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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| **Course Code** | **18CE2006** | **Duration** | **3hrs** |
| **Course Name** | **CONSTRUCTION ENGINEERING AND MANAGEMENT** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **Marks** |
| **PART – A (10 X 1 = 10 MARKS)**  **(Answer all the questions)** | | | | | |
| 1. | Define the superstructure in any building. | | CO1 | R | 1 |
| 2. | Name any 2 types of dewatering. | | CO1 | R | 1 |
| 3. | Define masonry. | | CO2 | R | 1 |
| 4. | Weigh batching or hand mixing which is technically better and analyze your answer with one reason. | | CO2 | An | 1 |
| 5. | There are many points to be kept in consideration to design an economical section of formwork. List any one of them. | | CO3 | R | 1 |
| 6. | Mention the hook length of TOR steel in the case of stirrup of a column member. | | CO3 | R | 1 |
| 7. | Define plastering. | | CO4 | R | 1 |
| 8. | Write about struck pointing. | | CO4 | R | 1 |
| 9. | Name the type of projects where CPM is adopted. | | CO5 | R | 1 |
| 10. | Indicate which part of the project milestone refers to. | | CO5 | U | 1 |
| **PART – B (6 X 3 = 18 MARKS)**  **(Answer all the questions)** | | | | | |
| 11. | List the steps that have to be taken before starting any construction project. | | CO1 | R | 3 |
| 12. | Show with diagram how English Bond is constructed. | | CO2 | A | 3 |
| 13. | Discuss pit method of underpinning. | | CO3 | U | 3 |
| 14. | List the important consideration for doors and windows. | | CO4 | R | 3 |
| 15. | Indicate any 3 objectives of programming of project. | | CO5 | U | 3 |
| 16. | Name the causes of accidents. | | CO5 | R | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q.No. 17 to 23, Q.No. 24 is Compulsory)** | | | | | |
| 17. | a. | Discuss the aspects that have to be considered during site layout planning. | CO1 | U | 6 |
|  | b. | Present the different types of foundations that are applicable for area with black cotton soil. | CO1 | A | 6 |
|  |  |  |  |  |  |
| 18. | a. | Explain the stages of production of concrete. | CO2 | U | 8 |
|  | b. | List the need for contraction joints in concrete. | CO2 | R | 4 |
|  |  |  |  |  |  |
| 19. | a. | Summarize the requirements of good formwork. | CO3 | U | 7 |
|  | b. | Write two functions of scaffolding. | CO3 | R | 3 |
|  | c. | What is the other name of dead shoring? | CO3 | R | 2 |
|  |  |  |  |  |  |
| 20. | a. | Name and discuss the components of paint. | CO4 | R | 4 |
|  | b. | Present the functional requirements of doors. | CO4 | A | 8 |
|  |  |  |  |  |  |
| 21. | a. | Explain bar chart giving its advantages and disadvantages. | CO5 | U | 6 |
|  | b. | Discuss the factors to be considered in preliminary planning. | CO5 | U | 6 |
|  |  |  |  |  |  |
| 22. | a. | Explain: (i) Sump Pumping method of dewatering and (ii) Deep well construction method of dewatering. | CO1 | U | 8 |
|  | b. | Write about dead shoring. | CO1 | R | 4 |
|  |  |  |  |  |  |
| 23. | a. | Discuss the functional requirement of roofing. | CO4 | U | 8 |
|  | b. | Explain any 2 defects in plastering. | CO4 | U | 4 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Discuss: (i) Storage and Inventory Management, (ii) Functions of Inventory Control and (iii) Need of Inventory Control. | CO6 | U | 9 |
|  | b. | List the components of operating cost of construction equipment. | CO6 | R | 3 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL

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|  | **COURSE OUTCOMES** |
| CO1 | Recall the basics of building components |
| CO2 | Understand the items / facets of construction engineering |
| CO3 | Apply the construction engineering techniques for various components |
| CO4 | Classify the various techniques for different project |
| CO5 | Explain the importance of project management |
| CO6 | Propose an Engineering and Management Plan |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / P** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 9 | 14 | 6 | - | - | - | 29 |
| CO2 | 5 | 8 | 3 | 1 | - | - | 17 |
| CO3 | 7 | 10 | - | - | - | - | 17 |
| CO4 | 9 | 12 | 8 | - | - | - | 29 |
| CO5 | 4 | 16 | - | - | - | - | 20 |
| CO6 | 3 | 9 | - | - | - | - | 12 |
|  | | | | | | | **124** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **18CE2020** | **Duration** | **3hrs** |
| **Course Name** | **REINFORCED CONCRETE ELEMENTS** | **Max. Marks** | **100** |

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| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **Marks** |
| **PART – A (10 X 1 = 10 MARKS)**  **(Answer all the questions)** | | | | | |
| 1. | State the partial safety factor for steel. | | CO1 | R | 1 |
| 2. | Classify the beam for the actual neutral axis is 152.3 mm and the critical neutral axis is 141. | | CO2 | U | 1 |
| 3. | Classify the slab for the length and breadth of a slab are 4.3 m and 3.5 m respectively. | | CO4 | U | 1 |
| 4. | Determine the value of Ʈcmax for M20 concrete under limit state method of design. | | CO3 | A | 1 |
| 5. | Identify the limiting value of l/d ratio for a simply supported beam. | | CO4 | R | 1 |
| 6. | Classify the column for height of a column is 3.9m and the size of the column is 300 mm. | | CO2 | An | 1 |
| 7. | The effective length of a column is 3200 m and the size of the column is 300 x 300 mm. Estimate the value of minimum eccentricity. | | CO2 | E | 1 |
| 8. | Identify the failure mode of a short column. | | CO4 | R | 1 |
| 9. | Define long column. | | CO6 | R | 1 |
| 10. | List any two methods available for the analysis of frames. | | CO6 | R | 1 |
| **PART – B (6 X 3 = 18 MARKS)**  **(Answer all the questions)** | | | | | |
| 11. | Explain about over reinforced beams. | | CO1 | U | 3 |
| 12. | Compare one-way and two-way slab. | | CO5 | U | 3 |
| 13. | Explain about flanged beams. | | CO4 | U | 3 |
| 14. | Explain about corner columns. | | CO2 | U | 3 |
| 15. | Discover the choice of combined footings. | | CO6 | A | 3 |
| 16. | List any three methods available for the analysis of building frames. | | CO6 | R | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q.No. 17 to 23, Q.No. 24 is Compulsory)** | | | | | |
| 17. | a. | Evaluate the moment of resistance of a rectangular beam of size 300mm x 450mm by limit state method of design. The beam is reinforced with 4 number of 16 mm dia Fe 500 rods. The grade of concrete is M25. | CO2 | An | 9 |
|  | b. | List the merits and demerits of ultimate load method of design. | CO1 | R | 3 |
|  |  |  |  |  |  |
| 18. | a. | Design a simply supported slab of size 7m x 3m. Adopt M20 grade concrete and Fe 415 steel. The live load is 3000 N/m2. [Draw a neat sketch and indicate the design details] | CO4 | An | 12 |
|  |  |  |  |  |  |
| 19. | a. | Design a rectangular beam to carry a UDL of 15 kN/m over a span of 8m. Apply the check for shear also. [Draw a neat sketch and indicate the design details] | CO4 | An | 12 |
|  |  |  |  |  |  |
| 20. | a. | Estimate the reinforcement needed for a column of size 230 x 300 to carry a factored load of 800 kN and a moment 75 kNm. Adopt M25 concrete and Fe 415 steel. | CO1 | An | 12 |
|  |  |  |  |  |  |
| 21. | a. | The load on a column of size 450mm x 450mm is 3000 kN. Design a footing to support the column on a soil having a safe bearing capacity of 200 kN/m2. | CO3 | An | 12 |
|  |  |  |  |  |  |
| 22. | a. | Estimate the moment of resistance of a T beam. Values Df, bf, bw and D are 100, 750, 230 and 550 respectively. It is reinforced with 5 nos. of 12mm φ rods with a clear cover of 30mm. Adopt Fe 415 steel and M 25 concrete. | CO2 | An | 12 |
|  |  |  |  |  |  |
| 23. | a. | A column of size 450mm x 600mm has to carry a factored load of 2000 kN and factored moments of 125 kNm and 100 kNm along the longer and shorter planes respectively. The grade of concrete is M30. Design the column and decide on the safety of the column. | CO5 | An | 12 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Determine the loads on beams B1 and B2 for the plan of the building is given below.   |  |  |  |  |  | | --- | --- | --- | --- | --- | |  | 4 | 4 | 5 |  | | 3 |  |  |  |  | | 3 |  |  |  |  | | A  3 | B1 | B2 | B3 | A |   Section AA is given below:   |  |  |  |  | | --- | --- | --- | --- | |  | 4 | 4 | 5 | | 4 |  |  |  | | 3 |  |  |  | | 3 | B1 | B2 | B3 | |  |  |  |  |   If the live load is 2000 N/m2 and the unit weight of brick masonry is 18 kN/m2. | CO6 | E | 12 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Identify the design philosophies for RCC elements. |
| CO2 | Demonstrate the behaviour of elements for load calculations. |
| CO3 | Illustrate the LSM for estimating stress resultants. |
| CO4 | Design the section and reinforcement for the structural elements. |
| CO5 | Develop suitable detailing diagrams. |
| CO6 | Prepare the design for buildings. |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / P** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 4 | 3 |  | 12 |  |  | 19 |
| CO2 |  | 4 |  | 22 | 1 |  | 27 |
| CO3 |  |  | 1 | 12 |  |  | 13 |
| CO4 | 2 | 4 |  | 24 |  |  | 30 |
| CO5 |  | 3 |  | 12 |  |  | 15 |
| CO6 | 5 |  | 3 | 12 |  |  | 20 |
|  | | | | | | | **124** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **18CE2023** | **Duration** | **3hrs** |
| **Course Name** | **FOUNDATION ENGINEERING** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **Marks** |
| **PART – A (10 X 1 = 10 MARKS)**  **(Answer all the questions)** | | | | | |
| 1. | State the values of Nc, Nγ and Nq at Φ =0. | | CO 1 | R | 1 |
| 2. | List out the purpose of site investigation. | | CO 1 | R | 1 |
| 3. | Recall the term disturbed sample. | | CO 2 | R | 1 |
| 4. | List the different methods of boring. | | CO 2 | R | 1 |
| 5. | Define immediate settlement. | | CO 3 | R | 1 |
| 6. | Write the circumstances the mat foundation can provide. | | CO 3 | R | 1 |
| 7. | Define pile. | | CO 4 | R | 1 |
| 8. | Recall shallow foundation. | | CO 4 | R | 1 |
| 9. | Define retaining wall. | | CO 5 | R | 1 |
| 10. | Write the applications of retaining wall. | | CO 5 | R | 1 |
| **PART – B (6 X 3 = 18 MARKS)**  **(Answer all the questions)** | | | | | |
| 11. | Discuss the effect of water table on bearing capacity. | | CO1 | U | 3 |
| 12. | Compare general and local shear failure. | | CO2 | U | 3 |
| 13. | Explain end bearing pile. | | CO3 | U | 3 |
| 14. | Differentiate ‘continuous footing’ and a ‘combined footing’. | | CO 4 | R | 3 |
| 15. | Find the value of υ (Poisson’s ratio) which gives the same value of K0 at Φ = 300. | | CO 5 | An | 3 |
| 16. | Explain in detail about piezometer. | | CO 6 | U | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q.No. 17 to 23, Q.No. 24 is Compulsory)** | | | | | |
| 17. | a. | Discuss the Standard Penetration Test with corrections. | CO1 | E | 12 |
|  |  |  |  |  |  |
| 18. | a. | Explain the Geophysical Methods of Soil Exploration. | CO2 | E | 12 |
|  |  |  |  |  |  |
| 19. | a. | Design a square footing of square isolated column having size 500 x 500 mm carrying 1600 kN axial load. Safe bearing capacity of soil is 200 kN/m2. Use M25 and Fe 415 grades. Check for one way and two way shear. | CO3 | C | 12 |
|  |  |  |  |  |  |
| 20. | a. | A group of 16 piles with 4 piles in a row was driven into soft clay extending from ground level to a great depth. The diameter and length of piles were 30 cm and 10 m respectively. The unconfined compression strength of clay is 70 kN/m2 . If the piles were spaced at 90cm centre to centre, compute the allowable load on the pile group on the basis of shear failure criteria for a factor of safety of 2.5, neglect bearing at the tip of piles, take m = 0.6 for shear mobilization around each pile. | CO4 | An | 12 |
|  |  |  |  |  |  |
| 21. | a. | A Gravity Retaining wall retains 12 m of a backfill**,** γ **=**17.7 kN/ m3**,** ф = 250 with a uniform horizontal surface. Assume the wall interface to be vertical, determine the magnitude and point of application of total active pressure. If the water table is at a height of 6 m, how far do the magnitude and the point of application of active pressure change? Draw the pressure diagram. | CO5 | An | 12 |
|  |  |  |  |  |  |
| 22. | a. | Explain the classification of Piles based on different criteria with sketches. | CO4 | E | 12 |
|  |  |  |  |  |  |
| 23. | a. | Describe the different steps performed by the foundation engineer to arrive at the most appropriate foundation for given structure at a given site. | CO3 | U | 12 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Explain the different sensors used in geotechnical engineering with their applications. | CO6 | U | 12 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Recall the various site investigation methods |
| CO2 | Calculate the bearing capacity of soils and foundation settlements. |
| CO3 | Analyze the various foundation system |
| CO4 | Design the foundation system for larger depths. |
| CO5 | Suggest retaining structures catering to earth pressure conditions. |
| CO6 | Adopt suitable subsurface instrumentation. |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / P** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 2 | 3 | - | - | 12 | - | 17 |
| CO2 | 2 | 3 | - | - | 12 | - | 17 |
| CO3 | 2 | 15 | - | - | - | 12 | 29 |
| CO4 | 5 | - | - | 12 | 12 | - | 29 |
| CO5 | 2 | - | - | - | 15 | - | 17 |
| CO6 | - | 15 | - | - | - | - | 15 |
|  | | | | | | | **124** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **18CE2028** | **Duration** | **3hrs** |
| **Course Name** | **QUANTITY SURVEYING AND ESTIMATION** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)**  **(Answer all the questions)** | | | | | |
| 1. | Write the unit measurement for the following items.   1. PCC 2. Plastering work in superstructure | | CO1 | R | 1 |
| 2. | List the order of booking dimensions, according to ISI method of measurement. | | CO1 | R | 1 |
| 3. | Write the nominal size of modular brick. | | CO2 | R | 1 |
| 4. | Define lead. | | CO2 | R | 1 |
| 5. | List the different methods used in building estimate. | | CO3 | R | 1 |
| 6. | Calculate the quantity of stone metal required for 2Km.Length for wearing coat of a 4m wide road. The thickness of the metal road required is 12cm loose. | | CO3 | A | 1 |
| 7. | Define abutment. | | CO4 | R | 1 |
| 8. | State plinth area. | | CO1 | R | 1 |
| 9. | Recall the important factors influencing the value of building. | | CO5 | R | 1 |
| 10. | State valuation. | | CO5 | R | 1 |
| **PART – B (6 X 3 = 18 MARKS)**  **(Answer all the questions)** | | | | | |
| 11. | Explain the importance of specification in estimation. | | CO1 | U | 3 |
| 12. | Compare centerline method and individual wall method. | | CO2 | U | 3 |
| 13. | Determine the Length of the rod. Assume side cover is 40mm. | | CO3 | U | 3 |
| 14. | Calculate the number of standard modular bricks required for flat brick soling for one kilometer length of 4 m wide road. | | CO4 | A | 3 |
| 15. | Compare depreciation and obsolescence. | | CO5 | U | 3 |
| 16. | Explain tender document. | | CO6 | U | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q.No. 17 to 23, Q.No. 24 is Compulsory)** | | | | | |
| 17. | a. | Describe the purpose of Estimation. | CO1 | U | 12 |
|  |  |  |  |  |  |
| 18. | a. | Prepare rate analysis and BOQ for a plastering work in CM 1:5. Thick of plastering is 12 mm and area of wall is 100 m2.  Assume other required data.  Labour required for 100 m2 plastering,   * Mason = 3 * Mazdoor = 5 * Beldar = 3 * Bhisti = 1   Rate of Labour   * Mason = 1150 * Mazdoor = 950 * Beldar = 718 * Bhisti = 300   Rate of material   * Cement – Rs.420 / Bag   P Sand – Rs. 1517 / m3 | CO2 | A | 12 |
|  |  |  |  |  |  |
| 19. | a. | Prepare the quantity estimation of the following items, using given plan and section. Assume other relevent data.  D = 1 x 2.1 m  W = 1 x 1.2 m   1. Earthwork excavation in foundation 2. Lime concrete in foundation 3. Brick work in substructure. 4. Damp proof course. 5. Plastering inside and outside walls. | CO3 | A | 12 |
|  |  |  |  |  |  |
| 20. | a. | Prepare a Detailed estimation of RCC beam shown in fig. Assume side cover is 40 mm and clear cover is 20 mm.    Assume suitable data wherever required. | CO4 | A | 12 |
|  |  |  |  |  |  |
| 21. | a. | Explain the following:   1. Scrap value 2. Market value 3. Salvage value. | CO5 | U | 6 |
|  | b. | Illustrate different methods of depreciation. | CO5 | U | 6 |
|  |  |  |  |  |  |
| 22. | a. | Explain different types of estimates. | CO4 | U | 12 |
|  |  |  |  |  |  |
| 23. | a. | A three storied building is standing on a plot of land measuring 1000 sq.m. the plinth area of each storey is 500 sq.m. the building is of R.C.C framed structure and the future life may be taken as 70 years. The building fetches a gross rent of Rs. 2500.00 per month. Calculate the capitalized value of the property on the basis of 6% net yield. For sinking fund 3% compound interest may be assumed. Cost of land may be taken Rs. 100.00 sq.m. Other data required may be assumed suitably. | CO3 | A | 12 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Compare security deposit and earnest money deposit. | CO6 | U | 4 |
|  | b. | Explain different classification of contracts. | CO6 | U | 8 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | List the detailed specification for different types of structures |
| CO2 | Plan the rate analysis of civil engineering works |
| CO3 | Determine the rates of various items of civil works |
| CO4 | Justify estimated cost of civil construction projects |
| CO5 | Evaluate the actual value of any property |
| CO6 | Explain specifications and tendering process for contracts |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 3 | 15 | - | - | - | - | 18 |
| CO2 | 2 | 3 | 12 | - | - | - | 17 |
| CO3 | 1 | 3 | 25 | - | - | - | 29 |
| CO4 | 1 | 12 | 15 | - | - | - | 28 |
| CO5 | 2 | 15 | - | - | - | - | 17 |
| CO6 | 3 | 12 | - | - | - | - | 15 |
|  | | | | | | | **124** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **18CE2056** | **Duration** | **3hrs** |
| **Course Name** | **TOWN PLANNING AND ARCHITECTURE** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **Marks** |
| **PART – A (10 X 1 = 10 MARKS)**  **(Answer all the questions)** | | | | | |
| 1. | Define town planning. | | CO1 | R | 1 |
| 2. | State land use planning. | | CO2 | R | 1 |
| 3. | Explain the term "skyscraper." | | CO3 | U | 1 |
| 4. | Identify the vision for establishing a floating city. | | CO3 | U | 1 |
| 5. | Define a smart city. | | CO3 | R | 1 |
| 6. | State smart solutions in terms of services and infrastructure. | | CO3 | R | 1 |
| 7. | Give an example of Indo-Aryan architecture. | | CO4 | U | 1 |
| 8. | Identify the time period during which the New Kingdom of Egypt was established. | | CO4 | U | 1 |
| 9. | Define framed structures. | | CO5 | R | 1 |
| 10. | Explain deconstructivism. | | CO6 | U | 1 |
| **PART – B (6 X 3 = 18 MARKS)**  **(Answer all the questions)** | | | | | |
| 11. | Name the three branches of the landscaping industry. | | CO2 | R | 3 |
| 12. | Describe the indoor climate concept in a floating city. | | CO3 | R | 3 |
| 13. | Explain the general requirements of new towns. | | CO2 | U | 3 |
| 14. | List the principles of the Garden City movement. | | CO2 | R | 3 |
| 15. | Infer the characteristics of Art Nouveau. | | CO6 | U | 3 |
| 16. | Interpret shape preferences and mention their types. | | CO5 | U | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q.No. 17 to 23, Q.No. 24 is Compulsory)** | | | | | |
| 17. | a. | Explain the town planning of Harappa. | CO1 | A | 6 |
|  | b. | Summarize the 1981 McLean plan for Jerusalem. | CO1 | A | 6 |
|  |  |  |  |  |  |
| 18. | a. | Write about Land use planning and its objectives. | CO2 | A | 6 |
|  | b. | State the important features to be considered for ideal towns. | CO2 | R | 6 |
|  |  |  |  |  |  |
| 19. | a. | Explain what a skyscraper is and highlight the development of elevators and materials that contribute to its success. | CO3 | U | 6 |
|  | b. | Identify the need for and features of satellite towns. | CO3 | U | 6 |
|  |  |  |  |  |  |
| 20. | a. | Explain deign objectives and structure of floating urbanization. | CO2 | U | 6 |
|  | b. | Interpret ancient Egyptian architecture and construction during the Old Kingdom. | CO4 | U | 6 |
|  |  |  |  |  |  |
| 21. | a. | Explain Dravidian architecture with a neat diagram. | CO4 | U | 6 |
|  | b. | Describe Mughal architecture. | CO4 | U | 6 |
|  |  |  |  |  |  |
| 22. | a. | List four national and international architects and their prominent works. | CO5 | R | 6 |
|  | b. | Explain the influence of Modern art on architecture. | CO5 | A | 6 |
|  |  |  |  |  |  |
| 23. | a. | Infer the impacts on architectural developments and society since the Industrial Revolution. | CO6 | A | 12 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Interpret the theory of Functionalism in architecture. | CO5 | A | 4 |
|  | b. | Explain structural systems and provide a detailed explanation of the types. | CO5 | U | 8 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| **CO1** | Compile the Historical Back Ground of Town Planning and architecture |
| **CO2** | Compose spaces of buildings using design concepts, planning principles |
| **CO3** | Understand the town planning standards, landscaping features and regulations controlling expansion of the towns and the cities |
| **CO4** | Distinguish architectural styles of eastern and western world |
| **CO5** | Understand the importance of architecture design |
| **CO6** | Analyze the importance of modern architecture methods |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / P** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 1 |  | 12 |  |  |  | 13 |
| CO2 | 13 | 9 | 6 |  |  |  | 28 |
| CO3 | 5 | 14 |  |  |  |  | 19 |
| CO4 |  | 20 |  |  |  |  | 20 |
| CO5 | 7 | 11 | 10 |  |  |  | 28 |
| CO6 |  | 4 | 12 |  |  |  | 16 |
|  | | | | | | | **124** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **18CE2060** | **Duration** | **3hrs** |
| **Course Name** | **GLOBAL CLIMATE CHANGE AND ITS IMPACT** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **Marks** |
| **PART – A (10 X 1 = 10 MARKS)**  **(Answer all the questions)** | | | | | |
| 1. | Define climate change. | | CO1 | R | 1 |
| 2. | List any two impacts of acid rain. | | CO1 | R | 1 |
| 3. | State atmospheric layers. | | CO2 | R | 1 |
| 4. | Identify the impacts of global warming. | | CO1 | R | 1 |
| 5. | Describe water conservation. | | CO3 | U | 1 |
| 6. | List any two names of greenhouse gases. | | CO1 | R | 1 |
| 7. | Define air pollution. | | CO1 | R | 1 |
| 8. | Enumerate ocean circulation. | | CO2 | R | 1 |
| 9. | Define Basel convention. | | CO6 | R | 1 |
| 10. | List the disadvantage of fossil fuels. | | CO1 | R | 1 |
| **PART – B (6 X 3 = 18 MARKS)**  **(Answer all the questions)** | | | | | |
| 11. | Given the following temperature and elevation data, determine the stability of the atmosphere.  Elevation (m) Temperature (oC)  2.00 14.35  324.00 11.13 | | CO3 | A | 3 |
| 12. | Interpret Ramsar Convention-1971. | | CO6 | U | 3 |
| 13. | Identify food security dimensions. | | CO3 | R | 3 |
| 14. | Illustrate the impacts of global warming. | | CO1 | U | 3 |
| 15. | Explain the types of storm. | | CO3 | U | 3 |
| 16. | Describe Earth’s Energy Budget. | | CO2 | R | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q.No. 17 to 23, Q.No. 24 is Compulsory)** | | | | | |
| 17. |  | Explain recent trend of climate modelling. | CO4 | U | 12 |
|  |  |  |  |  |  |
| 18. |  | Explain the scientific methods used to determine past climates. | CO3 | U | 12 |
|  |  |  |  |  |  |
| 19. |  | Write about global wind circulation. | CO5 | A | 12 |
|  |  |  |  |  |  |
| 20. |  | Articulate atmospheric stabilities using neat and clean diagram. | CO5 | A | 12 |
|  |  |  |  |  |  |
| 21. |  | Summarize the impact of air pollution on human health, animals and buildings. | CO1 | U | 12 |
|  |  |  |  |  |  |
| 22. |  | Interpret Potential climate adaptation strategies for maintaining water‐related ecosystem services. | CO5 | U | 12 |
|  |  |  |  |  |  |
| 23. |  | Write about Inter-governmental Panel on Climate Change (IPCC). | CO6 | A | 12 |
| **COMPULSORY QUESTION** | | | | | |
| 24. |  | Explain International agreements and protocols. | CO6 | U | 12 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Understand the climate and its change |
| CO2 | List the factors affecting global climate change |
| CO3 | Analyze the impacts of global climate change |
| CO4 | Explain the importance of climate change in various fields |
| CO5 | Develop Climate Change Models |
| CO6 | Study the impacts of climate change across the Globe |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / P** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 6 | 15 | - | - | - | - | 21 |
| CO2 | 2 | 3 | - | - | - | - | 5 |
| CO3 | - | 16 | 3 | - | - | - | 19 |
| CO4 | - | 12 | - | - | - | - | 12 |
| CO5 | - | 12 | 24 | - | - | - | 36 |
| CO6 | 4 | 15 | 12 | - | - | - | 31 |
|  | | | | | | | **124** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **18CE3002** | **Duration** | **3hrs** |
| **Course Name** | **ENVIRONMENTAL CHEMISTRY AND MICROBIOLOGY** | **Max. Marks** | **100** |

