according to crane manufactures Association of America (CMAA) with neat sketch. | [4] | Understand | CO4 |
| **2B.** | Determine the moments and forces due to the vertical and horizontal loads acting on a simply supported gantry girder as per given following data –<br>Simply Supported Span = 6 m<br>Crane Wheel Centre = 3.6 m<br>Self- weight of the girder = 1.6 KN/m<br>Maximum Crane wheel load = 220 KN<br>Weight of crab/trolley = 60 KN<br>Maximum Hook Load = 200 KN | [16] | Apply | CO4 |
| **2C.** | Design suitable section for a simply supported gantry girder as per following data –<br>Spacing of columns = 4 m<br>Crane Capacity = 160 KN<br>Weight of crab/trolley = 60 KN<br>Weight of crab excluding the crab = 250 KN<br>Minimum clearance of cross travel = 0.8 m<br>Wheel base = 5.3 m<br>C/c distance between gantry girders = 20 m<br>Height of rail = 105 m<br>Grade = Fe410<br>Simply Supported Span = 6 m<br>Crane Wheel Centre = 3.6 m<br>Self- weight of the girder = 1.6 KN/m<br>Maximum Crane wheel load = 220 KN<br>Maximum Hook Load = 200 KN | [16] | Apply | CO4 |

**Shri Shankaracharya Institute of Professional Management & Technology**
**Department of Civil Engineering**

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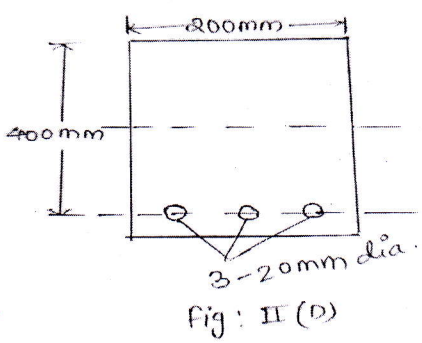
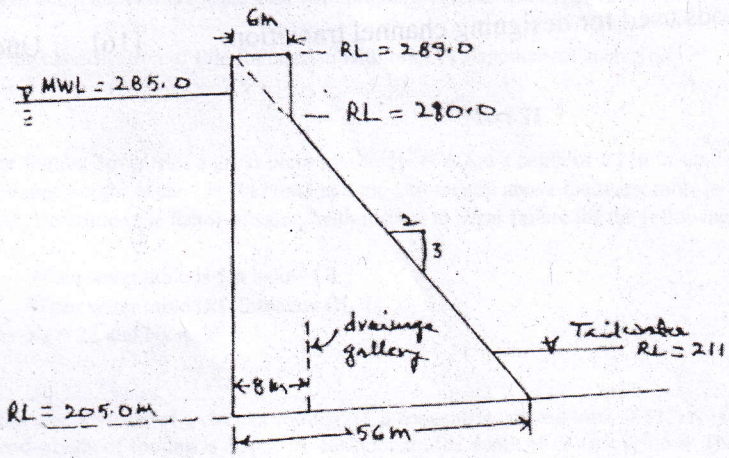
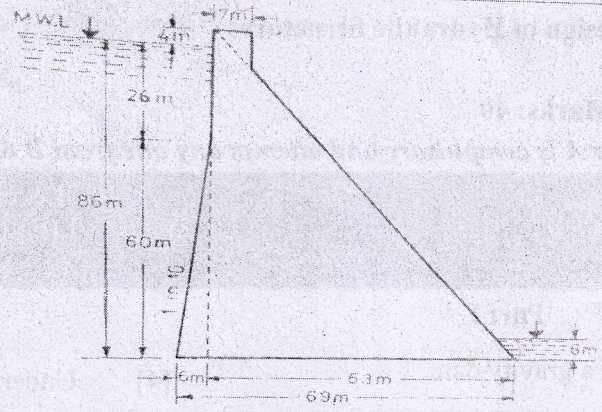
**Class Test – I** **Session: July – December 2022** **Month – November**
**Semester – 7th** **Subject – Design of Structure** **Code – D000703(020)**
Time Allowed: 2 hrs. Max Marks: 40
*Note: - In Part I & II, Question A is compulsory and attempt any two from B, C & D.*

| Q. No. | Questions | Marks | Levels of Bloom's taxonomy | CO's |
|---|---|---|---|---|
| | **Part I** | | | |
| **A.** | What do you mean by Permissible Stresses and Modular Ratio? | [4] | Understand | CO1 |
| **B.** | Describe assumptions of WSM and analyze a singly reinforced section beam by WSM. | [8] | Analyze | CO1 |
| **C.** | A beam has an overall dimension of 250mm x 450mm and an effective cover of 50mm, 4 bars of 16mm diameter are used as tension reinforcement (with Fe-415 Steel), and M-20 Grade Concrete has been used. Find $x_a$, $x_c$, type of section & Moment of Resistance. | [8] | Analyze | CO1 |
| **D.** | Design a simply supported beam of span 7m subjected to a live load of 42 kN/m. Using M-30 grade concrete and Fe-500 Steel. Take b = 300mm | [8] | Apply | CO1 |
| | **Part II** | | | |
| **A.** | What do you mean by Characteristics Loads and partial factor of safety? | [4] | Understand | CO2 |
| **B.** | Analyze a singly reinforced rectangular beam by LSM. Use appropriate notations for different parameters. | [8] | Analyze | CO2 |
| **C.** | Describe assumptions of LSM and Derive the expression for effective depth and area of tension reinforcement for singly reinforced rectangular beam. | [8] | Analyze | CO2 |
| **D.** | Discuss the limiting values of tension steel? Determine the Moment of resistance of a singly reinforced rectangular beam if<br>Width of beam = 200mm<br>Effective Depth = 400mm<br>Effective cover = 50mm<br>  <br><br>Fig: II (D) | [8] | Apply | CO2 |

