

Code: 20A15BT

III B.Tech. I Semester Supplementary Examinations June 2024

Advanced Structural Analysis

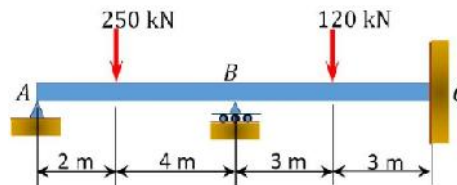
(Civil Engineering)

Max. Marks: 70

Time: 3 Hours

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)2. In Part-A, each question carries **Two marks**.3. Answer **ALL** the questions in **Part-A** and **Part-B****PART-A****(Compulsory question)**

1. Answer **all** the following short answer questions (5 X 2 = 10M) CO BL
- a) Illustrate the free body diagram of the cross section of a two hinged arch and mark the internal forces. CO1 L4
- b) Give the difference between carry over factor and distribution factor in structural analysis. CO2 L3
- c) Give the difference between the cantilever and portal method in analysis of portal frames under lateral loading. CO3 L4
- d) Identify the degree of kinematic indeterminacy for the loaded beam CO4 L4



- e) Find the shape factor of a tubular section with outer diameter equal to twice the inner diameter. CO5 L3

PART-B**Answer five questions by choosing one question from each unit (5 x 12 = 60 Marks)**

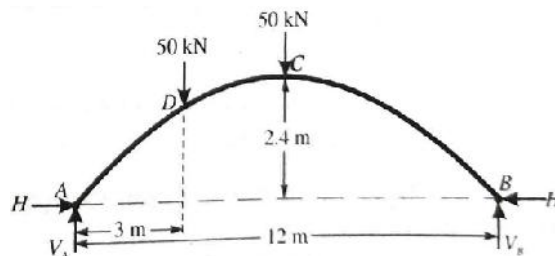
Marks CO BL

UNIT-I

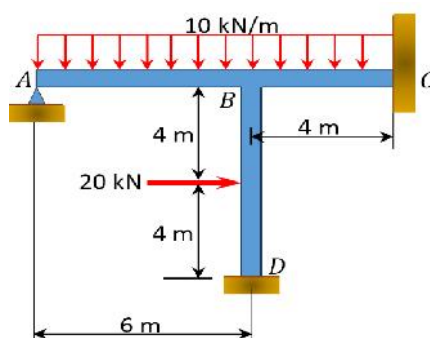
2. A three hinged parabolic arch of span 20 m and rise 4 m carries a concentrated load of 150 kN at 4 m from left support. Calculate the vertical reaction and horizontal thrust of the supports. 12M CO1 L4

OR

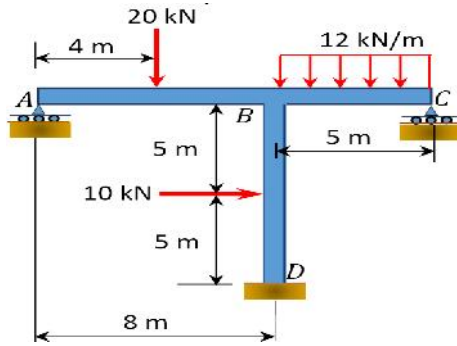
3. A two hinged parabolic arch of span 12 m and rise 2.4 m has secant variation for moment of inertia of rib and loaded as shown. Find the horizontal thrust of the arch and bending moment at D. 12M CO1 L4

**UNIT-II**

4. Using the slope-deflection method, determine the member end moments of the frame shown. 12M CO2 L3

**OR**

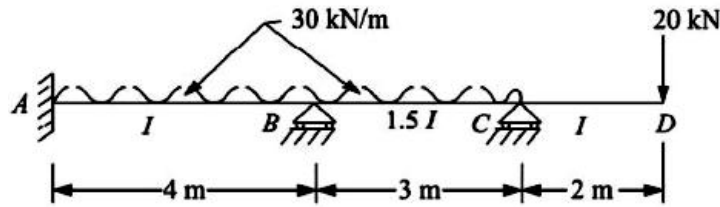
5. Use the moment distribution method to compute the end moment of members of the frame shown and draw the bending moment. $EI = \text{constant}$.