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| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **Marks** |
| **PART – A(4 X 20= 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | List down the water quality parameters to be analysed for determining the level of pollution. | CO4 | R | 4 |
|  | b. | How the hardness and chlorides of water can be analysed? Explain the principle behind the method of analysis. | CO4 | U | 16 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Distinguish between coagulation and flocculation. | CO1 | E | 4 |
|  | b. | List down the instrumental methods used in analysis of water quality.  Examine how the metals ions can be determined using UV Spectrophotometer. Write down the principle involved in determination. | CO1 | An | 16 |
|  |  | . |  |  |  |
| 3. | a. | List down the approaches and methods of synthesis of nanoparticles. | CO3 | R | 4 |
|  | b. | Analyze how the nano materials are applied as adsorbents. Discuss in detail the application of any two nano adsorbents in contaminant removal. | CO3 | A | 16 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Justify anions and cations can be separated using membrane technology. | CO2 | E | 10 |
|  | b. | Discuss in detail the behavior of nanoparticles in aqueous environment. | CO2 | An | 10 |
|  |  |  |  |  |  |
| 5. | a. | Analyze and discuss the growth rate curve of microbes. | CO5 | An | 14 |
|  | b. | Classify the microorganisms in terms of morphology. | CO5 | E | 6 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Outline the method of isolation of microbes from wastewater and soil and culturing mechanism. | CO4 | U | 10 |
|  | b. | List down the factors affecting the growth of microbes and discuss the significance of any two factors in detail. | CO6 | E | 10 |
|  |  |  |  |  |  |
| 7. | a. | Distinguish between biodegradation and bio augmentation. | CO5 | An | 8 |
|  | b. | Examine the functions of different types of bacteria used in wastewater treatment. | CO6 | An | 12 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Explain the role of microbes in activated sludge treatment of wastewater. | CO5 | E | 12 |
|  | b. | Highlight the significance suspended and attached growth process in treatment of wastewater using microbes. | CO5 | An | 8 |
| **PART – B (1 X 20 = 20 MARKS)**  **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Explain how the adsorption and desorption mechanism can be applied to remove the contaminant. | CO2 | E | 10 |
|  | b. | Discuss how the oxidation-reduction reaction influence the treatment of wastewater. | CO3 | An | 10 |

CO – COURSE OUTCOME BL – BLOOMS’ LEVEL

|  |  |
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|  | **COURSE OUTCOMES** |
| CO1 | Learn basic chemistry concepts. |
| CO2 | Gain competency in solving environmental issues. |
| CO3 | Able to determine chemical calculations required for treatment purpose. |
| CO4 | Identify contaminating chemicals and learn the conceptual skills. |
| CO5 | Apply micro-organisms for treatment of wastes. |
| CO6 | Evaluate type, growth metabolism and culturing techniques of micro-organisms. |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 |  |  | 16 | 4 |  |  | 20 |
| CO2 |  |  |  | 20 | 10 |  | 30 |
| CO3 | 4 |  | 16 | 10 |  |  | 30 |
| CO4 | 4 | 26 |  |  |  |  | 30 |
| CO5 |  | 12 |  | 30 | 6 |  | 48 |
| CO6 |  |  |  | 12 | 10 |  | 22 |
|  | | | | | | | **180** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **18CE3049** | **Duration** | **3hrs** |
| **Course Name** | **ELECTROCHEMICAL WATER PROCESSING AND WATER TREATMENT** | **Max. Marks** | **100** |

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| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Explain in detail the meaning of the following terms and its significance in water treatment  1. Electroneutrality  2. Potential differences at interfaces. | CO1 | U | 10 |
|  | b. | Explain the role of reference electrodes in potential measurement and explain any two common reference half-cells. | CO1 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Discuss in detail different types of electrodes and its reactions affecting the performance of water treatment. | CO6 | Ap | 10 |
|  | b. | Explain the Faraday’s law of electrolysis in the context of electro chemical application of water treatment. | CO1 | U | 10 |
|  |  |  |  |  |  |
| 3. | a. | Distinguish between the bipolar and monopolar electrode arrangement. | CO6 | U | 10 |
|  | b. | Explain how the passivation affects the efficiency of the electrochemical reactor in water treatment. | CO2 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Compare and contrast flow through cell and mixed tank cell (With a schematic diagram) | CO3 | Ap | 10 |
|  | b. | Differentiate between chemical coagulation and electrocoagulation. List down the advantages and disadvantages of both processes. | CO2 | Ap | 10 |
|  |  |  |  |  |  |
| 5. | a. | Explain the process of electrodialysis in water treatment / processing using electrochemical separation process with a neat sketch. Enumerate the advantages and limitations. | CO4 | U | 14 |
|  | b. | Distinguish between electrolysis and electrodialysis. | CO4 | U | 6 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | List down the components of electrodialysis. Discuss in detail the types of membranes used in electrodialysis. | CO4 | Ap | 12 |
|  | b. | Analyse the performance parameters of electrodialysis in desalination. | CO2 | An | 8 |
|  |  |  |  |  |  |
| 7. | a. | Discuss in detail the common removal technologies for chromium from the industrial effluent. | CO5 | Ap | 10 |
|  | b. | Explain in detail how the organic pollutants can be removal by electrocoagulation with a schematic diagram and equations. | CO6 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Analyze a case study of recovery of metallic iron from iron-rich wastewater. | CO5 | E | 10 |
|  | b. | Discuss in detail the process of flue gas desulphurization with a neat sketch. What is used to desulfurize flue gases? | CO5 | U | 10 |
|  | | | | | |
| 9. | a. | Explain any two methods of preparing the free halogens. | CO3 | U | 10 |
|  | b. | Discuss in detail the principles, process and applications of Electrolytic chlorination. | CO3 | Ap | 10 |

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|  | **COURSE OUTCOMES** |
| CO1 | Understand the basic concepts of electrochemistry |
| CO2 | Anlayse the characteristics of the effluent and sludge produced |
| CO3 | Design electrochemical reactor |
| CO4 | Understand the mechanism of electro dialysis for desalination |
| CO5 | Apply electrochemical methods for heavy metal removal |
| CO6 | Develop new electrodes for electrocoagulation and capacitive deionization |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| CO / BL | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | - | 20 | - | 10 | - | - | 30 |
| CO2 | - | 10 | 10 | 20 | - | - | 30 |
| CO3 | - | 10 | 20 | - | - | - | 30 |
| CO4 | - | 20 | 10 | - | - | - | 30 |
| CO5 | - | 10 | 10 | - | 10 | - | 30 |
| CO6 | - | 20 | 10 | - | - | - | 30 |
|  | | | | | | | **180** |



**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| **Course Code** | **18CE3059** | **Duration** | **3hrs** |
| **Course Name** | **IMPACT OF CLIMATE CHANGE OF WATER RESOURCES** | **Max. Marks** | **100** |

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| --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | **CO** | **BL** | **M** |
| **PART – A (5 X 16 = 80 MARKS)**  **(Answer any five from the following)** | | | | |
| 1. | Illustrate the global wind system and types of wind by using a neat and clean diagram. | CO2 | U | 16 |
|  |  |  |  |  |
| 2. | Explain greenhouse effects, its impact on living and non-living things, and Its possible mitigation measures. | CO1 | U | 16 |
|  |  |  |  |  |
| 3. | Report the potential climate adaptation strategies for maintaining water‐related ecosystem services (WES) during drought and their direct and indirect impacts on other WES. | CO5 | A | 16 |
|  |  |  |  |  |
| 4. | Write any case study (national/international) on climate change. | CO2 | A | 16 |
|  |  |  |  |  |
| 5. | Determine the climate variability and change effects on sanitation systems. | CO3 | A | 16 |
|  |  |  |  |  |
| 6. | Explain the effects of climate change on agriculture. | CO2 | U | 16 |
|  |  |  |  |  |
| 7. | Classify food security dimensions using examples. | CO4 | U | 16 |
| **PART – B (1 X 20 = 20 MARKS) [Compulsory Question]** | | | | |
| 8. | Define  1. IPCC  2. Role of IPCC  3. Structure of IPCC  4. Activities of IPCC | CO6 | R | 20 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Enumerate the characteristics of climate change |
| CO2 | Assess the impact of climate change |
| CO3 | Utilize the tools for vulnerability assessment |
| CO4 | Incorporate the adaptation techniques |
| CO5 | Plan the mitigation activities |
| CO6 | Implement the mitigation activities as per the policies |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | - | 16 |  | - | - | - | 16 |
| CO2 | - | 32 | 16 | - | - | - | 48 |
| CO3 | - | - | 16 | - | - | - | 16 |
| CO4 | - | 16 | - | - | - | - | 16 |
| CO5 | - | - | 16 | - | - | - | 16 |
| CO6 | 20 | - | - | - | - | - | 20 |
|  | | | | | | | **132** |



**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **18CE3059** | **Duration** | **3hrs** |
| **Course Name** | **IMPACT OF CLIMATE CHANGE ON WATER RESOURCES** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **Marks** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Visualize the effects of various SRES scenarios on temperature. | CO1 | U | 10 |
|  | b. | Identify the characteristics of climate system components. | CO1 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Describe the climate drivers and the major components of climate systems. | CO1 | U | 20 |
|  |  |  |  |  |  |
| 3. | a. | Relate the Hadley cell circulation and radiative forcing pattern around the earth surface. | CO2 | U | 20 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Explain relative vulnerability of water resources systems with reference to climate change. | CO3 | U | 20 |
|  |  |  |  |  |  |
| 5. | a. | Discuss in detail about carbon dioxide capture and storage. | CO4 | A | 20 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Elaborate the conflicts that arise between adaptation and mitigation in water resources project. | CO5 | A | 20 |
|  |  |  |  |  |  |
| 7. | a. | Determine the various issues related to transboundary waters along with conflicts raised by economics and trade. | CO6 | A | 20 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Evaluate the feature of Earth-system models of intermediate complexity. | CO3 | An | 10 |
|  | b. | Elaborate Himalayan glacier studies. | CO5 | U | 10 |
| **PART – B (1 X 20 = 20 MARKS)**  **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Examine the features of the Ganga Damodar Project. | CO6 | An | 10 |
|  | b. | Explain the procedures for temporal and spatial assessment of water resources. | CO6 | A | 10 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL

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| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Enumerate the characteristics of climate change |
| CO2 | Assess the impact of climate change |
| CO3 | Utilize the tools for vulnerability assessment |
| CO4 | Incorporate the adaptation techniques |
| CO5 | Plan the mitigation activities |
| CO6 | Implement the mitigation activities as per the policies |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / P** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 |  | 40 |  |  |  |  | 40 |
| CO2 |  | 20 |  |  |  |  | 20 |
| CO3 |  | 20 |  | 10 |  |  | 30 |
| CO4 |  |  | 20 |  |  |  | 20 |
| CO5 |  | 10 | 20 |  |  |  | 30 |
| CO6 |  |  | 30 | 10 |  |  | 40 |
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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **18CE3061** | **Duration** | **3hrs** |
| **Course Name** | **REMOTE SENSING AND GEOGRAPHICAL INFORMATION SYSTEM** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **Marks** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Examine the spectral signature and spectral curve. Interpret its usage in identifying the features. | CO1 | U | 10 |
|  | b. | List and explain orbits followed by remote sensing satellites. | CO1 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 2. |  | Explain in detail with neat sketches the Atmospheric interactions with Electro Magnetic Radiation. | CO1 | An | 20 |
|  |  |  |  |  |  |
| 3. | a. | Combine a short note on the features and applications of Remote Sensing Satellites. | CO2 | U | 10 |
|  | b. | Enumerate the different types of platform and explain in detail with give examples. | CO2 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Elaborate active sensor and passive sensor and explain in detail that are designed for satellites. | CO3 | A | 10 |
|  | b. | Discuss in detail about editing raster dataset. | CO4 | A | 10 |
|  |  |  |  |  |  |
| 5. | a. | Compare data products and relate the data products with applications. | CO3 | U | 10 |
|  | b. | Differentiate Supervised and Unsupervised image classification techniques. | CO4 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 6. |  | Discuss image enhancement techniques and explain image classification procedure with flow chart. | CO5 | An | 20 |
|  |  |  |  |  |  |
| 7. | a. | Describe in detail, Components of GIS and Theoretical models of GIS operation. | CO3 | U | 10 |
|  | b. | Classify map based on scale and purpose. | CO2 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | List the important functions of Data base management system. | CO3 | R | 10 |
|  | b. | Elaborate the advantages and disadvantages of raster and vector data structures. | CO3 | U | 10 |
| **PART – B (1 X 20 = 20 MARKS)**  **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Explain in briefly Spectral Reflectance of Water bodies. | CO6 | A | 10 |
|  | b. | Demonstrate the principle of RS. | CO6 | A | 10 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL

|  |  |
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|  | **COURSE OUTCOMES** |
| CO1 | Understand the principles and components of Remote Sensing and GIS. |
| CO2 | Analyze and interpret satellite images using digital image processing. |
| CO3 | Create thematic maps for various applications. |
| CO4 | Implement overlay analysis for various environmental and water resources application. |
| CO5 | Create spatial and temporal variation maps. |
| CO6 | Apply GIS and RS tool in environmental and water resources projects. |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 10 | 10 |  | 20 |  |  | 40 |
| CO2 |  | 30 |  |  |  |  | 30 |
| CO3 | 10 | 30 | 10 |  |  |  | 50 |
| CO4 |  | 10 | 10 |  |  |  | 20 |
| CO5 |  |  |  | 20 |  |  | 20 |
| CO6 |  |  | 20 |  |  |  | 20 |
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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| **Course Code** | **19CE2020** | **Duration** | **3hrs** |
| **Course Name** | **CONSTRUCTION SAFETY** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **Marks** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | Define the term Fatal Accident. | | CO1 | R | 1 |
| 2. | List the causes of fatal accidents. | | CO1 | R | 1 |
| 3. | List any four check list in excavation. | | CO2 | R | 1 |
| 4. | State any four safety arrangements in work over water. | | CO2 | R | 1 |
| 5. | Name the various parts of scaffolding. | | CO3 | R | 1 |
| 6. | Identify the hazards associated with confined spaces. | | CO3 | R | 1 |
| 7. | State the uses of conveyors. | | CO4 | R | 1 |
| 8. | List out the vehicles used in construction. | | CO4 | R | 1 |
| 9. | Define the use of law and regulation in construction industry. | | CO5 | R | 1 |
| 10. | State the different demolition techniques. | | CO6 | R | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | Illustrate the contents to available in accident report. | | CO1 | U | 3 |
| 12. | Identify the necessary of post blast inspection. | | CO2 | U | 3 |
| 13. | Identify the safety precautions to be considered while making scaffolding. | | CO3 | U | 3 |
| 14. | Describe about monthly inspection and maintenance of tower cranes. | | CO4 | U | 3 |
| 15. | List out the construction regulation for construction and demolition. | | CO5 | U | 3 |
| 16. | Identify some Indian standard code regarding safety and demolition. | | CO6 | U | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q.No 17 to 23, Q.No 24 is Compulsory)** | | | | | |
| 17. | a. | Explain the problems impeding safety in construction industry. | CO1 | U | 6 |
|  | b. | Summarize a short note on  (i) Pre Contract Activities (ii) Pre Construction Meeting. | CO1 | U | 6 |
|  |  |  |  |  |  |
| 18. | a. | Summarize a checklist to ensure safety in excavation of trench. | CO2 | U | 6 |
|  | b. | Discuss the safety measures while doing construction work in high rise building. | CO2 | U | 6 |
|  |  |  |  |  |  |
| 19. | a. | Explain the Safety in the erection, use and dismantling of Scaffolds of power plants. | CO3 | U | 6 |
|  | b. | Discuss the types of scaffoldings and its advantages. | CO3 | U | 6 |
|  |  |  |  |  |  |
| 20. | a. | Explain the different types of construction equipment. | CO4 | U | 6 |
|  | b. | Classify the different types of concrete vibrators and its importance. | CO4 | U | 6 |
|  |  |  |  |  |  |
| 21. | a. | Summarize the history of Labour Act and its main parameters. | CO5 | U | 6 |
|  | b. | Interpret the importance of labour license and Fitness certificate in construction. | CO5 | U | 6 |
|  |  |  |  |  |  |
| 22. | a. | Explain the following act   1. Minimum wages Act. 2. Labour Act | CO5 | A | 6 |
|  | b. | Discuss about the floor space index and its key parameters. | CO5 | U | 6 |
|  |  |  |  |  |  |
| 23. | a. | Explain the following   1. First Aid in construction site. 2. Fire Hazards in site. | CO6 | A | 6 |
|  | b. | Explain the measures to assess fire safety in construction. | CO6 | U | 6 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Explain the salient features to be considered in demolition works. | CO6 | U | 6 |
|  | b. | Summarize the pre-survey inspection checklist for demolition work. | CO6 | U | 6 |

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|  | **COURSE OUTCOMES** |
| CO1 | Ensure the security of the workers and protect the firm against lawsuits and damages |
| CO2 | Develop the essential aspects of health and safety in construction |
| CO3 | Adopt the management tools for structural Safety, Environment and Occupational Health |
| CO4 | Interprets the local technical standards and regulations on labour risks prevention, environmental management applicable to construction works |
| CO5 | Implement the safety and health issues in construction works and the typical hazards of the construction activity |
| CO6 | Select the most effective personal and collective safety equipment, based on the risks in construction activities |

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| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| CO / BL | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 2 | 15 |  |  |  |  | 17 |
| CO2 | 2 | 15 |  |  |  |  | 17 |
| CO3 | 2 | 15 |  |  |  |  | 17 |
| CO4 | 2 | 15 |  |  |  |  | 17 |
| CO5 | 1 | 21 | 6 |  |  |  | 28 |
| CO6 | 1 | 21 | 6 |  |  |  | 28 |
|  | | | | | | | **124** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **20CE1001** | **Duration** | **3hrs** |
| **Course Name** | **BUILDING SCIENCE AND ENGINEERING** | **Max. Marks** | **100** |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | | **CO** | **BL** | **Marks** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | | |
| 1. | Define the Solar radiation. | | | CO1 | R | 1 |
| 2. | Write the formula of Sol-air temperature. | | | CO1 | R | 1 |
| 3. | Recall the need of thermal comfort. | | | CO2 | R | 1 |
| 4. | Label the diseases caused by the variation of heat. | | | CO2 | R | 1 |
| 5. | Recall the percentage of energy consumed in office and residential building.. | | | CO3 | R | 1 |
| 6. | List the reason for increasing energy consumption in world. | | | CO3 | R | 1 |
| 7. | Define the term noise. | | | CO4 | R | 1 |
| 8. | Name the three main component of sound. | | | CO4 | R | 1 |
| 9. | Recall importance of daylighting in the building. | | | CO5 | R | 1 |
| 10. | Recall the equation used to measure the indoor thermal radiation. | | | CO6 | R | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | | |
| 11. | Identify the use of Heliodon device. | | | CO1 | U | 3 |
| 12. | Discuss the three main factors influencing the thermal comfort. | | | CO2 | U | 3 |
| 13. | Define the energy efficiency in building. | | | CO3 | U | 3 |
| 14. | Explain the term reverberation. | | | CO4 | U | 3 |
| 15. | Discuss the orientation of the building. | | | CO5 | U | 3 |
| 16. | Describe the energy efficiency building. | | | CO6 | U | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q.No 17 to 23, Q.No 24 is Compulsory)** | | | | | | |
| 17. | | a. | Describe the earth and sun relationship. | CO1 | U | 12 |
|  | |  |  |  |  |  |
| 18. | | a. | Explain the energy flow in human body with Gagge equation. | CO2 | U | 12 |
|  | |  |  |  |  |  |
| 19. | | a. | Discuss the concept of energy flow in the building. | CO3 | U | 12 |
|  | |  |  |  |  |  |
| 20. | | a. | Explain the factors that affect the quality of acoustics of the building. | CO4 | U | 12 |
|  | |  |  |  |  |  |
| 21. | | a. | Elaborate the shading device used in building design. | CO5 | U | 12 |
|  | |  |  |  |  |  |
| 22. | | a. | Delineate the HVAC systems. | CO6 | U | 12 |
|  | |  |  |  |  |  |
| 23. | | a. | Examine the auditorium acoustic design. | CO4 | U | 12 |
| **COMPULSORY QUESTION** | | | | | | |
| 24. | | a. | Explain the acoustic design of the building. | CO6 | U | 12 |

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Identify the climate responsive design of buildings |
| CO2 | Illustrate the thermal comfort and energy efficiency requirements |
| CO3 | Illustrate acoustics, in the design of buildings |
| CO4 | Demonstrate the principles of noise control |
| CO5 | Design for visual quality and day lighting |
| CO6 | Appraise the design principles in real time environment |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| CO / BL | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 2 | 15 |  |  |  |  | 17 |
| CO2 | 2 | 15 |  |  |  |  | 17 |
| CO3 | 2 | 15 |  |  |  |  | 17 |
| CO4 | 2 | 27 |  |  |  |  | 29 |
| CO5 | 1 | 15 |  |  |  |  | 16 |
| CO6 | 1 | 27 |  |  |  |  | 28 |
|  | | | | | | | **124** |



**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **20CE1002** | **Duration** | **3hrs** |
| **Course Name** | **ENGINEERING MECHANICS** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | | |
| 1. | Define Centroid. | | CO1 | R | | 1 |
| 2. | Write the expression for the moment of Inertia of a triangle about the base. | | CO1 | U | | 1 |
| 3. | Explain curvilinear motion with an example. | | CO2 | U | | 1 |
| 4. | State collinear system of forces. | | CO2 | R | | 1 |
| 5. | If the angular velocity of an object is 2π. Determine the speed in rpm. | | CO3 | A | | 1 |
| 6. | State the three conditions of static equilibrium. | | CO3 | R | | 1 |
| 7. | Explain about Poission’s ratio. | | CO4 | U | | 1 |
| 8. | State Hooke’s law. | | CO4 | R | | 1 |
| 9. | Classify the truss. | | CO5 | A | | 1 |
| 10. | Define co-efficient of friction. | | CO6 | R | | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | | |
| 11. | Determine the moment of Inertia of the figure given below about the X – X axis. Diameter of the circle is 30 mm. | | CO1 | A | | 3 |
| 12. | Explain kinetic energy. | | CO2 | U | | 3 |
| 13. | Distinguish centroid and center of gravity. | | CO3 | U | | 3 |
| 14. | The Young’s modulus and the Poisson’s ratio are 2 x 105 N/mm2 and 0.3 for a material. Estimate the value of rigidity modulus. | | CO4 | A | | 3 |
| 15. | Determine the reaction RA for the beam shown below: | | CO5 | A | | 3 |
| 16. | Draw the stress – strain diagram for mild steel and identify the salient points. | | CO6 | U | | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | | |
| 17. | a. | Determine the moment of Inertia of the section about YY axis given below: | CO1 | | A | 12 |
|  |  |  |  | |  |  |
| 18. | a. | The following forces act at a point:   1. 200N inclined at 300 towards North of East 2. 250N towards North 3. 300 N towards North of west at 45o 4. 350 N inclined at 40o towards south of west.   Find the resultant of the force system. | CO2 | | A | 12 |
|  |  |  |  | |  |  |
| 19. | a. | A horizontal rod of length 1.2m rotates about an axis through one end. It accelerates uniformly from 1200 rpm to 1800 rpm in an interval of 10 seconds. What is the linear velocity at the beginning and end of the interval? Discover the normal and tangential components of the acceleration of the mid-point of the bar after 3 seconds after the acceleration starts. | CO3 | | An | 12 |
|  |  |  |  | |  |  |
| 20. | a. | A bar of size 75mm x 25mm and length 500mm is subjected to a tensile force of 100 kN. Determine the change in the volume. The value of modulus of rigidity of a material is 0.8 x 105 N/mm2 and the value of Poisson’s ratio is 0.33. | CO4 | | A | 12 |
|  |  |  |  | |  |  |
| 21. | a. | Determine the support reactions for the beam shown below: | CO5 | | An | 12 |
|  |  |  |  | |  |  |
| 22. | a. | Analyze the pin jointed truss as shown below by method of joints. | CO4 | | An | 12 |
|  |  |  |  | |  |  |
| 23. | a. | Two cars A and B start from rest at the same time from two stations spaced ‘L’ apart along the same straight road. Car ‘A’ travels first with an acceleration of 0.6 m/s2 reaching a maximum velocity of 30 m/s and travels uniformly with this velocity. Car ‘B’ travels first with an acceleration of 0.75 m/s2 reaching a maximum velocity of 24 m/s. Both the cars cross each other at ‘C’ which is exactly mid-way between the two stations. Determine ‘L’ and the time taken by each car to cross ‘C’ | CO5 | | A | 12 |
| **COMPULSORY QUESTION** | | | | | | |
| 24. | a. | A compound tube consists of steel tube of 150mm internal diameter and 170mm external diameter. The steel tube is surrounded by a outer brass tube of 170mm internal diameter and 190mm external diameter. The tube is subjected to a load of 1200 kN. Determine the stresses in the tubes and the change in length. Length of the tube is 600 mm.  Es = 2 x 105 N/mm2 and Eb = 1 x 105 N/mm2. | CO6 | | A | 12 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| **CO1** | Illustrate the concepts of mechanics. |
| **CO2** | Identify the principles of dynamics. |
| **CO3** | Examine the concepts of kinetics. |
| **CO4** | Analyse the stresses in the members. |
| **CO5** | Apply the equilibrium concepts in analysis of members. |
| **CO6** | Apply the basic principles to solve problems in mechanics. |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | 1 | 1 | 15 |  |  |  | 17 |
| **CO2** | 1 | 4 | 12 |  |  |  | 17 |
| **CO3** | 1 | 3 | 1 | 12 |  |  | 17 |
| **CO4** | 1 | 1 | 15 | 12 |  |  | 29 |
| **CO5** |  |  | 16 | 12 |  |  | 28 |
| **CO6** | 1 | 3 | 12 |  |  |  | 16 |
|  | | | | | | | **124** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **20CE1003** | **Duration** | **3hrs** |
| **Course Name** | **GREEN DESIGN AND LIFE CYCLE ASSESSMENT** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)**  **(Answer all the questions)** | | | | | |
| 1. | State greenhouse gases. | | CO1 | R | 1 |
| 2. | List out the stages of life cycle assessment. | | CO1 | R | 1 |
| 3. | Infer BEMS. | | CO2 | U | 1 |
| 4. | Write down the environmental benefits of energy. | | CO2 | A | 1 |
| 5. | State GHG protocol. | | CO3 | R | 1 |
| 6. | Recall green analysis. | | CO3 | R | 1 |
| 7. | Review greenhouse gas emission. | | CO4 | U | 1 |
| 8. | State energy audit. | | CO4 | R | 1 |
| 9. | Define life cycle inventory analysis. | | CO5 | R | 1 |
| 10. | State Environmental Impact Assessment. | | CO5 | R | 1 |
| **PART – B (6 X 3 = 18 MARKS)**  **(Answer all the questions)** | | | | | |
| 11. | Describe greenhouse effect. | | CO1 | R | 3 |
| 12. | Indicate the principles of energy efficient building | | CO2 | U | 3 |
| 13. | Infer the benefits of green building. | | CO3 | R | 3 |
| 14. | Express the objectives of green energy auditing. | | CO4 | U | 3 |
| 15. | Employ the steps involved in data collection for LCA. | | CO5 | A | 3 |
| 16. | Illustrate low carbon materials with example. | | CO6 | U | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q.No. 17 to 23, Q.No. 24 is Compulsory)** | | | | | |
| 17. | a. | Write the primary causes of global warming and explain how the climate change affects the weather patterns. | CO1 | A | 6 |
|  | b. | Explain about the energy consumption in different sectors. | CO1 | U | 6 |
|  |  |  |  |  |  |
| 18. | a. | Describe the personal and social benefits of energy. | CO2 | U | 6 |
|  | b. | Explain about GHG mitigation in buildings. | CO2 | U | 6 |
|  |  |  |  |  |  |
| 19. | a. | Discuss the various green building rating systems. | CO3 | U | 6 |
|  | b. | Write down the GHG protocol standards. | CO3 | A | 6 |
|  |  |  |  |  |  |
| 20. | a. | Explain the customer and stakeholder satisfaction measurement in greenhouse gas emission. | CO4 | U | 6 |
|  | b. | Explain about the energy analysis in construction. | CO4 | A | 6 |
|  |  |  |  |  |  |
| 21. | a. | Explain Lifecycle inventory analysis. | CO5 | U | 6 |
|  | b. | Discuss about Environmental Impact Assessment. | CO5 | U | 6 |
|  |  |  |  |  |  |
| 22. | a. | Summarize the environmental impacts involved during construction. | CO6 | U | 6 |
|  | b. | Examine the aspects of sustainability. | CO6 | A | 6 |
|  |  |  |  |  |  |
| 23. | a. | Write down the benefits of using low carbon materials and the impacts of CO2 emission in construction. | CO6 | An | 6 |
|  | b. | Explain the business and financial measurement in greenhouse gas emission. | CO4 | U | 6 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Explain the cost benefit analysis of LCA. | CO5 | U | 6 |
|  | b. | Differentiate BREAMS and BEMS. | CO3 | An | 6 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Identify the carbon emission from the buildings |
| CO2 | Illustrate the energy efficiency principles |
| CO3 | Apply the energy analysis models |
| CO4 | Analyze the sustainability of buildings |
| CO5 | Apply the social and economic aspects in green buildings |
| CO6 | Formulate techniques for green design in buildings |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 5 | 6 | 6 | - | - | - | 17 |
| CO2 | - | 16 | 1 | - | - | - | 17 |
| CO3 | 5 | 6 | 6 | 6 | - | - | 23 |
| CO4 | 1 | 16 | 6 | - | - | - | 23 |
| CO5 | 2 | 18 | 3 | - | - | - | 23 |
| CO6 | - | 9 | 6 | 6 | - | - | 21 |
|  | | | | | | | **124** |