**Shri Shankaracharya Institute of Professional Management & Technology**
**Department of Civil Engineering**
**Class Test – I** **Session: July-Dec, 2022** **Month – November**
**Semester – 7th** **Subject – Design of Hydraulic Structures**
**Code – D020712(020)**
**Time Allowed: 2 hrs.** **Max Marks: 40**
***Note: - In Part I & II, Question A is compulsory and attempt any one from B & C.***

| Q. No. | Questions | Marks | Levels of Bloom's taxonomy | CO's |
|---|---|---|---|---|
| | **Part I** | | | |
| **A.** | Explain briefly the modes of failure of a gravity dam. | [4] | Understand | CO1 |
| **B.** | Derive the principal and shear stress of gravity dam. A concrete dam is shown in fig. Calculate (Neglecting earthquake forces):<br>1. The maximum vertical stresses at heel and toe of the dam.<br>2. The major principal stress at the toe of the dam.<br>3. Shear stress at toe of the dam.<br>  | [16] | Analyze, Apply | CO1 |
| **C.** | Fig. shows the section of a gravity dam built of concrete. Examine the stability of this section at the base. The earthquake forces may be taken as equivalent to 0.15 g for horizontal forces and 0.06 g for vertical forces. The uplift may be taken as equal to the hydrostatic pressure at the either ends and is considered to act over 65% of the area of the section. A tail water depth of 6m is assumed to be present when the reservoir is full. Also indicate the values of various kinds of stresses that are developed at heel and toe. Assume the unit weight of concrete is 23.5 KN/$m^3$ and unit weight of water 10KN/ $m^3$. | [16] | Apply | CO1 |




**Part II**

| | | | | |
|---|---|---|---|---|
| **A.** | Write the selection of suitable type of cross drainage work. | [4] | Understand | CO5 |
| **B.** | Explain the various types of cross drainage work with neat sketch. | [16] | Understand | CO5 |
| **C.** | Explain the various methods used for designing channel transition. | [16] | Understand | CO5 |

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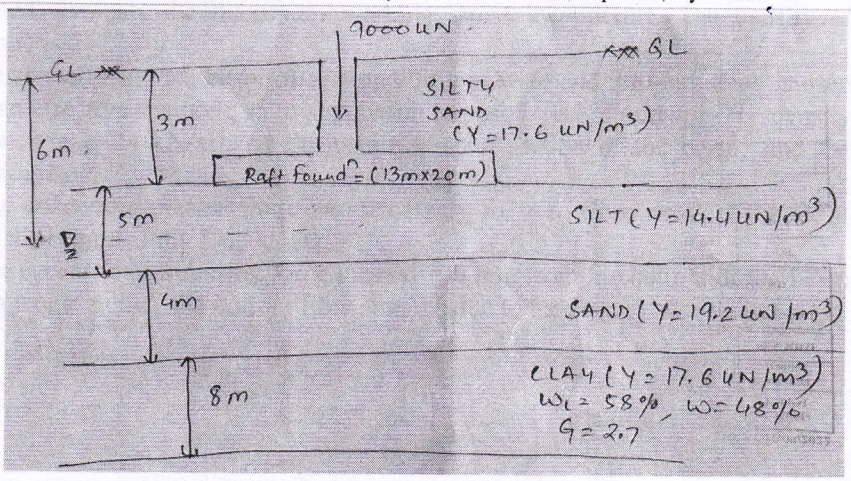
**Shri Shankaracharya Institute of Professional Management & Technology**
**Department of Civil Engineering**

**Class Test – I** **Session: July-December, 2022** **Month – November**
**Semester – 7th** **Subject – Foundation Engineering** **Code – D020713 (020)**
**Time Allowed: 2 hrs.** **Max Marks: 40**