12M CO2 L3

UNIT-III

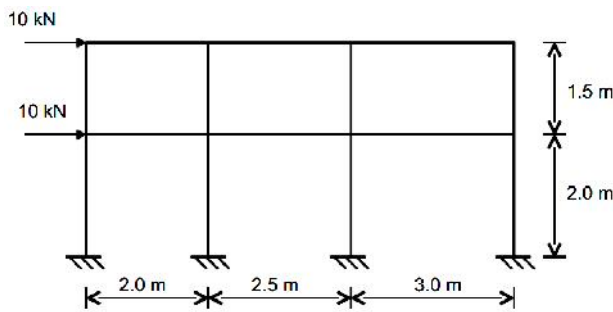
6. Analyse the beam shown by Kani's method. Take constant flexural rigidity.



12M CO3 L4

OR

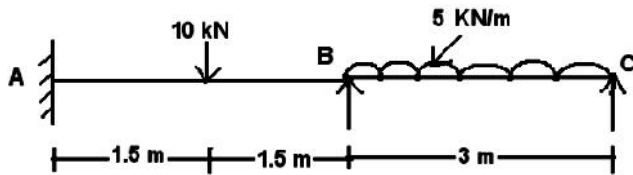
7. The frame is loaded by lateral load as shown. Analyse and plot the bending moment diagram using cantilever method.



12M CO3 L4

UNIT-IV

8. Analyse the continuous beam by matrix stiffness method

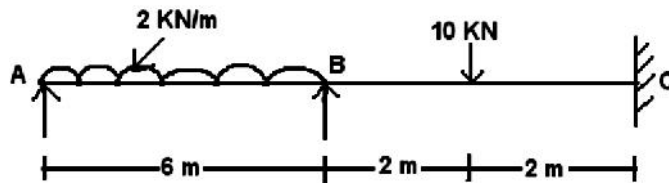


$EI = \text{Constant}$

12M CO4 L4

OR

9. Analyse the continuous beam ABC by flexibility matrix method



$EI = \text{Constant}$

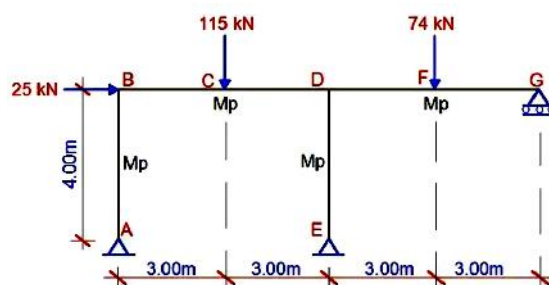
12M CO4 L4

UNIT-V

10. a) Give the significance of plastic moment in a section. 4M
 b) Calculate the value of shape factor for a rectangular steel beam of cross section 500 mm x 1000 mm, as per plastic analysis of steel structures design concept. 8M CO5 L3

OR

11. The frame is loaded with factored load as shown. Find the critical M_p value. Draw the collapse moment diagram.



*** End ***

12M CO5 L3

Code: 20A151T

III B.Tech. I Semester Supplementary Examinations June 2024

Basic Reinforced Concrete Design

(Civil Engineering)

Max. Marks: 70

Time: 3 Hours

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)2. In Part-A, each question carries **28 marks**.3. In Part-B, each question carries **14 marks**.**PART-A****Answer any one question from the following**

- | | Marks | CO | BL |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-----|----|
| 1. Design a R.C. slab for a room measuring 4m X 6m in size (Clear Dimensions). The slab is simply supported on all the four edges on 300mm wide masonry wall, with corners held down and carries a superimposed load of 3.2 kN/m ² , inclusive of floor finishes etc. Use M20 mix, Fe 415 steel. Sketch the reinforcement details. | 28 | CO3 | L4 |
| OR | | | |
| 2. Design the reinforcement in a column of size 400mm x 600mm, subject to an axial load of 1800kN under service dead and live loads. The column has an unsupported length of 3.0m and is braced against sideway in both directions. Use M20 concrete and Fe 415 steel. Sketch the details of reinforcement. | 28 | CO4 | L4 |