**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **20CE1004** | **Duration** | **3hrs** |
| **Course Name** | **SUSTAINABLE BUILDING MATERIALS** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | Give any two examples of Igneous rock. | | CO1 | U | 1 |
| 2. | Describe pile foundation. | | CO1 | R | 1 |
| 3. | Define sustainable building material. | | CO2 | R | 1 |
| 4. | Give any two examples of locally available construction materials. | | CO2 | U | 1 |
| 5. | Explain the general composition of ferro-cement walls. | | CO3 | U | 1 |
| 6. | Define Polyethylene (PE) core panels used in construction. | | CO6 | R | 1 |
| 7. | Describe geopolymer concrete. | | CO4 | U | 1 |
| 8. | Give examples of waste materials commonly used in innovative construction practices. | | CO4 | U | 1 |
| 9. | Identify the purpose for which glass bottles are used during the construction of foundations. | | CO5 | U | 1 |
| 10. | State the characteristic property of shape memory alloy. | | CO6 | R | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | Explain arches with a neat diagram. | | CO1 | U | 3 |
| 12. | Describe the benefits of using low-VOC materials. | | CO2 | R | 3 |
| 13. | Summarize the need for steam curing for precast and prestressed concrete units. | | CO3 | U | 3 |
| 14. | Explain the advantages of nanomaterials in construction. | | CO4 | U | 3 |
| 15. | Interpret one example of post-consumer water use in construction. | | CO5 | U | 3 |
| 16. | Compare light-emitting concrete and photochromic materials in terms of their properties and applications. | | CO6 | U | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | |
| 17. | a. | State the selection criteria for dressing stones used in construction. | CO1 | R | 4 |
|  | b. | Illustrate the rock formation process with the help of the rock cycle. | CO1 | U | 8 |
|  |  |  |  |  |  |
| 18. |  | Explain biotech concrete and the process of CaCO3 crystal binding with a neat diagram. | CO2 | U | 12 |
|  |  |  |  |  |  |
| 19. |  | Interpret filler slabs as a primary construction material for building roofs, mentioning their advantages and disadvantages. | CO3 | A | 12 |
|  |  |  |  |  |  |
| 20. | a. | Describe the building process and design considerations for ICFs (Insulating Concrete Forms). | CO4 | U | 8 |
|  | b. | Summarize the application of carbon nanotubes for cement-based materials. | CO4 | U | 4 |
|  |  |  |  |  |  |
| 21. | a. | Explain in detail the application of tires used in building construction. | CO5 | A | 6 |
|  | b. | Distinguish the role of innovative materials such as bamboo and hempcrete and compare their properties in sustainable construction practices. | CO3 | A | 6 |
|  |  |  |  |  |  |
| 22. | a. | Generalize the role of fly ash as an eco-friendly construction material. | CO5 | U | 6 |
|  | b. | List the importance of post-consumer waste. | CO3 | R | 6 |
|  |  |  |  |  |  |
| 23. |  | Explain the manufacturing process and composition of SMB (Stabilized Mud Block) blocks and mention their properties and types. | CO1 | A | 12 |
| **COMPULSORY QUESTION** | | | | | |
| 24. |  | Evaluate the environmental benefits and challenges associated with using smart concrete and biomimetic designs in building structures. | CO4 | AN | 12 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| **CO1** | Identify the sustainable building materials |
| **CO2** | Distinguish between conventional and modern construction materials |
| **CO3** | Define the concepts of embodied carbon or carbon footprint |
| **CO4** | Identify the different sustainable construction techniques |
| **CO5** | Analyze the usage of waste materials for construction |
| **CO6** | Analyze the use of smart materials |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | 5 | 12 | 12 |  |  |  | 29 |
| **CO2** | 4 | 13 |  |  |  |  | 17 |
| **CO3** | 6 | 4 | 18 |  |  |  | 28 |
| **CO4** |  | 17 | 12 |  |  |  | 29 |
| **CO5** |  | 10 | 6 |  |  |  | 16 |
| **CO6** | 2 | 3 |  |  |  |  | 5 |
|  | | | | | | | **124** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **20CE2001** | **Duration** | **3hrs** |
| **Course Name** | **SURVEYING AND GEOMATICS ENGINEERING** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)**  **(Answer all the questions)** | | | | | |
| 1. | Define contouring. | | CO3 | R | 1 |
| 2. | Differentiate back sight and fore sight. | | CO1 | R | 1 |
| 3. | Compare face left and face right. | | CO2 | U | 1 |
| 4. | Classify two types of theodolite. | | CO2 | U | 1 |
| 5. | Recall the value of multiplying constant (K) and additive constant (C) When the theodolite is fitted with anallatic lens. | | CO1 | R | 1 |
| 6. | List the three cases of single plane method. | | CO3 | R | 1 |
| 7. | Define curve. | | CO4 | R | 1 |
| 8. | Calculate radius of the circular curve if the degree of the curve is 1o. | | CO4 | A | 1 |
| 9. | Recall the advantages of total station. | | CO5 | R | 1 |
| 10. | Explain working principle of total station. | | CO6 | U | 1 |
| **PART – B (6 X 3 = 18 MARKS)**  **(Answer all the questions)** | | | | | |
| 11. | List the different types of levelling. | | CO3 | R | 3 |
| 12. | Differentiate latitude and departure. | | CO2 | U | 3 |
| 13. | Explain the anallatic lens and state the use of it in tacheometer. | | CO1 | U | 3 |
| 14. | Explain different types of vertical curve. | | CO4 | U | 3 |
| 15. | Illustrate the purpose of setting out a building. | | CO4 | U | 3 |
| 16. | Illustrate the types of drone flight path. | | CO6 | U | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q.No. 17 to 23, Q.No. 24 is Compulsory)** | | | | | |
| 17. |  | The following is an incomplete page of level book in which X indicates missing entry line. Calculate all the missing entries and complete the page of level book. Also give the usual arithmetical check.   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | BS | IS | FS | Rise | Fall | RL | Remarks | | 2.56 |  |  |  |  | 100 | BM | |  | 3.54 |  |  | ? | ? |  | |  | 3.20 |  | ? |  | ? |  | |  | 2.34 |  | ? |  | ? |  | | 1.95 |  | ? | 1.08 |  | ? | CP | |  | 2.44 |  |  | X | ? |  | |  |  | 3.46 |  | X | ? |  | | CO3 | A | 12 |
|  |  |  |  |  |  |
| 18. |  | The following records are obtained in a traverse survey, where the length and bearing of the last line were not recorded:   |  |  |  | | --- | --- | --- | | **LINE** | **LENGTH (m)** | **BEARING** | | AB | 75.50 | 30o 24' | | BC | 180.50 | 110 o 36’ | | CD | 60.25 | 210 o30’ | | DA | ? | ? |   Calculate the length and bearing of the line DA. | CO2 | A | 12 |
|  |  |  |  |  |  |
| 19. |  | Following observations were recorded with a tacheometer fitted with an anallatical lens (K=100; C=0). Calculate the reduced levels of A, B and C, and the horizontal distance between AB and BC. The staff was held vertical during the observations and the reduced level of B.M was 450.5 m.   |  |  |  |  |  | | --- | --- | --- | --- | --- | | Instrument station | H.I  (m) | Staff station | Vertical angle | Staff Readings  (m) | | A | 1.345 | B.M | - 5o 30’ | 0.905, 1.455, 2.005 | | A | 1.345 | B | 8o 0’ | 0.755, 1.655, 2.555 | | B | 1.550 | C | 10o 0’ | 1.500, 2.250, 3.000 | | CO2 | A | 12 |
|  |  |  |  |  |  |
| 20. |  | Explain different types of horizontal curves with neat sketch. | CO4 | U | 12 |
|  |  |  |  |  |  |
| 21. |  | Explain principle and classification of Total station. | CO5 | U | 12 |
|  |  |  |  |  |  |
| 22. |  | Two straights intersect at chainage 1615m, the deflection angle being 11°. Calculate all the data necessary to set out a 3° simple right handed curve by the Rankine’s method of deflection angles. Peg interval may be taken as 20m. Draw the table of deflection angles. | CO4 | A | 12 |
|  |  |  |  |  |  |
| 23. |  | Discuss the different classification of Surveying. | CO1 | U | 12 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Explain the benefits of drone surveying. | CO6 | U | 6 |
|  | b. | Explain the drone flight flan. | CO6 | U | 6 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Recall the principles of surveying equipment’s |
| CO2 | Select methods to measure angles and distances |
| CO3 | Schedule field surveying operations |
| CO4 | Examine the implementation of surveying procedures for setting out curves |
| CO5 | Appraise the usage of equipment’s and methods in triangulation survey |
| CO6 | Formulate the surveying methods and executions |

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| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 2 | 15 | - | - | - | - | 17 |
| CO2 | - | 5 | 24 | - | - | - | 29 |
| CO3 | 5 | - | 12 | - | - | - | 17 |
| CO4 | 1 | 18 | 13 | - | - | - | 32 |
| CO5 | 1 | 12 | - | - | - | - | 13 |
| CO6 | - | 16 | - | - | - | - | 16 |
|  | | | | | | | **124** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **20CE2002** | **Duration** | **3hrs** |
| **Course Name** | **MECHANICS OF SOLIDS** | **Max. Marks** | **100** |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | | | **CO / BL** | | **Marks** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | | | |
| 1. | Define Young`s Modulus. | | | | CO1/ R | | 1 |
| 2. | Define Principal planes. | | | | CO1/ R | | 1 |
| 3. | What is the maximum shear stress if the principal stresses are σ1 and σ2? | | | | CO2/ U | | 1 |
| 4. | Define point of contraflexure. | | | | CO2/ R | | 1 |
| 5. | When a simply supported beam is loaded with uniformly distributed load over the full span, where the maximum shear force will occur? | | | | CO3/ U | | 1 |
| 6. | Write the deflection equation of a simply supported beam carrying a point load at the centre. | | | | CO3/ R | | 1 |
| 7. | Name any two methods for finding the slope and deflection at a section. | | | | CO1/ R | | 1 |
| 8. | The hoop stress is \_\_\_\_\_\_\_\_\_ at the inner circumference and \_\_\_\_\_\_\_\_\_ at the outer circumference. | | | | CO1/ U | | 1 |
| 9. | Define stiffness of the spring. | | | | CO1/ R | | 1 |
| 10. | What is the power developed by a shaft rotating at a speed of N r.p.m. and subjected to a torque of T Nm? | | | | CO5/ U | | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | | | |
| 11. | | Draw the stress-strain diagram of mild steel. | | CO1/ U | | 3 | |
| 12. | | Explain different types of supports. | | CO1/ R | | 3 | |
| 13. | | Explain different types of beams. | | CO1/ R | | 3 | |
| 14. | | State the assumptions made in theory of simple bending. | | CO2/ U | | 3 | |
| 15. | | Determine the power transmitted by a 75 mm diameter shaft at 140 rpm at a maximum shear stress of 60 N/mm². | | CO3/ A | | 3 | |
| 16. | | State the assumptions made in the derivation of shear stress produced in a circular shaft subjected to torsion | | CO2/ U | | 3 | |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q.no 17 to 23. Q.No 24 is Compulsory)** | | | | | | | |
| 17. | | a. | A bar of 30 mm diameter is subjected to a pull of 60kN. The measured extension on gauge length of 200 mm is 0.1 mm and change in diameter is 0.004mm. Calculate   1. Youngs modulus 2. Poisons ratio 3. Bulk modulus | CO3/ A | | 12 | |
|  | |  |  |  | |  | |
| 18. | | a. | The principal stress at a point across two planes is 120 N/mm2 (tensile) and 60 N/mm2 (tensile). Determine the normal, tangential stress and the resultant stress on a plane inclined at 30o to the axis of minor stresses. | CO3/ An | | 12 | |
|  | |  |  |  | |  | |
| 19. | | a. | A simply supported beam is subjected to a combination of loads as shown in figure. Sketch the shear force and bending moment diagrams.  A  20 kN/m  10 kN  4m  4m  2m  B  C  D | CO5/A | | 12 | |
|  | |  |  |  | |  | |
| 20. | | a. | A rectangular beam 200mm deep and 300mm wide is simply supported over a span of 8m. What uniformly distributed load per meter the beam may carry, if the bending stress is not to exceed 120N/mm2. | CO3/ An | | 12 | |
|  | |  |  |  | |  | |
| 21. | | a. | A beam of length 5m and of uniform rectangular section is supported at its ends and carries a UDL over the entire length. Calculate the depth of the section if the maximum permissible bending stress is 8N/mm2 and the central deflection is not to exceed 10mm. | CO3/ An | | 12 | |
|  | |  |  |  | |  | |
| 22. | | a. | A hollow shaft of ecternal diameter 120mm transmits 300 kw power at 200 r.p.m. Determining the maximum internal diameter if the maximum stress in the shaft is not to exeed 60N/mm2. | CO5/ A | | 12 | |
|  | |  |  |  | |  | |
| 23. | | a. | A boiler is subjected to an internal steam pressure of 2 N/mm2. The thickness of boiler plate is 2.0 cm and permissible tensile stress is 120 N/mm2. Find out the maximum diameter, when efficiency of longitudinal joint is 90% and that of circumferential joint is 40%. | CO5/ A | | 12 | |
|  | |  | **Compulsory:** | | | | |
| 24. | | a. | Calculate the Eulers critical load for a struct of a T-Section, the flange width being 10cm, overall depth 8 cm and both flange and stem 1 cm thick. The strut is 3 m long and is built in at both ends. Take E = 2x105 N/mm2. | CO3/ A | | 12 | |

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|  | **COURSE OUTCOMES** |
| CO1 | Illustrate the concepts and principles |
| CO2 | Explain the behaviour of structural elements |
| CO3 | Analyze the structural members for various forces |
| CO4 | Estimate the response of the elements |
| CO5 | Develop suitable response intricacies |
| CO6 | Adapt suitable analysis procedure |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / BL** | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 10 | 4 |  |  |  |  | 14 |
| CO2 | 1 | 7 |  |  |  |  | 8 |
| CO3 | 1 | 1 | 27 | 36 |  |  | 65 |
| CO4 |  |  |  |  |  |  |  |
| CO5 |  | 1 | 36 |  |  |  | 37 |
| CO6 |  |  |  |  |  |  |  |
|  | | | | | | | **124** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **20CE2003** | **Duration** | **3hrs** |
| **Course Name** | **FLUID MECHANICS AND MACHINERY** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)**  **(Answer all the questions)** | | | | | |
| 1. | Relate kinematic and dynamic viscosity. | | CO1 | U | 1 |
| 2. | Define weight density. | | CO1 | R | 1 |
| 3. | State Pascal’s law with some examples. | | CO1 | U | 1 |
| 4. | Differentiate Venturimeter and Orificemeter. | | CO2 | A | 1 |
| 5. | Draw the velocity profile for a pipe flow. | | CO3 | R | 1 |
| 6. | Enumerate various forms of energies which the Bernoulli’s equation takes into account. | | CO3 | R | 1 |
| 7. | Define critical depth. | | CO4 | R | 1 |
| 8. | Mention the device used to measure average velocity of flow in an open channel. | | CO4 | U | 1 |
| 9. | Define Total head in case of pumps. | | CO5 | U | 1 |
| 10. | State an example for reaction turbine. | | CO6 | R | 1 |
| **PART – B (6 X 3 = 18 MARKS)**  **(Answer all the questions)** | | | | | |
| 11. | Capillary rise in a glass tube of 2.5 mm diameter is 1.8 cm when immersed in water. Calculate the surface tension of water in contact with air. | | CO1 | An | 3 |
| 12. | An oil of specific gravity 0.9 is contained in a vessel. At a point the height of oil is 40 m. Calculate the corresponding height of water at the point | | CO1 | A | 3 |
| 13. | Compare steady and unsteady flows with examples. | | CO2 | U | 3 |
| 14. | Express the relationship between minimum specific energy and critical depth. | | CO3 | U | 3 |
| 15. | Differentiate Backwater and drawdown curves. | | CO4 | A | 3 |
| 16. | Elaborate Cavitation and its effects. | | CO6 | A | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q.No. 17 to 23, Q.No. 24 is Compulsory)** | | | | | |
| 17. | a. | A differential manometer is connected at the two points A and B of two pipes. The pipe A contains a liquid of sp. gr = 1.5 while pipe B contains a liquid of sp.gr = 0.9. The pressures at A and B are 1 N/m2 and 1.8 N/m2 respectively. Estimate the difference in mercury level in the differential manometer. | CO1 | A | 6 |
|  | b. | A plane 0.025mm distant from a fixed plate, moves at 60 m/s and requires a force of 2 N per unit area i.e., 2N/m2 to maintain this speed. Determine the fluid viscosity between the plates. | CO1 | A | 6 |
|  |  |  |  |  |  |
| 18. | a. | Estimate the loss of head when a pipe of diameter 200 mm is suddenly enlarged to a diameter of 400mm. The rate of flow of water through the pipe is 250 litres/s | CO2 | A | 6 |
|  | b. | A pipe, through which water is flowing, is having diameters, 20 cm and 10cm at the cross-sections 1 and 2 respectively. The velocity of water at section 1 is given 40 m/s. Calculate the velocity head at sections 1 and 2 and also the rate of discharge. | CO2 | A | 6 |
|  |  |  |  |  |  |
| 19. | a. | A pipeline carrying oil of specific gravity 0.87 changes in diameter from 200 mm diameter at a position A to 500 mm diameter at a position B which is 4 m at a higher level. If the pressures at A and B are 9.81 N/cm2 and 5.886 N/cm2 respectively and the discharge is 200 l/s determine the loss of head and direction of flow. | CO3 | A | 6 |
|  | b. | A rectangular channel of width 4m is having a bed slope of 1 in 1500. Estimate the maximum discharge through this most economical channel. Take value of C= 50 | CO4 | A | 6 |
|  |  |  |  |  |  |
| 20. | a. | In a rectangular channel of 0.5 m width, a hydraulic jump occurs at a point where depth of water flow is 0.15 m and Froude number is 2.5. Determine: 1.Specific Energy 2.Critical and subsequent depths 3.Head loss 4. Energy dissipated | CO4 | An | 12 |
|  |  |  |  |  |  |
| 21. | a. | Elaborate on the construction of specific energy curve diagram. | CO5 | U | 6 |
|  | b. | A trapezoidal channel has a bottom width 6 m and side slope of 2 horizontal to 1 vertical. If the depth of flow is 1.2m at a discharge of 10 m3/s, compute the specific energy and critical depth. | CO5 | An | 6 |
|  |  |  |  |  |  |
| 22. | a. | A sluice gate discharges water into a horizontal rectangular channel with a velocity of 6 m/s and the depth of flow is 0.4 m. The width of the channel is 8 m. Determine whether a hydraulic jump will occur, and if so, determine the height of the jump and loss of energy per unit weight of water. Also determine the power lost in the hydraulic jump. | CO5 | An | 12 |
|  |  |  |  |  |  |
| 23. | a. | A three stage centrifugal pump has impellers 400mm in diameter and 20mm wide at outlet. The vanes are curved back at the outlet at 45° and reduce the circumferential area by 10%. The manometric efficiency is 90% and the overall efficiency is 80%. The pump is running at 1000 rpm and delivering 0.05 m3/s, Determine:  a. Head generated by the pump.  b. Shaft power required to run the pump | CO6 | A | 12 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | The diameter and stroke length of a single-acting reciprocating pump are 12cm and 20cm respectively. The lengths of the suction and delivery pipes are 8 and 25m respectively and their diameters are 7.5 cm. If the pump is running at 40 rpm and suction and delivery heads are 4m and 14 m respectively. Estimate the pressure head in the cylinder i) At the beginning of the suction and delivery strokes ii) At the middle of the suction and delivery strokes Take atmospheric pressure head = 10.3m of water and f = 0.009 for both pipes. | CO6 | An | 12 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Recall the behaviour of fluids under static condition, measure pressure changes and estimate total pressure on plane surfaces |
| CO2 | Demonstrate flow measurement methods |
| CO3 | Identify the flow pattern and estimate total energy |
| CO4 | Measure flow in open channels |
| CO5 | Demonstrate various types of flows in open channels |
| CO6 | Investigate the selection and operation turbines and pumps |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 1 | 2 | 15 | 3 |  |  | 21 |
| CO2 |  | 3 | 13 |  |  |  | 16 |
| CO3 | 2 | 3 | 6 |  |  |  | 11 |
| CO4 | 1 | 1 | 9 | 12 |  |  | 23 |
| CO5 |  | 7 |  | 18 |  |  | 25 |
| CO6 | 1 |  | 27 |  |  |  | 28 |
|  | | | | | | | **124** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **20CE2004** | **Duration** | **3hrs** |
| **Course Name** | **SOIL MECHANICS AND FOUNDATION ENGINEERING** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)**  **(Answer all the questions)** | | | | | |
| 1. | Describe the soil’s engineering properties. | | CO1 | R | 1 |
| 2. | Enumerate Atterberg’s limit. | | CO1 | R | 1 |
| 3. | State the two tests conducted for liquid limit. | | CO2 | R | 1 |
| 4. | Infer the term permeability. | | CO2 | R | 1 |
| 5. | Define the term compaction. | | CO3 | R | 1 |
| 6. | Recall the spring analogy formula. | | CO3 | R | 1 |
| 7. | State disadvantage of auger and shell boring. | | CO4 | R | 1 |
| 8. | Infer the term contact pressure. | | CO4 | R | 1 |
| 9. | Describe the direct method of exploration. | | CO5 | R | 1 |
| 10. | Identify the types of bearing capacity failures. | | CO6 | R | 1 |
| **PART – B (6 X 3 = 18 MARKS)**  **(Answer all the questions)** | | | | | |
| 11. | Identify the relationship between e, v, S and G in the context of soil mechanics. | | CO1 | U | 3 |
| 12. | Identify the porosity value of soil if it has a voids ratio of 0.6. | | CO2 | U | 3 |
| 13. | Identify the types of stresses induced in the soil. | | CO3 | U | 3 |
| 14. | Infer the types of stress acting on the principal plane. | | CO4 | U | 3 |
| 15. | Cite the disadvantage of precision drilling. | | CO5 | U | 3 |
| 16. | Describe safe bearing capacity. | | CO6 | U | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q.No. 17 to 23, Q.No. 24 is Compulsory)** | | | | | |
| 17. | a. | Explain the Illustrate the weight and volume relationship and its functional relationship. | CO1 | U | 6 |
|  | b. | Compute porosity and specific gravity for the soil having voids ratio of 0.6 and the degree of saturation is 60% of the soil. Mass of the soil sample is 180g and after oven drying the soil mass reduced to 160g. | CO1 | U | 6 |
|  |  |  |  |  |  |
| 18. | a. | Compute the coefficient of permeability of a soil sample and its velocity, 6 cm in height and 50 cm2 in coss-sectional area, if a quantity of water equal to 430 ml passed down in 10 minutes under the effective constant head of 40 cm. | CO2 | U | 6 |
|  | b. | Discuss the flow net and its characteristics. | CO2 | U | 6 |
|  |  |  |  |  |  |
| 19. | a. | Discuss the various test method for compaction and consolidation. | CO3 | U | 6 |
|  | b. | Differentiate the compaction and the consolidation of soil. | CO3 | U | 6 |
|  |  |  |  |  |  |
| 20. | a. | Articulate the concentrated forces acting on the soil using Boussinesq theory. | CO4 | A | 6 |
|  | b. | Explain the Mohr stress circle and its failure theory. | CO4 | A | 6 |
|  |  |  |  |  |  |
| 21. | a. | Summarize the minimum depth of foundation for various conditions. | CO5 | U | 6 |
|  | b. | Classify the types of boring methods. | CO5 | U | 6 |
|  |  |  |  |  |  |
| 22. | a. | Summarize the bore log report and its informations. | CO5 | A | 6 |
|  | b. | Illustrate the procedure for the standard penetration test. | CO5 | A | 6 |
|  |  |  |  |  |  |
| 23. | a. | Record the different types of deep foundations. | CO6 | A | 6 |
|  | b. | Summarize the types of pile based on the function. | CO6 | A | 6 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Summarize the minimum depth of foundation by Rankine’s Analysis. | CO6 | E | 6 |
|  | b. | Assess the various types of bearing capacity failures. | CO6 | E | 6 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | List the basic equations of elasticity |
| CO2 | Distinguish between the applications of different types of finite elements |
| CO3 | Develop the finite element discrimination for seepage, consolidation soil structure interaction problems |
| CO4 | Identify the suitable foundation for construction |
| CO5 | Design the foundation system for shallow depth |
| CO6 | Analyse the earth retaining structures for different soil medium |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 2 | 15 |  |  |  |  | 17 |
| CO2 | 2 | 15 |  |  |  |  | 17 |
| CO3 | 2 | 15 |  |  |  |  | 17 |
| CO4 | 2 | 3 | 12 |  |  |  | 17 |
| CO5 | 1 | 15 | 12 |  |  |  | 28 |
| CO6 | 1 | 3 | 12 |  | 12 |  | 28 |
|  | | | | | | | **124** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **20CE2005** | **Duration** | **3hrs** |
| **Course Name** | **WATER SUPPLY AND SANITARY ENGINEERING** | **Max. Marks** | **100** |