***Note: - 1) In Part I, Questions 1,2,3 and 4 are compulsory and solve any one out of 5 and 6***
***2) In Part II all questions are compulsory.***

| Q. No. | Questions | Marks | Levels of Bloom's taxonomy | CO's |
|---|---|---|---|---|
| | **Part I** | | | |
| **1)** | Explain Bearing Capacity and the factors affecting it | 2 | Understand | CO1 |
| **2)** | Briefly discuss about General Shear Failure and Local Shear Failure | 2 | Understand | CO1 |
| **3)** | What are the assumptions used in Terzaghi's analysis? | 2 | Analyze | CO1 |
| **4)** | Describe Housel's approach for analysis in foundations | 2 | Analyze | CO2 |
| **5)** | Discuss in detail about Plate Load Test with proper diagrams and explanations. | 4 | Understand | CO2 |
| **6)** | Outline the classification of Pile foundation with brief explanations of each type | 4 | Analyze | CO3 |
| | **Part II** | | | |
| **1)** | A square footing 3m carries a gross pressure of 350kN/m2 at a depth of 1.2 m in sand. The saturated unit weight of sand is 20kN/m3 and the unit weight above the water table is 17kN/m3. Determine the factor of safety with respect to shear failure for the following cases: -<br>a. When water table is 5m below GL.<br>b. When water table is 1.2mbelow GL.<br>Consider Nq = 22 and Ny = 20 | 7 | Apply | CO1 |
| **2)** | Determine the diameter of a circular footing. If a concentric column load of 825kN is acting and weight of footing is also to be considered. The depth of footing is 1.5m. The soil is partly saturated and has c=55kN/m2 and Y= 19kN/m3. 20% of the total column load is equal to the weight of footing. Water table is at GL. Use Terzaghi's Analysis and FOS = 3. | 7 | Apply | CO1 |
| **3)** | A square footing of size 2.5m × 2.5m is built in a C-Ø soil of unit weight 17kN/m3 and having an internal angle of friction $25^0$. The depth of base of footing is 1.2m below GL. Calculate the safe load carried by the footing for a FOS=3. Use Terzaghi's Analysis.<br>C= 39kN/m2, Nc = 46.17, Nq = 33.32, Ny = 40.74, Nc' = 42, Nq' = 36, Ny' = 39. | 7 | Apply | CO1 |
| **4)** |  <br>For the soil profile shown for raft foundation (13m×20m), Calculate the settlement of the foundation for a load distribution of 2V:1H. | 7 | Apply | CO2 |

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# Shri Shankaracharya Institute of Professional Management & Technology
## Department of Civil Engineering

Class Test – II Session: July-Dec, 2022 Month – November

**Semester – 7th Subject – Prestressed Concrete Structures Code – D020732(020)**

Time Allowed: 2 hrs Max Marks: 40

| Q. No. | Questions | Marks | Levels of Bloom's taxonomy | COs |
|---|---|---|---|---|
| | **Part- I** | | | |
| **Note: - Question (A) is compulsory and solve any two questions from (B), (C) and (D)** | | | | |
| **(A)** | Discuss the following:<br>A. Principle of Prestressed Concrete.<br>B. Comparison Between Non prestressed and Prestressed Concrete Beams | [06] | Understand | CO1 |
| **(B)** | Discuss the following:<br>A. Full and Partial Prestressing System.<br>B. Use of High Strength concrete and High-grade Steel | [07] | Understand | CO1 |
| **(C)** | List various methods of pre tensioning and post tensioning. Describe the long line method of prestressing. | [07] | Understand | CO1 |
| **(C)** | Describe the Freyssinet and Magnel Blaton System of presteress Concrete. | [07] | Understand | CO1 |
| | **Part- II** | | | |
| **Note: - Solve any two questions from (A), (B), and (C).** | | | | |
| **(A)** | A prestressed concrete beam supports a live load of 4 kN/m over a simply supported span of 8 m. The beam has an I-section with an overall depth of 400 mm. The thicknesses of the flange and web are 60 and 80 mm, respectively. The width of the flange is 200 mm. The beam is to be prestressed by an effective prestressing force of 235 kN at a suitable eccentricity such that the resultant stress at the soffit ofthe beam at the centre of the span is zero.<br>(a) Find the eccentricity required for the force.<br>(b) If the tendon is concentric, what should be the magnitude of the prestressing force for the resultant stress to be zero at the bottom fibre of the central span section. | [10] | Evaluate | CO2 |
| **(B)** | A rectangular concrete beam of cross-section 30 cm deep and 20 cm wide is prestressed by means of 15 wires of 5 mm diameter located 6.5 cm from the bottom of the beam and 3 wires of diameter of 5 mm, 2.5 cm from the top. Assuming the prestress in the steel as 840 $N/mm^2$, calculate the stresses at the extreme fibres of the mid-span section when the beam is supporting its own weight over a span of 6 m. If a uniformly distributed live load of 6 kN/m is imposed, evaluate the maximum working stress in concrete. The density of concrete is 24 $kN/m^3$. | [10] | Evaluate | CO2 |
| **(C)** | A prestressed concrete beam of section 200 mm wide and 300 mm deep is used over an effective span of 6 m to support an imposed load of 4 kN/m. The density of concrete is 24 $kN/m^3$. At the centre-of-span section of the beam, find the magnitude of<br>(a) the concentric prestressing force necessary for zero fibre stress at the soffit when the beam is fully loaded, and<br>(b) the eccentric prestressing force located 100 mm from the bottom of the beam which would nullify the bottom fibre stresses due to loading. | [10] | Evaluate | CO2 |