PART-B**Answer any three questions from the following (3 x 14 = 42 Marks)**

- | | Marks | CO | BL |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|----|----|
| 3. a) Explain the principles of:
i) Working stress method. ii) Limit state method | 7M | 1 | L2 |
| b) Derive the stress block parameter for a reinforced rectangular cross section in limit state method. | 7M | 1 | L2 |
| 4. A reinforced concrete beam 250 mm wide and 400 mm effective depth is subjected to ultimate design shear force of 160 kN at the critical section near supports. The tensile reinforcement at the section near supports is 0.5 percent. Design the shear stirrups near the supports. Also, design the minimum shear reinforcement at the mid span. Assume concrete of grade M20 and mild steel bars of Fe 250 grade. Span of beam is 4.5 m. | 14M | 2 | L4 |
| 5. Design a R.C. slab for a room having inside dimensions 3.5 m x 6 m. The thickness of supporting wall is 300 mm. The slab carries 100 mm thick lime concrete at its top, the unit weight which may be taken as 19kN/m ³ . The live load on the slab may be taken as 3kN/m ² . Assume the slab to be simply supported at the ends. Use M30 grade concrete and Fe 415 grade steel. | 14M | 3 | L4 |
| 6. A RC rectangular column 3 m long of size 350 mm x 450 mm is to carry a factored axial load of 1200 kN and moments 50 kN-m and 75 kN-m parallel to short and long edges respectively. Design the column using M25 grade concrete and Fe415 grade steel. | 14M | 4 | L4 |
| 7. a) What are the main requirements of a foundation system for the structure? | 7M | 5 | L2 |
| b) What are various types of footings? Give design steps for isolated square footing. | 7M | 5 | L2 |

*** End ***

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R-20

Code: 20A55FT

III B.Tech. I Semester Supplementary Examinations June 2024

Data Structures using Python

(Common to CE &ME)

Max. Marks: 70

Time: 3 Hours

- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. In Part-A, each question carries **Two marks**.
3. Answer **ALL** the questions in **Part-A** and **Part-B**

PART-A

(Compulsory question)

- | | | | |
|---------------------------------------------------------------------------|----|----|--|
| 1. Answer all the following short answer questions (5 X 2 = 10M) | CO | BL | |
| a) List python sequence types | 1 | L1 | |
| b) Define Queue data structure | 2 | L2 | |
| c) Write recursive function for Fibonacci series | 3 | L1 | |
| d) Write the differences between binary tree and binary search tree | 4 | L1 | |
| e) Give, applications for pattern matching | 5 | L2 | |

PART-B

Answer five questions by choosing one question from each unit (5 x 12 = 60 Marks)

- | | Marks | CO | BL |
|---------------------------------------------------------------------------------------------------------------------------------------------|-------|----|----|
| UNIT-I | | | |
| 2. Explain static and dynamic arrays in python | 12M | 1 | L2 |
| OR | | | |
| 3. What is a Data structures? Explain Linear data structures and Non Linear data types with example | 12M | 1 | L3 |
| UNIT-II | | | |
| 4. a) Write an algorithm to convert infix to post fix expression using stack | 6M | 2 | L1 |
| b) Use stack to Convert the infix to postfix for a-(b+c)*(d/e) | 6M | 2 | L2 |
| OR | | | |
| 5. a) What is a linked list? Explain Single linked list and various operations on it. | 6M | 2 | L3 |
| b) Write a program to implement insert front and delete end operations. | 6M | 2 | L1 |
| UNIT-III | | | |
| 6. Explain the concept of towers of Hanoi | 12M | 3 | L2 |
| OR | | | |
| 7. Explain Merge sort? Sort the following elements using merge sort. Below is example for Your reference 45, 23, 20, 50,70, 24, 33, 43, 47. | 12M | 3 | L2 |
| UNIT-IV | | | |
| 8. a) What is Binary search? Write a Program to implement it? | 6M | 4 | L3 |
| b) What are the applications of binary search? | 6M | 4 | L3 |
| OR | | | |
| 9. Explain three standard ways of traversing a binary tree T with a recursive algorithm. | 12M | 4 | L2 |
| UNIT-V | | | |
| 10. Which pattern matching algorithm avoids the repeated comparison of characters? Discuss with suitable example. | 12M | 5 | L1 |
| OR | | | |
| 11. Which pattern matching algorithm scans the characters from right to left? Explain it with suitable example. | 12M | 5 | L1 |