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| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **Marks** |
| **PART – A (10 X 1 = 10 MARKS)**  **(Answer all the questions)** | | | | | |
| 1. | List the physical properties of water. | | CO1 | R | 1 |
| 2. | Define the geometric increase method. | | CO3 | R | 1 |
| 3. | Explain the sedimentation process operating in primary treatment. | | CO1 | U | 1 |
| 4. | Give examples for gate valves. | | CO6 | U | 1 |
| 5. | Describe deep manhole. | | CO4 | R | 1 |
| 6. | Define PVC fitting. | | CO6 | R | 1 |
| 7. | Define lakes. | | CO1 | R | 1 |
| 8. | State forward osmosis. | | CO3 | R | 1 |
| 9. | Give examples of any two types of drains. | | CO4 | U | 1 |
| 10. | Define sewage. | | CO2 | R | 1 |
| **PART – B (6 X 3 = 18 MARKS)**  **(Answer all the questions)** | | | | | |
| 11. | List the factors that influence total water consumption. | | CO3 | R | 3 |
| 12. | Identify the key steps involved in the process of primary treatment. | | CO1 | U | 3 |
| 13. | Differentiate between a shallow manhole and a standard manhole. | | CO4 | U | 3 |
| 14. | Identify the common causes of leakages in mains. | | CO2 | U | 3 |
| 15. | Infer the treatment process of wastewater in three levels. | | CO1 | U | 3 |
| 16. | Enumerate the various types of joints used in plumbing. | | CO2 | R | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q.No. 17 to 23, Q.No. 24 is Compulsory)** | | | | | |
| 17. | a. | Classify the types of water sources. | CO1 | U | 6 |
|  | b. | Differentiate between water-washed and water-based diseases, and provide examples of each. | CO1 | U | 6 |
|  |  |  |  |  |  |
| 18. | a. | Explain the process of sludge treatment. | CO2 | U | 6 |
|  | b. | Interpret physical unit operations and outline the advantages of this approach. | CO2 | U | 6 |
|  |  |  |  |  |  |
| 19. | a. | Write the design specifications for the construction manhole. | CO4 | A | 8 |
|  | b. | Identify the commonly used pipe joints in pipelines. | CO4 | U | 4 |
|  |  |  |  |  |  |
| 20. | a. | Explain the construction of a manhole and highlight the purpose of constructing a manhole. | CO4 | A | 8 |
|  | b. | Illustrate a cross-section view of combined and separate sewers, detailing their internal structure and components. | CO2 | A | 4 |
|  |  |  |  |  |  |
| 21. | a. | Classify the various types of traps commonly used in plumbing. | CO6 | U | 6 |
|  | b. | Summarize the safety measures and precautions to be observed during plumbing tasks. | CO6 | U | 6 |
|  |  |  |  |  |  |
| 22. | a. | List the various types of water recycling methods in detail. | CO3 | R | 6 |
|  | b. | Interpret the methods used for sludge disposal in sludge management treatment. | CO2 | U | 6 |
|  |  |  |  |  |  |
| 23. | a. | Describe the use of radioactive isotopes in leakage detection methods. | CO2 | U | 6 |
|  | b. | Write about the biological properties of water. | CO1 | A | 6 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | List the different types of sludge in wastewater treatment. | CO2 | R | 6 |
|  | b. | Explain the methods used in the role of sludge disposal for effective sludge management. | CO3 | U | 6 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Select appropriate treatment to raw water |
| CO2 | Design the pipe-network for water supply and sewage disposal effectively. |
| CO3 | Calculate and Estimate the quantity and quality of water used for domestic as well as construction. |
| CO4 | Design the water distribution and sewer networks. |
| CO5 | Make use of available standards. |
| CO6 | Prepare the plan and implement house plumbing work effectively. |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 2 | 19 | 6 | - | - | - | 27 |
| CO2 | 10 | 27 | 4 | - | - | - | 41 |
| CO3 | 11 | 6 | - | - | - | - | 17 |
| CO4 | 1 | 8 | 16 | - | - | - | 25 |
| CO5 | - | - | - | - | - | - | 0 |
| CO6 | 1 | 13 | - | - | - | - | 14 |
|  | | | | | | | **124** |



**END SEMESTER EXAMINATION – APRIL / MAY 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **20CE2006** | **Duration** | **3hrs** |
| **Course Name** | **SOLID WASTE MANAGEMENT** | **Max. Marks** | **100** |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | | |
| 1. | Define solid waste. | | | CO1 | R | 1 |
| 2. | Describe bathtub effects. | | | CO4 | R | 1 |
| 3. | State the impacts of landfill on the environment. | | | CO4 | U | 1 |
| 4. | List the various uses of biogas. | | | CO4 | R | 1 |
| 5. | Explain risk grading. | | | CO2 | U | 1 |
| 6. | Summarize “Brown” waste. | | | CO1 | U | 1 |
| 7. | Explain ramp method. | | | CO4 | U | 1 |
| 8. | Identify methods of disposal. | | | CO4 | R | 1 |
| 9. | Interpret waste segregation. | | | CO1 | U | 1 |
| 10. | Infer the difference between mechanical composting and banglore composting methods. | | | CO4 | R | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | | |
| 11. | Explain the importance of transfer operations in waste management. | | | CO3 | U | 3 |
| 12. | Classify of waste based on various sources. | | | CO1 | U | 3 |
| 13. | Illustrate banglore methods for composting. | | | CO3 | A | 3 |
| 14. | Infer the steps of risk assessment. | | | CO2 | U | 3 |
| 15. | Describe the advantages and limitations of a biogas plant. | | | CO4 | R | 3 |
| 16. | Illustrate the essential components of landfill. | | | CO4 | A | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | | |
| 17. | |  | Explain the concepts of Hauled Container System (HCS) and Stationary Container System (SCS) using neat diagrams. | CO3 | U | 12 |
|  | |  |  |  |  |  |
| 18. | | a. | Illustrate the types of transfer stations. | CO3 | U | 6 |
|  | | b. | Analyze the color coding system for segregating biomedical waste. | CO6 | An | 6 |
|  | |  |  |  |  |  |
| 19. | |  | Define factors that cause variations in the quantity and composition of solid waste. | CO2 | R | 12 |
|  | |  |  |  |  |  |
| 20. | |  | Describe the treatment and disposal methods of biomedical waste. | CO1 | R | 12 |
|  | |  |  |  |  |  |
| 21. | |  | Illustrate the types and classification of landfills. | CO4 | U | 12 |
|  | |  |  |  |  |  |
| 22. | |  | Describe the provisions of the Solid Waste Management Rule 2016. | CO5 | R | 12 |
|  | |  |  |  |  |  |
| 23. | |  | Discuss the advantages and disadvantages of incineration, emphasizing key factors for consideration. | CO3 | U | 12 |
| **COMPULSORY QUESTION** | | | | | | |
| 24. | |  | Describe the various types of biogas plants.   * Fixed dome biogas plant * Floating dome biogas plant | CO4 | R | 12 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| **CO1** | Analyse the nature and characteristics of municipal solid wastes |
| **CO2** | Sort out the functional elements for solid waste management |
| **CO3** | Apply the techniques and methods used in transformation, conservation and recovery of materials from solid waste |
| **CO4** | Identify and design waste containment systems |
| **CO5** | Gain knowledge in regulatory requirements regarding municipal solid waste management |
| **CO6** | Apply the basic scientific principles for solving practical waste management challenges |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | 13 | 5 | - | - | - | - | 18 |
| **CO2** | 12 | 4 | - | - | - | - | 16 |
| **CO3** | - | 33 | 3 | - | - | - | 36 |
| **CO4** | 19 | 14 | 3 | - | - | - | 36 |
| **CO5** | 12 | - | - | - | - | - | 12 |
| **CO6** | - | - | - | 6 | - | - | 6 |
|  | | | | | | | **124** |



**END SEMESTER EXAMINATION – APRIL / MAY 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **20CE2007** | **Duration** | **3hrs** |
| **Course Name** | **TRANSPORTATION ENGINEERING** | **Max. Marks** | **100** |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | | **BL** | | **M** | |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | | | | |
| 1. | State any contributions made by Jayakar committee for the road development in India. | | CO1 | | U | | 1 | |
| 2. | Infer the importance of BOT project. | | CO1 | | R | | 1 | |
| 3. | What are meant by 85th, 50th and 15th percentile speeds in traffic study? | | CO2 | | R | | 1 | |
| 4. | Summarize the methods of conducting origin destination survey. | | CO2 | | R | | 1 | |
| 5. | Identify the factors considered in design of pavements. | | CO3 | | U | | 1 | |
| 6. | How change in temperature produce frictional stresses in rigid pavements? | | CO3 | | R | | 1 | |
| 7. | Indicate the factor governing super elevation of a road surface. | | CO4 | | U | | 1 | |
| 8. | Recall about cant gradient. | | CO4 | | R | | 1 | |
| 9. | List the purpose of signaling. | | CO5 | | U | | 1 | |
| 10. | State adzing of sleepers in railways. | | CO6 | | U | | 1 | |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | | | | |
| 11. | Infer the requirements of an Ideal Permanent Way. | | CO1 | | An | | 3 | |
| 12. | Identify the psychological human factors governing road user behavior? | | CO2 | | U | | 3 | |
| 13. | Differentiate Flexible pavement and rigid pavement. | | CO3 | | An | | 3 | |
| 14. | Comment about extra widening on horizontal curves. | | CO4 | | U | | 3 | |
| 15. | Interpret the necessity of coning of wheels in Railway. | | CO5 | | An | | 3 | |
| 16. | Comment about the types of Signaling in railway stations. | | CO6 | | U | | 3 | |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | | | | |
| 17. | a. | Classify highways based on Nagpur road plan. | | CO1 | | U | | 6 | |
|  | b. | Explain about the engineering surveys conducted for highway alignment. | | CO1 | | U | | 6 | |
|  |  |  | |  | |  | |  | |
| 18. | a. | Sketch the Permanent way in Railway and label the components with its applications. | | CO2 | | A | | 6 | |
|  | b. | Differentiate BOT and BOOT based on its operations. | | CO2 | | An | | 6 | |
|  |  |  | |  | |  | |  | |
| 19. | a. | Sketch the components of flexible pavements with its functions. | | CO3 | | A | | 6 | |
|  | b. | Indicate the factors affecting design and performance of Rigid pavements. | | CO3 | | An | | 6 | |
|  |  |  | |  | |  | |  | |
| 20. | a. | Classify sight distance and explain the factors affecting sight distance. | | CO4 | | U | | 6 | |
|  | b. | Explain about the elements of intersections. | | CO4 | | U | | 6 | |
|  |  |  | |  | |  | |  | |
| 21. | a. | Enumerate the various types of gradient with all the details. | | CO5 | | A | | 6 | |
|  | b. | Comment about Points and crossing with neat sketches. | | CO5 | | An | | 6 | |
|  |  |  | |  | |  | |  | |
| 22. | a. | Infer the necessity of transition curve in highways. | | CO4 | | U | | 6 | |
|  | b. | Explain about the Geometric design of railway. | | CO4 | | U | | 6 | |
|  |  |  | |  | |  | |  | |
| 23. | a. | Interpret the various methods of carrying out speed and delay study. | | CO1 | | An | | 8 | |
|  | b. | Comment about Public Private Partnership. | | CO1 | | An | | 4 | |
| **COMPULSORY QUESTION** | | | | | | | | |
| 24. | a. | Explain about the Construction and maintenance of railway tracks. | | CO6 | | U | | 8 | |
|  | b. | Write about Stabilization of track on poor soil. | | CO6 | | U | | 4 | |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| **CO1** | Understand the concepts of development of highway and railway engineering |
| **CO2** | Explain the components of highway and railway engineering |
| **CO3** | Carryout the engineering surveys involved in planning of highway and railway engineering |
| **CO4** | Design the geometric elements of highway and railway engineering |
| **CO5** | Recognize the functions of structural elements of highway and railway engineering |
| **CO6** | Identify the materials used for the construction of highway and railway engineering |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | 1 | 13 |  | 22 |  |  | 36 |
| **CO2** | 2 | 3 | 6 | 6 |  |  | 17 |
| **CO3** | 1 | 1 | 6 | 9 |  |  | 17 |
| **CO4** | 1 | 24 |  |  |  |  | 25 |
| **CO5** |  | 1 | 9 | 6 |  |  | 16 |
| **CO6** |  | 13 |  |  |  |  | 13 |
|  | | | | | | | **124** |