*** End ***

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R-20

Code: 20A152T

III B.Tech. I Semester Supplementary Examinations June 2024

Environmental Engineering

(Civil Engineering)

Max. Marks: 70

Time: 3 Hours

- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
 2. In Part-A, each question carries **Two marks**.
 3. Answer **ALL** the questions in **Part-A** and **Part-B**

PART-A

(Compulsory question)

- | | | |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----|
| 1. Answer <i>all</i> the following short answer questions (5 X 2 = 10M) | CO | BL |
| a) Enlist the unique characteristics of water which make it a unique resource. | CO1 | L1 |
| b) Identify at least three important water quality parameters and explain the reason of measuring such parameters. | CO2 | L2 |
| c) Enumerate the objectives of water treatment. | CO3 | L2 |
| d) When rainy season is confined to a few months, like that in India, the preferred sewerage system would be..... | CO4 | L2 |
| e) A laboratory provides the following solids analysis for a wastewater sample: TS=225 mg/L, TDS = 40 mg/L, FSS = 30 mg/L. What is the total suspended solids concentration of this sample? | CO5 | L3 |

PART-B

Answer *five* questions by choosing one question from each unit (5 x 12 = 60 Marks)

Marks CO BL

UNIT-I

- | | | | |
|-------------------------------------------------------------------------------------------------------------------|----|-----|----|
| 2. a) According to your understanding and experience, enlist important factors affecting per capita water demand. | 6M | CO1 | L2 |
| b) Show how 'losses and wastes' are accounted for in the quantity estimation of water for a city. | 6M | CO1 | L2 |

OR

3. The decennial (Ten years) census records for a city are given below. Estimate the 2030 population for each city by appropriate method.

Year	Population
1990	20,000
2000	60,000
2010	1,00,000
2020	1,40,00

12M CO1 L3

UNIT-II

- | | | | |
|-----------------------------------------------------------------------------------------------------------|----|-----|----|
| 4. a) Show the classifications of impurities based on their nature and physical state. | 6M | CO2 | L2 |
| b) Define intake. What are the various factors which govern the selection of site for locating an intake? | 6M | CO2 | L2 |

OR

5. a) State the factors you would take into consideration and the procedure you would follow in designing a distribution system for the water supply of a city. 6M CO2 L2
- b) Define the meaning of the term *pathogen* and give the names of pathogen groups. What determines the kinds and concentrations of pathogens in water? Define the meaning of fecal–oral route in the transmission of diseases. 6M CO2 L2

UNIT–III

6. a) Identify the *zones* in ideal sedimentation tank and depict in a simple diagram. 6M CO3 L2
- b) Briefly describe *mechanical straining* and adsorption or filtration mechanisms. 6M CO3 L2

OR

7. a) Identify the four factors that bound the selection of a primary disinfectant. 6M CO3 L2
- b) Explain how colloidal particles become negatively charged. 6M CO3 L2

UNIT–IV

8. a) Explain the need for estimating the velocity of wastewater in a pipe that is flowing less than full or half full. 6M CO4 L2
- b) It was decided to introduce an underground drainage (UGD) system for an industrial town. With the aid of suitable sketch, explain any two sewer appurtenances required for the efficient running of UGD system. 6M CO4 L2

OR

9. a) Two cities A and B are planned for wastewater carriage system. City A intended for conveyance of foul sewage in one sewer and rainwater in another sewer. Whereas city B intended for conveyance of foul sewage and rainwater in sewer. Name the water carriage system. Describe in brief various advantages and disadvantages. 6M CO4 L3
- b) Explain how you will test the newly laid sewer lines before bringing them into commission. 6M CO4 L2

UNIT–V

10. a) Why are coagulants used in sewage treatment? Under what conditions chemical aided sedimentation is preferred to plain sedimentation. 6M CO5 L2
- b) Investigate the specific mechanisms by which ammonia nitrogen, total nitrogen, and phosphorus are treated or recovered at your local municipal wastewater treatment plant. Are the processes chemical or biochemical (or a combination)? Discuss your answer. 6M CO5 L2

OR

11. In the following sentences, circle the correct term in boldface. If the solids retention time (SRT) is low (for example, 4 days), which conditions exist? (a) The F/M ratio is low/high. (b) The power requirements for aeration will be less/greater. (c) The microorganisms will be starved/saturated with food. (d) The mean cell retention time is low/high. (e) The sludge age is low/high. (f) The sludge wastage rate may have been recently increased/ decreased. (g) The MLSS may have been increased/decreased 12M CO5 L3

*** End ***

Hall Ticket Number :

R-20

Code: 20A15AT

III B.Tech. I Semester Supplementary Examinations June 2024

Sustainable Construction Methods

(Civil Engineering)

Max. Marks: 70

Time: 3 Hours

- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. In Part-A, each question carries **Two marks**.
3. Answer **ALL** the questions in **Part-A** and **Part-B**

PART-A

(**Compulsory question**)

- | | | |
|---------------------------------------------------------------------------|----|----|
| 1. Answer all the following short answer questions (5 X 2 = 10M) | CO | BL |
| a) What is meant by green building? | 1 | L1 |
| b) Give briefly on launching of green building rating systems. | 2 | L1 |
| c) What is system efficiency in green buildings? | 3 | L1 |
| d) Mention the design philosophy of green buildings. | 4 | L2 |
| e) Give brief note on the term 'Certified Wood'. | 5 | L1 |

PART-B

Answer **five** questions by choosing one question from each unit (5 x 12 = 60 Marks)

Marks CO BL

UNIT-I

- | | | | |
|------------------------------------------------------------------------------------------------|----|---|----|
| 2. a) Explain in your words why the green buildings are needed in modern construction context. | 6M | 1 | L2 |
| b) Explain in detail about the benefits of green building. | 6M | 1 | L2 |

OR

- | | | | |
|--------------------------------------------------------------------------------------------|-----|---|----|
| 3. Explain in detail about any six green building materials used in construction industry. | 12M | 1 | L2 |
|--------------------------------------------------------------------------------------------|-----|---|----|

UNIT-II

- | | | | |
|--------------------------------------------------------------------------|-----|---|----|
| 4. Discuss the green building opportunities and their benefits in India. | 12M | 2 | L2 |
|--------------------------------------------------------------------------|-----|---|----|

OR

- | | | | |
|-------------------------------------------------------------------------------------------------------------|-----|---|----|
| 5. Describe the procedure involved in the typical energy saving approach in buildings and its applications. | 12M | 2 | L2 |
|-------------------------------------------------------------------------------------------------------------|-----|---|----|

UNIT-III

- | | | | |
|---------------------------------------------------------------|-----|---|----|
| 6. Explain the reduction in energy demand in green buildings. | 12M | 3 | L1 |
|---------------------------------------------------------------|-----|---|----|

OR

- | | | | |
|-------------------------------------------------|-----|---|----|
| 7. Discuss the use of renewable energy sources. | 12M | 3 | L2 |
|-------------------------------------------------|-----|---|----|

UNIT-IV

- | | | | |
|-------------------------------------------------------------------------------------|-----|---|----|
| 8. Explain the design philosophy of a HVAC system and write about energy modelling. | 12M | 4 | L2 |
|-------------------------------------------------------------------------------------|-----|---|----|

OR

- | | | | |
|-------------------------------------------------------------------------------------------|-----|---|----|
| 9. Describe the factors governing the selection of cooling towers and air handling units. | 12M | 4 | L1 |
|-------------------------------------------------------------------------------------------|-----|---|----|

UNIT-V

- | | | | |
|---------------------------------------------------------------------------------------------|----|---|----|
| 10. a) Practically, how we can achieve the reduction of waste during construction? | 6M | 5 | L3 |
| b) Describe the significance of air conditioning and indoor air quality in green buildings. | 6M | 5 | L1 |

OR

- | | | | |
|----------------------------------------------------------------------------|----|---|----|
| 11. a) List the reasons for poor IAQ | 6M | 5 | L1 |
| b) Explain briefly about the measures to obtain the acceptable IAQ levels. | 6M | 5 | L2 |

*** End ***

Hall Ticket Number :