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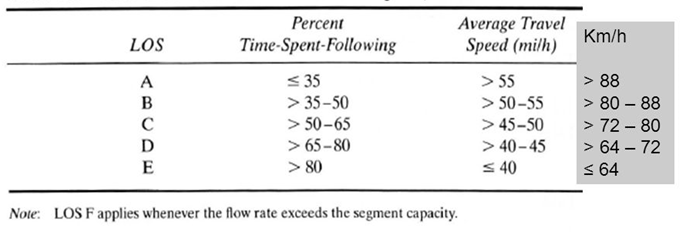
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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **20CE2008** | **Duration** | **3hrs** |
| **Course Name** | **TRAFFIC ENGINEERING AND MANAGEMENT** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)**  **(Answer all the questions)** | | | | | |
| 1. | State the objectives of traffic engineering. | | CO1 | R | 1 |
| 2. | List the fundamental paramenters of traffic stream. | | CO1 | R | 1 |
| 3. | Define the need of the traffic volume study. | | CO2 | R | 1 |
| 4. | State the use of spot speed study. | | CO2 | R | 1 |
| 5. | List the urban road classifications. | | CO3 | R | 1 |
| 6. | Define the capacity and level of service measurement. | | CO3 | R | 1 |
| 7. | Name the types in at-grade intersections. | | CO4 | R | 1 |
| 8. | State the term unchannelized intersection. | | CO4 | R | 1 |
| 9. | Define the need of Road safety audit. | | CO5 | R | 1 |
| 10. | State one difference between conventional traffic safety study and road safety audit. | | CO6 | R | 1 |
| **PART – B (6 X 3 = 18 MARKS)**  **(Answer all the questions)** | | | | | |
| 11. | List the measuring types in spot speed study. | | CO1 | U | 3 |
| 12. | Identify the endoscope concept and its advantages. | | CO2 | U | 3 |
| 13. | Distinguish relationship between speed, volume and density. | | CO3 | U | 3 |
| 14. | Interpret the advantages of channelized intersections. | | CO4 | U | 3 |
| 15. | Describe the first two key publications followed in road safety audit. | | CO5 | U | 3 |
| 16. | Describe any two traffic control devices. | | CO6 | U | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q.No. 17 to 23, Q.No. 24 is Compulsory)** | | | | | |
| 17. | a. | Illustrate the time mean speed and space mean speed with neat diagram. | CO1 | U | 6 |
|  | b. | Interpret the traffic characteristics using flowchart. | CO1 | U | 6 |
|  |  |  |  |  |  |
| 18. | a. | Discuss the methods in speed and delay study. | CO2 | U | 6 |
|  | b. | Classify the methods in origin and destination survey. | CO2 | U | 6 |
|  |  |  |  |  |  |
| 19. | a. | Summarize the passenger car unit (PCU) and mention the factors affecting it. | CO3 | An | 6 |
|  | b. | Determine the Level of service (LOS) of Two-lane Roads if Percent- Time-spent-following (PTSE) and Average travel speed (ATS) are as shown in Table, and also calculate the LOS the roadway segments for:   1. Class I and 2. Class II  |  |  |  | | --- | --- | --- | | Segment | PTSE (%) | ATS (km/hr.) | | 1 | 48 | 78 | | 2 | 35 | 87 | | 3 | 82 | 68 | | 4 | 76 | 58 | | 5 | 95 | 48 | | CO3 | An | 6 |
|  |  |  |  |  |  |
| 20. | a. | Illustrate the types in Level of Service with neat sketch (graph). | CO4 | U | 6 |
|  | b. | Classify the types of intersection in traffic engineering with neat sketch. | CO4 | U | 6 |
|  |  |  |  |  |  |
| 21. | a. | Write the road safety audit objectives and mention the working methods. | CO5 | U | 6 |
|  | b. | Explain the trends in pedestrian accident pattern and highlight the measures to reduce accidents. | CO5 | U | 6 |
|  |  |  |  |  |  |
| 22. | a. | Articulate the types of accidents in cyclists and the measures to reduce it. | CO5 | A | 6 |
|  | b. | Classify the different ways to reduce the environmental hazards and air pollution caused due to traffic. | CO5 | A | 6 |
|  |  |  |  |  |  |
| 23. | a. | Explain the various traffic demand management techniques. | CO6 | A | 6 |
|  | b. | Summarize the various traffic segregation techniques. | CO6 | A | 6 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Summarize the travel demand management need and its methodology. | CO6 | E | 6 |
|  | b. | Recommend area traffic management system using intelligent transport system. | CO6 | E | 6 |

**Table 1: Level of service**



**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Understand the fundamentals of traffic engineering |
| CO2 | Carry out different traffic studies |
| CO3 | Design channels, intersections, signals, roundabouts and parking arrangements |
| CO4 | Express the application of traffic flow theory |
| CO5 | Enhance safety and environment in all design aspects |
| CO6 | Develop Traffic management Systems |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 2 | 15 |  |  |  |  | 17 |
| CO2 | 2 | 15 |  |  |  |  | 17 |
| CO3 | 2 | 3 |  | 12 |  |  | 17 |
| CO4 | 2 | 15 |  |  |  |  | 17 |
| CO5 | 1 | 15 | 12 |  |  |  | 28 |
| CO6 | 1 | 3 | 12 |  | 12 |  | 28 |
|  | | | | | | | **124** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **20CE2009** | **Duration** | **3hrs** |
| **Course Name** | **SMART CITY PLANNING AND MANAGEMENT** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **Marks** |
| **PART – A (10 X 1 = 10 MARKS)**  **(Answer all the questions)** | | | | | |
| 1. | State the year the 'Smart Nation' initiative was officially launched, as part of Singapore's smart city development. | | CO1 | R | 1 |
| 2. | Define the role of sustainability and resilience in the context of smart city development. | | CO2 | R | 1 |
| 3. | Identify the major developments in transportation and urban planning during the freeway era (1950s - 2010s). | | CO3 | U | 1 |
| 4. | Describe Transit-Oriented Development (TOD) in urban planning. | | CO3 | R | 1 |
| 5. | Explain Lighting controls. | | CO4 | U | 1 |
| 6. | Define smart HVAC systems. | | CO4 | R | 1 |
| 7. | State any two challenges in smart water management. | | CO5 | R | 1 |
| 8. | Name Vienna's approach to addressing challenges associated with population growth. | | CO6 | R | 1 |
| 9. | List any two essential components of a building security system. | | CO4 | R | 1 |
| 10. | Define Smart energy. | | CO4 | R | 1 |
| **PART – B (6 X 3 = 18 MARKS)**  **(Answer all the questions)** | | | | | |
| 11. | Interpret the general policies for any smart city. | | CO1 | U | 3 |
| 12. | Identify the challenges faced by conventional urban mobility. | | CO3 | U | 3 |
| 13. | Illustrate components of smart gird. | | CO4 | U | 3 |
| 14. | Distinguish fire safety and early warning. | | CO4 | U | 3 |
| 15. | Illustrate key features of SWM. | | CO5 | U | 3 |
| 16. | List the objectives behind the smart city Amritsar. | | CO6 | R | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q.No. 17 to 23, Q.No. 24 is Compulsory)** | | | | | |
| 17. | a. | Explain the evolution of smart cities. | CO1 | U | 6 |
|  | b. | Infer the role of IoT (Internet of Things) in the development of smart cities. | CO2 | U | 6 |
|  |  |  |  |  |  |
| 18. | a. | List the advantages of smart urban mobility. | CO3 | R | 6 |
|  | b. | Interpret the key initiatives for smart urban mobility. | CO3 | A | 6 |
|  |  |  |  |  |  |
| 19. | a. | Describe the components of smart energy. | CO4 | U | 6 |
|  | b. | Explain the key initiatives for smart energy management in Rajkot, India, and New York City, USA | CO4 | A | 6 |
|  |  |  |  |  |  |
| 20. | a. | Write about lighting controls and mention the factors for automated control. | CO4 | A | 6 |
|  | b. | Distinguish between controlled access and an access control system in the context of surveillance and security. | CO4 | U | 6 |
|  |  |  |  |  |  |
| 21. | a. | Determine the steps involved in implementing smart water management through data analysis. | CO5 | A | 6 |
|  | b. | Explain the categories and options for domestic demand monitoring and inland water monitoring. | CO5 | A | 6 |
|  |  |  |  |  |  |
| 22. | a. | Summarize the smart city proposal that addresses the needs of Amritsar. | CO6 | U | 6 |
|  | b. | Identify the projects that have transformed urban life in Amritsar. | CO6 | U | 6 |
|  |  |  |  |  |  |
| 23. | a. | State the evolution of urban form and transportation over time. | CO3 | R | 6 |
|  | b. | Explain the Five-Step TOD Framework. | CO3 | U | 6 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Interpret the key insights acquired from Singapore’s case study in its transition to a smart city. | CO6 | A | 6 |
|  | b. | Explain the AMRUT Mission as a case study. | CO6 | U | 6 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Identify the concepts of smart city |
| CO2 | Understand the components of Smart City |
| CO3 | Apply the concepts of urban mobility |
| CO4 | Apply the smart energy and smart building concepts |
| CO5 | Apply the smart water management concepts. |
| CO6 | Analyse the smart cities across the countries |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / P** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 1 | 9 |  |  |  |  | 10 |
| CO2 | 1 | 6 |  |  |  |  | 7 |
| CO3 | 13 | 16 |  |  |  |  | 29 |
| CO4 | 3 | 19 | 12 |  |  |  | 34 |
| CO5 | 1 | 3 | 12 |  |  |  | 16 |
| CO6 | 4 | 18 | 6 |  |  |  | 28 |
|  | | | | | | | **124** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **20CE2010** | **Duration** | **3hrs** |
| **Course Name** | **ENGINEERING SUSTAINABILITY: ANALYSIS AND DESIGN** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)**  **(Answer all the questions)** | | | | | |
| 1. | Define the term sustainability. | | CO1 | R | 1 |
| 2. | Describe bridging type of social capital. | | CO1 | R | 1 |
| 3. | Enumerate the term sustainability quotient. | | CO2 | R | 1 |
| 4. | State the importance of social capital. | | CO2 | R | 1 |
| 5. | Define the term rate of return. | | CO3 | R | 1 |
| 6. | Recall the term Environmental Product Declaration (EPD). | | CO3 | R | 1 |
| 7. | List the ecological footprint uses. | | CO4 | R | 1 |
| 8. | Name the classes of environmental sustainability. | | CO4 | R | 1 |
| 9. | Describe low impact development. | | CO5 | R | 1 |
| 10. | Identify some alternative cement replacement materials. | | CO6 | R | 1 |
| **PART – B (6 X 3 = 18 MARKS)**  **(Answer all the questions)** | | | | | |
| 11. | Review the various types of social capital. | | CO1 | U | 3 |
| 12. | Identify the types of environmental labels used. | | CO2 | U | 3 |
| 13. | Infer the steps followed in life cycle assessment. | | CO3 | U | 3 |
| 14. | Observe the categories list of Life cycle assessment (LCIA). | | CO4 | U | 3 |
| 15. | Review the uses of Geothermal energy foundations, | | CO5 | U | 3 |
| 16. | Intrepret the objectives of DFAD. | | CO6 | U | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q.No. 17 to 23, Q.No. 24 is Compulsory)** | | | | | |
| 17. | a. | Discuss the traditional and sustainable economics. | CO1 | U | 6 |
|  | b. | Summarize the steps of life cycle cost analysis. | CO1 | U | 6 |
|  |  |  |  |  |  |
| 18. | a. | Interpret the life cycle analysis and its importance. | CO2 | U | 6 |
|  | b. | Illustrate a case study on sustainability analysis and management. | CO2 | U | 6 |
|  |  |  |  |  |  |
| 19. | a. | Explain how life cycle impact assessment is used in civil engineering. | CO3 | U | 6 |
|  | b. | Define the Product category rule PCR and how it helps in implementing Environmental Product Declaration (EPD). | CO3 | U | 6 |
|  |  |  |  |  |  |
| 20. | a. | Explain the impacts of social media in civil engineering | CO4 | A | 6 |
|  | b. | Define the Human Development Index (HDI) and its merits, demerits. | CO4 | A | 6 |
|  |  |  |  |  |  |
| 21. | a. | Summarize some alternate fill materials and its impact on sustainability. | CO5 | U | 6 |
|  | b. | Explain costal resilience and factors affecting it. | CO5 | U | 6 |
|  |  |  |  |  |  |
| 22. | a. | Write a case study on methods used to improve outdoor air quality. | CO5 | A | 6 |
|  | b. | Articulate the sustainable earth wall and its advantages. | CO5 | A | 6 |
|  |  |  |  |  |  |
| 23. | a. | Examine the various methods adopted to improve worker safety. | CO6 | A | 6 |
|  | b. | Predict the parameters that are used for the crash modification. | CO6 | A | 6 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Summarize the concept of Intelligent transportation systems and how they help maintain sustainability. | CO6 | E | 6 |
|  | b. | Assess the various types of waste material used in construction. | CO6 | E | 6 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Identify the concepts of sustainability |
| CO2 | Understand the Concepts of Economic Sustainability |
| CO3 | Analyse the Concepts of Environmental Sustainability |
| CO4 | Analyse the Social aspects of sustainability |
| CO5 | Apply the concepts of sustainability to environmental and geotechnical engineering |
| CO6 | Apply the concepts of sustainability to construction and transportation engineering |

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| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 2 | 15 |  |  |  |  | 17 |
| CO2 | 2 | 15 |  |  |  |  | 17 |
| CO3 | 2 | 15 |  |  |  |  | 17 |
| CO4 | 2 | 3 | 12 |  |  |  | 17 |
| CO5 | 1 | 15 | 12 |  |  |  | 28 |
| CO6 | 1 | 3 | 12 |  | 12 |  | 28 |
|  | | | | | | | **124** |



**END SEMESTER EXAMINATION – APRIL / MAY 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **20CE2011** | **Duration** | **3hrs** |
| **Course Name** | **ANALYSIS OF STRUCTURES** | **Max. Marks** | **100** |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Q. No.** | | **Questions** | | **CO** | | **BL** | | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | | | | |
| 1. | | Define virtual work. | | CO1 | | R | | 1 |
| 2. | | List out different energy methods. | | CO1 | | R | | 1 |
| 3. | | Recall how many numbers of slope deflection equation for two span continuous beam. | | CO2 | | R | | 1 |
| 4. | | Explain the limitations of slope deflection method. | | CO2 | | U | | 1 |
| 5. | | Find FEM for the member BC (MFCB) of the portal frame shown in fig. | | CO3 | | A | | 1 |
| 6. | | Draw the ILD for reaction at the left and right support of a simply supported beam. | | CO3 | | A | | 1 |
| 7. | | List the reasons due to which sway may occur in portal frames. | | CO4 | | U | | 1 |
| 8. | | Explain the uses of influence line diagram. | | CO4 | | R | | 1 |
| 9. | | Define Arch. | | CO5 | | U | | 1 |
| 10. | | Write the shape of a cable structure. | | CO6 | | U | | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | | | | |
| 11. | | Compare resilience and proof resilience. | | CO1 | | U | | 3 |
| 12. | | Between slope deflection and moment distribution methods, which one would you prefer for analyzing a rigid frame with 10 joints, why? | | CO2 | | U | | 3 |
| 13. | | Find the fixed end moments for the beam shown in the given figure. | | CO3 | | A | | 3 |
| 14. | | Differentiate circular arch and parabolic arch. | | CO4 | | U | | 3 |
| 15. | | Explain the main functions of stiffening girders in suspension bridges. | | CO5 | | U | | 3 |
| 16. | | Develop the element stiffness matrix for a given beam shown in fig. EI is constant. | | CO5 | | A | | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | | | | |
| 17. | a. | | Determine the vertical displacement at the free end E in the frame shown in figure using virtual work method. Take EI = 20,000 kN-m2. | CO1 | A | | 12 | | |
|  |  | |  |  |  | |  | | |
| 18. | a. | | Analyse the structure loaded as shown in figure by slope deflection method also sketch the bending moment diagram. EI is constant throughout the beam | CO2 | An | | 12 | | |
|  |  | |  |  |  | |  | | |
| 19. | a. | | Analyse the portal frame loaded as shown in fig. by moment distribution method also sketch bending moment diagram. | CO3 | An | | 12 | | |
|  |  | |  |  |  | |  | | |
| 20. | a. | | Two point loads of 100 kN and 200 kN spaced 3 m apart cross a girder of span 12 m from left to right with the 100 kN load leading. Draw the ILD for shear force and bending moment and find the values of maximum shear force and bending moment at a section 4 m from the left hand support. | CO4 | A | | 12 | | |
|  |  | |  |  |  | |  | | |
| 21. | a. | | A three hinged parabolic arch, hinged at the crown and springing, has a horizontal span of 15m with a central rise of 3m. It carries a uniformly distributed load of 32kN/m over the left half of the span. Calculate the normal thrust, radial shear and bending moment at 5m from the left hand hinge. | CO5 | A | | 12 | | |
|  |  | |  |  |  | |  | | |
| 22. | a. | | A suspension cable is supported at two points 25m apart. The left support is 2.5 m above the right support. The cable is loaded with a uniformly distributed load of 10 kN/m throughout the span. The maximum dip in the cable from the left support is 4m. Find the maximum and minimum tensions in the cable. | CO5 | A | | 12 | | |
|  |  | |  |  |  | |  | | |
| 23. | a. | | Analyze the continuous beam shown in fig. and draw the bending moment diagram using Moment distribution method. Assume EI is constant. | CO3 | An | | 12 | | |
| **COMPULSORY QUESTION** | | | |
| 24. | a. | | Analyze the continuous beam shown in fig. and draw the bending moment diagram using Stiffness martix method. Assume EI is constant | CO6 | An | | 12 | | |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| **CO1** | Illustrate the concepts and principles. |
| **CO2** | Explain the behaviour of structural elements. |
| **CO3** | Analyze the structural members for various forces. |
| **CO4** | Analyze the response of the Structural elements. |
| **CO5** | Develop suitable response intricacies. |
| **CO6** | Adapt suitable analysis procedure. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | 2 | 3 | 12 |  |  |  | 17 |
| **CO2** | 1 | 4 |  | 12 |  |  | 17 |
| **CO3** |  |  | 5 | 24 |  |  | 29 |
| **CO4** | 1 | 4 | 12 |  |  |  | 17 |
| **CO5** |  | 4 | 24 |  |  |  | 28 |
| **CO6** |  | 1 | 3 | 12 |  |  | 16 |
|  | | | | | | | **124** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **20CE2012** | **Duration** | **3hrs** |
| **Course Name** | **MECHANICS AND DESIGN OF CONCRETE STRUCTURES** | **Max. Marks** | **100** |