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R-20

Code: 20A153T

III B.Tech. I Semester Supplementary Examinations June 2024

Water Resource Engineering

(Civil Engineering)

Max. Marks: 70

Time: 3 Hours

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)

2. In Part-A, each question carries **Two marks**.

3. Answer **ALL** the questions in **Part-A** and **Part-B**

PART-A

(Compulsory question)

- | | | | |
|----------------------------------------------------------------------------|-----------------|----|----|
| 1. Answer all the following short answer questions | (5 X 2 = 10M) | CO | BL |
| a) Explain about any four forms of precipitation | | 1 | L1 |
| b) Define Darcy's law along with expression. | | 2 | L1 |
| c) Explain how the consumptive use is estimated by Blaney- Criddle method? | | 3 | L2 |
| d) What is Ogee spillway? Where is it preferred? | | 4 | L2 |
| e) What is Type-III aqueduct and when it is preferred to construct? | | 5 | L2 |

PART-B

Answer **five** questions by choosing one question from each unit (5 x 12 = 60 Marks)

Marks CO BL

UNIT-I

- | | | | |
|------------------------------------------------------------------------------------------------------------------------------------------|----|-----|----|
| 2. a) Describe the principle of working of a float type recording raingauge with a neat sketch. Discuss its advantages and disadvantages | 7M | CO1 | L2 |
| b) Explain the factors affecting infiltration in detail. | 5M | CO1 | L2 |

OR

- | | | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------|----|-----|----|
| 3. a) Explain rainfall mass curve and hyetograph with the help of neat sketches. How a rainfall hyetograph can be derived from a given rainfall mass curve? | 6M | CO1 | L3 |
| b) Explain the scope of hydrology and its application in water resources development programmes | 6M | CO1 | L2 |

UNIT-II

- | | | | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|-----|----|
| 4. a) Explain the derivation of Unit Hydrograph by mentioning its assumptions | 5M | CO2 | L3 |
| b) What is S- Curve Technique? The ordinates of 4h U.H. of a basin of area 300 km ² measured at 1 h intervals are 6, 36, 66, 91,106, 93, 79, 68, 58, 49, 41, 34, 27, 17, 13, 9, 6, 3 and 1.5 cumecs respectively. Obtain the ordinates of a 3 h U.H. for the basin using the S -curve technique | 7M | CO2 | L3 |

OR

5. a) Differentiate between confined and unconfined aquifers with a neat sketch. 6M CO2 L2
- b) For a data of maximum recorded flood of a river, the mean and standard deviation are $4500\text{m}^3/\text{s}$ and $1700\text{m}^3/\text{s}$, respectively. Using Gumbel's extreme value distribution, estimate the return period of a design flood of $9500\text{m}^3/\text{s}$. Assume an infinite sample size. $n = 0.57, 722$ and $n = 1.28255$ 6M CO2 L4

UNIT-III

6. a) Appraise various methods in which the irrigation water can be applied to the fields with neat diagrams. 8M CO3 L3
- b) Derive the relationship between Duty, Delta and Base period. 4M CO3 L3

OR

7. a) Find the channel section and discharge that can be allowed to flow in it, if $B/D=5.7$, bed slope= $1/5000$ and $N=0.0225$. Use Kennedy's theory 6M CO3 L4
- b) Discuss in detail about the types of reservoirs and reservoir yield. 6M CO3 L3

UNIT-IV

8. a) Explain in detail about the safe design criteria for earthen dams. 6M CO4 L2
- b) Describe any six types of spill ways, advantages and disadvantages with neat figures 6M CO4 L3

OR

9. a) Explain Khosla's method of independent of variables. How do you apply corrections for (i) thickness of floor, (ii) indication of floor and (iii) interference of piles? 7M CO4 L3
- b) What is the necessity of temperature control in gravity dam? How is temperature controlled 5M CO4 L3

UNIT-V

10. a) Explain the cross-drainage structure to be adopted based on H.F.L of drain and F.S.L of the canal? 6M CO5 L3
- b) Describe about the design principles of Straight Glacis fall 6M CO5 L3

OR

11. a) Explain how to select site for cross drainage works 5M CO5 L2
- b) Describe the design principles of Syphon aqueduct 7M CO5 L3

*** End ***