IS 456, SP 16 codes are permitted, Assume the missing design data suitably

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)**  **(Answer all the questions)** | | | | | |
| 1. | Define the term “M50”. | | CO1 | R | 1 |
| 2. | Write the material safety factor of concrete. | | CO2 | U | 1 |
| 3. | Write the load factor used for dead and live load. | | CO1 | R | 1 |
| 4. | List the types of grade of steel available in the market. | | CO1 | R | 1 |
| 5. | Select the footing used in boundary line of building | | CO2 | U | 1 |
| 6. | Identify the appropriate cover used for column | | CO1 | U | 1 |
| 7. | Classify different types of beams based on support | | CO2 | U | 1 |
| 8. | Sketch the bending moment diagram of simply supported beam | | CO2 | A | 1 |
| 9. | Write the minimum reinforcement to be used for columns | | CO1 | A | 1 |
| 10. | Define the term neutral axis. | | CO3 | R | 1 |
| **PART – B (6 X 3 = 18 MARKS)**  **(Answer all the questions)** | | | | | |
| 11. | Explain the concepts of Limit state method with example. | | CO1 | U | 3 |
| 12. | Sketch the stress strain diagram of concrete and steel. | | CO3 | A | 3 |
| 13. | Sketch the mode of failure in beams under flexure and shear. | | CO2 | A | 3 |
| 14. | Define the term singly and doubly reinforced section. | | CO1 | R | 3 |
| 15. | Classify the types of shallow footing with sketches. | | CO6 | U | 3 |
| 16. | List the type of columns located in the RCC building with sketches. | | CO1 | R | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q.No. 17 to 23, Q.No. 24 is Compulsory)** | | | | | |
| 17. |  | Calculate the thickness and reinforcement details of the one way simply supported slab for the following data  Size of slab – 3.5x10m  Grade of concrete – M30  Grade of steel - Fe500  Live load - 4kN/m2  Floor finish – 1 kN/m2 | CO4 | A | 12 |
|  |  |  |  |  |  |
| 18. |  | Analyze and Design the two way slab for the following data.  Size of slab 4mx4m, M20 grade concrete and Fe 500 grade steel, live load – 4kN/m2  Edge condition: Interior panel – consider only negative moment at support. | CO4 | An | 12 |
|  |  |  |  |  |  |
| 19. |  | Design the RCC beam of size 230x500mm supported on column of 230mm thick. Span of the beam is 5.5m. The load from the slab to the beam is 12kN/m. M30 concrete and Fe 500 grade. Evaluate the depth and reinforcement details of section. | CO5 | E | 12 |
|  |  |  |  |  |  |
| 20. |  | Analyze and Design the column for the following data.  Axial load – 2600kN  Grade of concrete – M30  Grade of steel - Fe500  Size of column – 300x300mm | CO4 | An | 12 |
|  |  |  |  |  |  |
| 21. |  | Determine the reinforcement to be provided for the uniaxial bending column for the following data (On two side and four sides).  Axial load – 3500kN  Grade of concrete – M35  Grade of steel - Fe500  Size of column – 230x450mm  Bending in one direction – 120kNm | CO5 | A | 12 |
|  |  |  |  |  |  |
| 22. |  | Estimate the size required and the area of reinforcement for the Isolated footing with the following data.  Grade of concrete – M35  Grade of steel - Fe500  Size of column –300x450mm  Axial load – 3500kN  Safe bearing capacity of soil – 150kN/m2 | CO5 | E | 12 |
|  |  |  |  |  |  |
| 23. |  | Explain the reinforcement detailing of one way, two way slab and Isolated footing with neat sketches. | CO6 | U | 12 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Compare the difference between Working stress and Limit state method. | CO3 | U | 6 |
|  | b. | Sketch the stress block and strain diagram of beam and discuss the concepts. | CO3 | A | 6 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Identify the design philosophies of RCC elements |
| CO2 | Analyse the behaviour of structural elements |
| CO3 | Illustrate the stress resultants of LSM and WSM |
| CO4 | Recommend the design section of the structural elements |
| CO5 | Develop suitable detailing diagrams of RC elements |
| CO6 | Prepare the design basis report for RC buildings |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 9 | 4 | 1 | - | - | - | 14 |
| CO2 | - | 3 | 4 | - | - | - | 7 |
| CO3 | 1 | 6 | 9 | - | - | - | 16 |
| CO4 | - | - | 12 | 24 | - | - | 36 |
| CO5 | - | - | 12 | - | 24 | - | 36 |
| CO6 | - | 15 | - | - | - | - | 15 |
|  | | | | | | | **124** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **20CE2013** | **Duration** | **3hrs** |
| **Course Name** | **DESIGN OF STEEL STRUCTURES** | **Max. Marks** | **100** |

**IS 800-2007, IS 875 Part 1, 2 and 3, SP 6 & Steel Tables are permitted for the Exam**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **Marks** |
| **PART – A (10 X 1 = 10 MARKS)**  **(Answer all the questions)** | | | | | |
| 1. | Can you recommend a suitable Channel section available in Indian Market for steel structures? | | CO1 | E | 1 |
| 2. | How would you decide on the maximum pitch of bolts for a compression member in terms of thickness of the thinner plate in connection? | | CO4 | E | 1 |
| 3. | Can you recognize the influence of bolt holes in tension members? | | CO2 | A | 1 |
| 4. | How would you define the shear lag of an angle? | | CO1 | R | 1 |
| 5. | Classify the type of weld used for connecting two plates in the direction perpendicular to each other. | | CO1 | U | 1 |
| 6. | Can you name the buckling class of a hot rolled hollow section? | | CO3 | R | 1 |
| 7. | How would you determine the most unfavourable slenderness ratio of a column made with two sections? | | CO3 | E | 1 |
| 8. | How would you compare the allowable deflection in a simply supported beam subjected to udl for elastic cladding with the actual value? | | CO3 | U | 1 |
| 9. | How would you select the type of roof sheet being used in the present days in construction of steel trussed buildings? | | CO3 | A | 1 |
| 10. | Can you categorize the type of roof provided in Immanuel Auditorium of Karunya Institute of Technology and Sciences? | | CO1 | An | 1 |
| **PART – B (6 X 3 = 18 MARKS)**  **(Answer all the questions)** | | | | | |
| 11. | Can you conclude on the type of failure that can occur when the plate is strong and bolts are weak in tension members? | | CO1 | An | 3 |
| 12. | How would you interpret the factors controlling the design strength of tension members? | | CO3 | U | 3 |
| 13. | Estimate the buckling class of ISMB 400 about both the axes. | | CO4 | E | 3 |
| 14. | How would you compare a plate girder with a rolled steel beam? | | CO5 | A | 3 |
| 15. | How would you choose the clearance to be provided for an Industrial building with an overhead crane? | | CO5 | R | 3 |
| 16. | Sketch the different types of roof trusses according to the economical span. | | CO1 | R | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q.No. 17 to 23, Q.No. 24 is Compulsory)** | | | | | |
| 17. | a. | A lap joint is made with 10mm thick plates with 6 numbers of 12mm black bolts (G 4.6) as represented in Fig.1. How would you find its joint capacity by providing fully threaded bolts? | CO2 | An | 12 |
|  |  |  |  |  |  |
| 18. | a. | How would you calculate the maximum load on a steel flat 200 x 8mm having 3 bolts of M20 bolts in 22mm holes in two rows, connected to a gusset plate of 8mm thick shown in the Figure?  Strength of bolts need not be checked. For Steel fu= 410 MPa, fy= 250 MPa | CO2 | An | 12 |
|  |  |  |  |  |  |
| 19. | a. | Design a bridge compression member of 2 channels placed back to back. The length of two members is 8m. It carries a load of 1200kN. The width over the backs of channels is to be decided by the designer considering practical point of view. | CO3 | A | 12 |
|  |  |  |  |  |  |
| 20. | a. | Design a simply supported beam to carry an udl of 45kN/m. The effective span of the beam is 8m. The compression flange of the beam is prevented from lateral deflection | CO3 | A | 12 |
|  |  |  |  |  |  |
| 21. | a. | Determine the maximum concentrated working load P that can act at mid-span of the simply supported beam with an effective span of 6m. The girder provided is ISMB500 and it is laterally unsupported.  C:\Users\hp\Desktop\FINAL STEEL 19.05.14\FINAL IMAGES 1-8\Chapter 8\8.9-Model.png  **6m** | CO3 | A | 12 |
|  |  |  |  |  |  |
| 22. | a. | How would you categorize the types of Gantry Girders, their components and application? | CO1 | An | 12 |
|  |  |  |  |  |  |
| 23. | a. | Design a suitable purlin for the pratt truss shown in Fig | CO3 | An | 12 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Design a lacing system for a bridge compression member made of 2 Nos of ISMC 300 @ 35.8 kg/m channels placed toe to toe. The member carries a load of 800kN and the length of the member is 6.5m. The unfavourable slenderness ratio of the section as a whole is 55.05. The width over the backs of channels may be decided by the designer. | CO3 | An | 12 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Identify the behaviour of members |
| CO2 | Estimate the forces in members. |
| CO3 | Design the member for forces |
| CO4 | Choose suitable codal provisions |
| CO5 | Explain the design intricacies |
| CO6 | Formulate the design for steel structures |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / P** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 4 | 1 | 0 | 16 | 1 | 0 | 22 |
| CO2 | 0 | 0 | 1 | 36 | 0 | 0 | 37 |
| CO3 | 1 | 4 | 37 | 12 | 1 | 0 | 55 |
| CO4 | 0 | 0 | 0 | 0 | 4 | 0 | 4 |
| CO5 | 3 | 0 | 3 | 0 | 0 | 0 | 6 |
| CO6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|  | | | | | | | **124** |



**END SEMESTER EXAMINATION – APRIL / MAY 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **20CE2014** | **Duration** | **3hrs** |
| **Course Name** | **WATER RESOURCES SYSTEMS** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)**  **(Answer all the questions)** | | | | | |
| 1. | State Hydrologic cycle. | | CO1 | U | 1 |
| 2. | Paraphrase convective precipitation. | | CO1 | R | 1 |
| 3. | Mention the components of hydrograph. | | CO2 | R | 1 |
| 4. | Elucidate the importance of base flow separation. | | CO2 | An | 1 |
| 5. | Define flood routing. | | CO3 | R | 1 |
| 6. | Mention any two control structures used in irrigation systems. | | CO4 | R | 1 |
| 7. | List the purposes of aqueducts. | | CO4 | R | 1 |
| 8. | Elucidate consumptive irrigation requirement. | | CO5 | U | 1 |
| 9. | State the disadvantages of flooding method of irrigation. | | CO5 | U | 1 |
| 10. | Classify aquifers. | | CO6 | R | 1 |
| **PART – B (6 X 3 = 18 MARKS)**  **(Answer all the questions)** | | | | | |
| 11. | Appraise the factors affecting runoff. | | CO1 | U | 3 |
| 12. | Differentiate single ring and double ring infiltrometer with diagrams. | | CO3 | U | 3 |
| 13. | List the monsoons faced by Indian country and the corresponding regions benefitted by the monsoons. | | CO2 | U | 3 |
| 14. | Compare Canal falls and Canal regulators. | | CO4 | An | 3 |
| 15. | If wheat requires about 9.5cm of water every 28days, and the base period for wheat is140days, estimate delta for wheat. | | CO5 | Ap | 3 |
| 16. | State the assumptions of Dupuit-Theim’s theory for radial flow of groundwater. | | CO6 | R | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | |
| 17. | a. | Elaborate about different forms of precipitation with diagrams. | CO1 | U | 4 |
|  | b. | Enumerate the about the various devices available for automatic measurement of rain gauges. | CO1 | Ap | 8 |
|  |  |  |  |  |  |
| 18. | a. | Enumerate about the factors that affect the evapo-transpiration process. | CO2 | U | 4 |
|  | b. | Infiltration capacity data obtained in a flooding-type infiltration test is given below:   |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | Time since start (min) | 5 | 10 | 15 | 25 | 45 | 60 | 75 | 90 | 110 | 130 | | Cumulative infiltration depth (cm) | 1.75 | 3.0 | 3.95 | 5.5 | 7.25 | 8.3 | 9.3 | 10.2 | 11.28 | 12.36 |   For this data, determine the infiltration rate at 25 and 90 minutes and ultimate infiltration capacity. | CO2 | Ap | 8 |
|  |  |  |  |  |  |
| 19. | a. | Characterize the physiographic and climatic factors affecting the Hydrographs. | CO3 | U | 6 |
|  | b. | Elaborate the base flow separation techniques followed for hydrographs. | CO3 | Ap | 6 |
|  |  |  |  |  |  |
| 20. | a. | Explain various irrigation efficiencies. | CO4 | U | 6 |
|  | b. | Discuss the merits and demerits of any 3 irrigation methods. | CO5 | U | 6 |
|  |  |  |  |  |  |
| 21. | a. | Discuss the stages of reservoir planning and the criteria for selection of site for dam construction. | CO4 | U | 12 |
|  |  |  |  |  |  |
| 22. | a. | Enumerate the various methods applied for improving duty. | CO5 | U | 12 |
|  |  |  |  |  |  |
| 23. | a. | Elaborate about artificial recharging techniques and its effect on groundwater table level. | CO6 | U | 12 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Elucidate about the control structures used in an irrigation system and their purposes. | CO4 | An | 6 |
|  | b. | During the recuperation test of a 4.0 m open well a recuperation of the depression head from 2.5 m to 1.25 m was found to take place in 90 minutes. Determine the (i) specific capacity per unit well area, and (ii) yield of the well for a safe drawdown of 2.5 m (iii) What would be the yield from a well of 5.0 m diameter for a drawdown of 2.25 m. | CO6 | Ap | 6 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Recognise the concepts to manage water resources and apply for hydrological modelling |
| CO2 | Decide and plan basic water resources projects |
| CO3 | Analyse the flow in streams |
| CO4 | Appreciate the importance of reservoirs and hydraulic structures |
| CO5 | Identify the irrigation methods |
| CO6 | Plan structures for recharging groundwater |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | 1 | 8 | 8 |  |  |  | 17 |
| **CO2** | 1 | 7 | 8 | 1 |  |  | 17 |
| **CO3** | 1 | 9 | 6 |  |  |  | 16 |
| **CO4** | 2 | 18 |  | 9 |  |  | 29 |
| **CO5** |  | 20 | 3 |  |  |  | 23 |
| **CO6** | 4 | 12 | 6 |  |  |  | 22 |
|  | | | | | | | **124** |



**END SEMESTER EXAMINATION – APRIL / MAY 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **20CE2015** | **Duration** | **3hrs** |
| **Course Name** | **QUANTITY SURVEYING AND ESTIMATION** | **Max. Marks** | **100** |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | | |
| 1. | Explain basic principle of specification. | | CO1 | U | | 1 |
| 2. | Recall the steps involved in estimating 1 cubic meter of concrete. | | CO2 | R | | 1 |
| 3. | Recall the percentage of steel required for footing. | | CO1 | R | | 1 |
| 4. | Discuss the types of estimates. | | CO1 | U | | 1 |
| 5. | Explain abstract estimate. | | CO1 | U | | 1 |
| 6. | Define slab culvert. | | CO1 | R | | 1 |
| 7. | Discuss water bound macadam road. | | CO1 | U | | 1 |
| 8. | Recall rent fixation of a building. | | CO5 | R | | 1 |
| 9. | Explain sinking fund method. | | CO5 | U | | 1 |
| 10. | Define report on estimates. | | CO6 | R | | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | | |
| 11. | Recall the importance of building estimate. | | CO1 | R | | 3 |
| 12. | Find the cost involved for 1 cubic meter of concrete production, consider the cost of cement: fine aggregate: coarse aggregate = 10Rs; 2.56Rs; 2.7Rs. | | CO2 | U | | 3 |
| 13. | Recall the necessity of specification. | | CO1 | U | | 3 |
| 14. | Explain Bill of Quantities, and its objective and importance. | | CO3 | U | | 3 |
| 15. | Explain in detail the valuation of building. | | CO5 | U | | 3 |
| 16. | Recall the report on estimate for construction of a culvert. | | CO5 | R | | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | | |
| 17. | a. | Explain different types of estimate in detail with suitable examples. | CO1 | | U | 6 |
|  | b. | Recall general rules for measurement in accordance with IS 1200. | CO1 | | R | 6 |
|  |  |  |  | |  |  |
| 18. | a. | Recall the general items of works for building cost estimation. | CO1 | | R | 12 |
|  |  |  |  | |  |  |
| 19. | a. | Calculate the quantity of materials required for the construction of the building shown below. Consider the wall height as 3 m. Cost of cement: sand: brick = 8Rs; 2.66Rs; 15Rs.  Assume if any data is required.  C:\Users\Staff\Downloads\DocScanner 15-Mar-2024 5-37 pm.jpg | CO3 | | A | 12 |
|  |  |  |  | |  |  |
| 20. | a. | Describe a detailed estimate of the given residential duilding. Use M20 grade concrete, consider the size of D = 1.05 x 2.10; D1 = 0.9 x 2.10 m; D2 = 0.75 x 2.1 m; W = 2.43 x 1.37 m; W1 = 1.83 x 1.37 m; W2 = 1.83 x 0.91 m; W3 = 1.37 x 1.37 m; V = 0.91 x 0.6 m, external wall thickness as 230 mm, the wall height was found to be 3 m. Cost of cement: aggregate: brick: steel = 10Rs; 3Rs; 13Rs; 69Rs. Take the plaster thickness as 30 mm (internal 10 mm; external 20 mm). Assume if any data is required. Note: all dimensions are in meter.  C:\Users\Staff\Downloads\DocScanner 15-Mar-2024 1-45 pm_1.jpg | CO3 | | R | 12 |
|  |  |  |  | |  |  |
| 21. | a. | C:\Users\Staff\Downloads\DocScanner 15-Mar-2024 2-02 pm_1.jpg  Calculate the cost involved for the manufacturing of RCC slab as shown, for a room size of 3 m x 4 m. Consider the cost of cement; aggregate; steel = 7Rs; 2.6Rs; 70Rs, use M20 grade concrete, concrete cover = 20 mm. All dimensions are in meter. Assume if any data is required. | CO3 | | A | 12 |
|  |  |  |  | |  |  |
| 22. | a. | C:\Users\Staff\Downloads\DocScanner 15-Mar-2024 2-00 pm_1.jpg  Calculate the cost of reinforced concrete beam production as shown. Consider the cost of cement; aggregate; steel = 6Rs; 2Rs; 65Rs, use M20 grade concrete, concrete cover = 25 mm. All dimensions are in meter. Assume if any data is required. | CO3 | | A | 12 |
|  |  |  |  | |  |  |
| 23. | a. | Explain various methods of depreciation in detail with suitable examples. | CO5 | | U | 12 |
| **COMPULSORY QUESTION** | | | | | | |
| 24. | a. | Explain a detailed report on estimates for the construction of residential building | CO6 | | U | 12 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| **CO1** | List the detailed specification for different types of structures |
| **CO2** | Plan the rate analysis of civil engineering works |
| **CO3** | Determine the rates of various items of civil works |
| **CO4** | Justify estimated cost of civil construction projects |
| **CO5** | Evaluate the actual value of any property |
| **CO6** | Explain specifications and tendering process for contracts |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | 23 | 13 | - | - | - | - | 36 |
| **CO2** | 1 | 3 | - | - | - | - | 4 |
| **CO3** | 12 | 3 | 36 | - | - | - | 51 |
| **CO4** | - | - | - | - | - | - | - |
| **CO5** | 4 | 16 | - | - | - | - | 20 |
| **CO6** | 1 | 12 | - | - | - | - | 13 |
|  | | | | | | | **124** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **20CE2016** | **Duration** | **3hrs** |
| **Course Name** | **CONSTRUCTION TECHNOLOGY AND AUTOMATION** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **Marks** |
| **PART – A (10 X 1 = 10 MARKS)**  **(Answer all the questions)** | | | | | |
| 1. | Classify the structural loads acting on a building. | | CO1 | U | 1 |
| 2. | Name the types of brick bats. | | CO1 | R | 1 |
| 3. | Recall the different category of buildings based upon their usage. | | CO1 | R | 1 |
| 4. | Recognize the term that has depression on bed faces of a brick. | | CO2 | R | 1 |
| 5. | Identify the thermal insulator that is made up of animal hair. | | CO2 | U | 1 |
| 6. | Define the term damp proof course. | | CO2 | R | 1 |
| 7. | Name the chemicals used for anti-termite treatment. | | CO3 | R | 1 |
| 8. | Identify the type of crane that is used in the construction of oil rigs. | | CO4 | U | 1 |
| 9. | Enumerate the survey done by drones. | | CO5 | R | 1 |
| 10. | Quote at least four digital technology trends that impacts the current construction industry. | | CO6 | R | 1 |
| **PART – B (6 X 3 = 18 MARKS)**  **(Answer all the questions)** | | | | | |
| 11. | Recall the key factors to be considered for the selection of site. | | CO1 | R | 3 |
| 12. | Classify the key considerations of the green building concept. | | CO1 | U | 3 |
| 13. | Identify the use of drones in civil engineering field. | | CO5 | R | 3 |
| 14. | Explain the different types of equipment maintenance. | | CO3 | U | 3 |
| 15. | Identify the significance of material handling. | | CO5 | U | 3 |
| 16. | Explain the merits of 3D printing technology. | | CO6 | R | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q.No. 17 to 23, Q.No. 24 is Compulsory)** | | | | | |
| 17. | a. | Explain the principles of planning, utilizing relevant examples to demonstrate their practical application and significance in diverse contexts. | CO1 | R | 7 |
|  | b. | Describe the functional requirements of a building, focusing on spatial layout, accessibility, safety, and user needs to demonstrate their role in design and functionality. | CO1 | U | 5 |
|  |  |  |  |  |  |
| 18. | a. | Compare and contrast load-bearing structures and framed structures, highlighting their distinct characteristics and explaining the structural principles that differentiate them. | CO1 | U | 8 |
|  | b. | Classify different types of foundations based on their structural designs, load-bearing capacities, and suitability for specific soil conditions. | CO3 | U | 4 |
|  |  |  |  |  |  |
| 19. |  | Examine and categorize the applications of diverse fire protection systems within a building, considering factors such as building occupancy, fire risks, and safety regulations. | CO3 | R | 12 |
|  |  |  |  |  |  |
| 20. | a. | Explain the significance of damp-proof courses, illustrating how they prevent moisture infiltration and contribute to the structural integrity of buildings. | CO4 | A | 5 |
|  | b. | Describe the different types of operating costs associated with equipment in the initial stages of operation. | CO5 | U | 7 |
|  |  |  |  |  |  |
| 21. | a. | Classify the categories of compacting equipment used in construction sites, detailing their distinct features and suitable applications. | CO3 | U | 7 |
|  | b. | A person wants to build a mini theater at his residence. Focus on the qualities of the acoustical material that he would prefer. | CO2 | An | 5 |
|  |  |  |  |  |  |
| 22. | a. | Write the properties, applications, and environmental impact of different types of thermal insulating materials. | CO4 | A | 6 |
|  | b. | Explain the methods of applying damp proof course, evaluating their effectiveness in preventing moisture infiltration in buildings. | CO4 | U | 6 |
|  |  |  |  |  |  |
| 23. |  | Discover the creative strategies that the construction workers can employ to handle material transportation at a construction site, incorporating principles of safety and efficiency. | CO5 | A | 12 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Evaluate the case study on the world’s first 3D printed concrete bridge – ‘The Striatus bridge’. | CO6 | An | 9 |
|  | b. | Examine the ways of using LIDAR in civil engineering field. | CO6 | R | 3 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Adopt the construction practices adopted in the field |
| CO2 | Demonstrate basic knowledge about construction equipment |
| CO3 | Identify the equipment types for different construction projects |
| CO4 | Evaluate the material handling equipment and the equipment productivity |
| CO5 | Demonstrate construction project management skills. |
| CO6 | Adapt automation in construction site. |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 12 | 17 |  |  |  |  | 29 |
| CO2 | 2 | 1 |  | 5 |  |  | 8 |
| CO3 | 13 | 14 |  |  |  |  | 27 |
| CO4 |  | 7 | 11 |  |  |  | 18 |
| CO5 | 4 | 10 | 12 |  |  |  | 26 |
| CO6 | 7 |  |  | 9 |  |  | 16 |
|  | | | | | | | **124** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **20CE2017** | **Duration** | **3hrs** |
| **Course Name** | **DISASTER PREPAREDNESS AND PLANNING** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)**  **(Answer all the questions)** | | | | | |
| 1. | Define hazards. | | CO1 | R | 1 |
| 2. | List the type of disaster. | | CO1 | R | 1 |
| 3. | State vulnerability assessment. | | CO1 | R | 1 |
| 4. | Identify a suitable example of a man-made disaster. | | CO1 | R | 1 |
| 5. | Describe the concept of risk. | | CO2 | U | 1 |
| 6. | List the type of early warning systems. | | CO2 | R | 1 |
| 7. | Define NDRF (National Disaster Response Force). | | CO5 | R | 1 |
| 8. | Identify the general effects of a disaster. | | CO4 | R | 1 |
| 9. | Define climate change. | | CO2 | R | 1 |
| 10. | List any two nodal agencies of India for disaster preparedness. | | CO5 | R | 1 |
| **PART – B (6 X 3 = 18 MARKS)**  **(Answer all the questions)** | | | | | |
| 11. | Compare zone 1 and zone 2 for the classification of hazardous areas. | | CO6 | U | 3 |
| 12. | Explain the role of a hospital in a disaster. | | CO5 | U | 3 |
| 13. | Define the terms  I. Disaster  II. Vulnerability. | | CO1 | R | 3 |
| 14. | Differentiate preparedness and mitigation. | | CO1 | U | 3 |
| 15. | Explain the role of media in effective disaster management. | | CO4 | U | 3 |
| 16. | List the agencies for disaster management. | | CO6 | R | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q.No. 17 to 23, Q.No. 24 is Compulsory)** | | | | | |
| 17. |  | Report any current trends observed on man-made disaster as a case study. | CO2 | U | 12 |
|  |  |  |  |  |  |
| 18. |  | Classify types of disaster and health effects. | CO3 | U | 12 |
|  |  |  |  |  |  |
| 19. |  | Write about structural and non-structural measures for disaster preparedness. | CO1 | A | 12 |
|  |  |  |  |  |  |
| 20. |  | Articulate hazardous location classification using a suitable diagram. | CO3 | A | 12 |
|  |  |  |  |  |  |
| 21. |  | Illustrate an environmental management system. | CO3 | U | 12 |
|  |  |  |  |  |  |
| 22. |  | Interpret disaster management plans at various levels. | CO6 | U | 12 |
|  |  |  |  |  |  |
| 23. |  | Explain the role and function of National Disaster Management Authority (NDMA). | CO5 | U | 12 |
| **COMPULSORY QUESTION** | | | | | |
| 24. |  | Summarize key national level decision making bodies for disaster management. | CO6 | U | 12 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Recall the types of disasters and its causes. |
| CO2 | Understand disaster cycle and assess the risks. |
| CO3 | Apply disaster concepts to disaster management |
| CO4 | Analyze relationship between development and disasters. |
| CO5 | Decide the roles and responsibilities of organizations and institutions to society and its  Organizational structure. |
| CO6 | Design the disaster management and mitigation plan. |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 7 | 3 | 12 | - | - | - | 22 |
| CO2 | 2 | 13 |  | - | - | - | 15 |
| CO3 | - | 24 | 12 | - | - | - | 36 |
| CO4 | 1 | 3 | - | - | - | - | 4 |
| CO5 | 2 | 15 | - | - | - | - | 17 |
| CO6 | 3 | 27 | - | - | - | - | 30 |
|  | | | | | | | **124** |



**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **20CE2018** | **Duration** | **3hrs** |
| **Course Name** | **CONSTRUCTION ENGINEERING AND MANAGEMENT** | **Max. Marks** | **100** |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | | **BL** | | **M** | | |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | | | | | |
| 1. | What is cement grouting? | | CO1 | | U | | 1 | | |
| 2. | Describe the role of backfilling. | | CO1 | | R | | 1 | | |
| 3. | Explain pre-stressed concrete. | | CO3 | | U | | 1 | | |
| 4. | Explain flying shoring. | | CO3 | | U | | 1 | | |
| 5. | Recall 3D volumetric construction. | | CO3 | | R | | 1 | | |
| 6. | Recall the role of project management consultant. | | CO5 | | R | | 1 | | |
| 7. | State the importance of CPM method. | | CO5 | | U | | 1 | | |
| 8. | Explain time-cost trade-off. | | CO5 | | U | | 1 | | |
| 9. | Explain scheduling techniques. | | CO6 | | U | | 1 | | |
| 10. | Discuss labour productivity control. | | CO6 | | U | | 1 | | |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | | | | | |
| 11. | Discuss the foundation works employed in building construction. | | CO1 | | U | | 3 | | |
| 12. | Explain caisson foundation and its importance. | | CO2 | | U | | 3 | | |
| 13. | Explain the need for pre-stressing in concrete. | | CO3 | | U | | 3 | | |
| 14. | Explain types of shafts in tunnel construction. | | CO3 | | U | | 3 | | |
| 15. | Discuss the role of project management consultant. | | CO5 | | U | | 3 | | |
| 16. | Define material wastage analysis. | | CO6 | | R | | 3 | | |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | | | | | |
| 17. | a. | Discuss the sequence of work in construction of residential building. | | CO1 | | U | | 12 |
|  |  |  | |  | |  | |  |
| 18. | a. | Explain various types of methods used to prevent soil sliding during construction. | | CO2 | | U | | 6 |
|  | b. | Recall the types of excavations used in the construction sector. | | CO2 | | R | | 6 |
|  |  |  | |  | |  | |  |
| 19. | a. | Recall the process involved to safeguard the structure from termite attack. | | CO2 | | R | | 12 |
|  |  |  | |  | |  | |  |
| 20. | a. | Explain various types of constructions used for building structures with suitable sketches. | | CO3 | | U | | 12 |
|  |  |  | |  | |  | |  |
| 21. | a. | Explain modern methods of construction in detail with a suitable example. | | CO3 | | U | | 6 |
|  | b. | Recall the tunneling procedure employed in the construction of national highway. | | CO3 | | R | | 6 |
|  |  |  | |  | |  | |  |
| 22. | a. | Explain the principles of construction management in detail with suitable examples. | | CO4 | | U | | 6 |
|  | b. | Explain construction project planning in detail. | | CO4 | | U | | 6 |
|  |  |  | |  | |  | |  |
| 23. | a. | Explain project modeling technique and analysis of network. | | CO5 | | U | | 6 |
|  | b. | Recall the step by step procedure involved in resource allocation and levelling. | | CO5 | | R | | 6 |
| **COMPULSORY QUESTION** | | | | | | | |
| 24. | a. | Discuss the necessity of quality control in resources and project | | CO6 | | U | | 12 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
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|  | **COURSE OUTCOMES** |
| **CO1** | Recall the basics of building components |
| **CO2** | Understand the items / facets of construction engineering |
| **CO3** | Apply the construction engineering techniques for various components |
| **CO4** | Demonstrate construction project management skills and apply tools of project management |
| **CO5** | Explain the importance of project management |
| **CO6** | Propose an Engineering and Management Plan |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | 1 | 16 | - | - | - | - | 17 |
| **CO2** | 18 | 9 | - | - | - | - | 27 |
| **CO3** | 7 | 26 | - | - | - | - | 33 |
| **CO4** | - | 12 | - | - | - | - | 12 |
| **CO5** | 7 | 11 | - | - | - | - | 18 |
| **CO6** | 3 | 14 | - | - | - | - | 17 |
|  | | | | | | | **124** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **20CE2019** | **Duration** | **3hrs** |
| **Course Name** | **DESIGN OF PRECAST CONCRETE STRUCTURES** | **Max. Marks** | **100** |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)**  **(Answer all the questions) IS 15916 and IS 1343 codes are permitted** | | | | |
| 1. | Name the type of curing used for developing precast elements. | CO1 | R | 1 |
| 2. | Recall the type of concrete preferred for precast elements. | CO1 | R | 1 |
| 3. | Select the suitable minimum standard length for beam element. | CO2 | R | 1 |
| 4. | List the lifting devices used in precast element erection. | CO2 | R | 1 |
| 5. | Recall the minimum grade of concrete used in prestressed concrete. | CO1 | R | 1 |
| 6. | Recall the allowable limit of tensile stresses in prestressed concrete. | CO2 | R | 1 |
| 7. | Choose the suitable optimized shape for beam section in bridge girder. | CO1 | A | 1 |
| 8. | Choose the suitable grade of concrete for Post tension case. | CO2 | A | 1 |
| 9. | Recall the minimum bearing to be maintained for concrete. | CO1 | R | 1 |
| 10. | Estimate the area of steel required for member under direct tension 500kN. Grade of steel Fe 550. | CO3 | An | 1 |
| **PART – B (6 X 3 = 18 MARKS)**  **(Answer all the questions)** | | | | |
| 11. | Infer the term Self compacting concrete. | CO1 | U | 3 |
| 12. | Define prestressed concrete and its applications. | CO2 | U | 3 |
| 13. | List some of the losses that occur during prestressing stage. | CO2 | R | 3 |
| 14. | Define the term progressive collapse. | CO1 | R | 3 |
| 15. | Differentiate shear joint and moment resistant joint. | CO3 | U | 3 |
| 16. | Write the factors affecting the deflection of prestressed concrete beam. | CO2 | U | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | |
| 17. | Explain different stages of Precasting of concrete products with sketches. | CO2 | A | 12 |
|  |  |  |  |  |
| 18. | Explain the application, advantages, challenges and limitations in using precast concrete. Also discuss the types of loading and its pattern of a framed precast building with neat sketches. | CO4 | A | 12 |
| 19. | Classify and explain the categories of Precast Structural system with sketches. | CO2 | U | 12 |
|  |  |  |  |  |
| 20. | Discuss the types of structural joints in Precast elements and explain the requirements of it. | CO3 | U | 12 |
|  |  |  |  |  |
| 21. | Discuss the design considerations and requirements of Precast structure in detail as per IS code. | CO6 | U | 12 |
|  |  |  |  |  |
| 22. | Analyse the stresses in the prestressed concrete beam for the following data.  Size of beam – 230x500mm  Eccentricity – 75mm  Prestress in tendon – 1200MPa  8 no of 5mm dia strands are used  Live load – 20kN/m | CO4 | An | 12 |
|  |  |  |  |  |
| 23. | Calculate the deflection of prestressed concrete beam for the following data.  Size of beam 230x300mm  Grade of concrete M30  Live load 5kN/m  Span of beam 5m  8 no of 7mm dia strands are used  Prestress in tendon – 1300MPa  Eccentricity 50mm | CO4 | An | 12 |
| **COMPULSORY QUESTION** | | | | |
| 24. | Evaluate the moment of resistance of PSC precast beam section for the following data.  Area of prestressing steel 425mm2  Ultimate tensile strength of PSC bar 1500MPa  Effective depth 450mm  Size of section 230x500mm  Grade of Concrete M40 | CO5 | E | 12 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
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|  | **COURSE OUTCOMES** |
| CO1 | Identify the suitable prefabrication building system |
| CO2 | Explain the behavior of precast elements |
| CO3 | Classify different types of joints for prefabricated structures |
| CO4 | Analyse the building system and joints |
| CO5 | Design the components of precast building system |
| CO6 | Appraise the possibilities of progressive collapse |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 7 | 3 | 1 | - | - | - | 11 |
| CO2 | 6 | 18 | 13 | - | - | - | 37 |
| CO3 | - | 15 | - | 1 | - | - | 16 |
| CO4 | - | 12 | - | 24 | - | - | 36 |
| CO5 | - | - | - | - | 12 | - | 12 |
| CO6 | - | 12 | - | - | - | - | 12 |
|  | | | | | | | **124** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| **Course Code** | **20CE2020** | **Duration** | **3hrs** |
| **Course Name** | **ARTIFICIAL INTELLIGENCE IN PROJECT MANAGEMENT** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
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| **Q. No.** | **Questions** | | **CO** | **BL** | **Marks** |
| **PART – A (10 X 1 = 10 MARKS)**  **(Answer all the questions)** | | | | | |
| 1. | Define knowledge representation in the context of artificial intelligence. | | CO2 | R | 1 |
| 2. | State backward reasoning. | | CO3 | R | 1 |
| 3. | Describe labeled data. | | CO6 | U | 1 |
| 4. | State Bayes' theorem. | | CO3 | R | 1 |
| 5. | Identify the inspiration behind computational artificial neural networks (ANNs). | | CO3 | U | 1 |
| 6. | List the two factors minimized during optimal route planning. | | CO5 | R | 1 |
| 7. | Give examples of marking instruments. | | CO1 | U | 1 |
| 8. | Expand the term BIM. | | CO1 | R | 1 |
| 9. | Define historical data in AI. | | CO3 | R | 1 |
| 10. | Name the technology that can enhance project performance. | | CO1 | R | 1 |
| **PART – B (6 X 3 = 18 MARKS)**  **(Answer all the questions)** | | | | | |
| 11. | Describe in detail the term "Breadth-First Search." | | CO3 | U | 3 |
| 12. | Explain unsupervised learning. | | CO6 | R | 3 |
| 13. | Illustrate the optimization of design parameters with genetic algorithms. | | CO4 | U | 3 |
| 14. | List AI techniques for cost estimation. | | CO5 | R | 3 |
| 15. | Explain the key challenge in risk management. | | CO3 | U | 3 |
| 16. | Identify performance management using AI. | | CO1 | U | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q.No. 17 to 23, Q.No. 24 is Compulsory)** | | | | | |
| 17. | a. | Classify the main three types of AI. | CO3 | U | 6 |
|  | b. | Interpret the search algorithm and mention its types. | CO3 | U | 6 |
|  |  |  |  |  |  |
| 18. | a. | Explain in detail the various types of machine learning. | CO2 | U | 6 |
|  | b. | List the limitations and applications of Bayesian networks. | CO6 | R | 6 |
|  |  |  |  |  |  |
| 19. | a. | Explain K clustering and highlight the evaluation of cluster quality. | CO3 | U | 6 |
|  | b. | Summarize the challenges and limitations of Artificial Neural Networks (ANNs) and highlight its applications. | CO3 | U | 6 |
|  |  |  |  |  |  |
| 20. | a. | Determine structural optimization and its applications. | CO4 | A | 6 |
|  | b. | Interpret the role of AI in scheduling civil projects. | CO1 | U | 6 |
|  |  |  |  |  |  |
| 21. | a. | Write about optimizing project priorities with AI. | CO1 | A | 6 |
|  | b. | Explain sequencing in different phases of civil projects. | CO1 | U | 6 |
|  |  |  |  |  |  |
| 22. | a. | Classify marking techniques with AI. | CO4 | U | 6 |
|  | b. | Identify the role of AI in cost prediction. | CO4 | U | 6 |
|  |  |  |  |  |  |
| 23. | a. | Explain the types of risks associated with construction projects. | CO1 | U | 6 |
|  | b. | Summarize probability distributions and mention their types. | CO5 | U | 6 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Explain the techniques of AI for improving project management efficiency. | CO1 | A | 6 |
|  | b. | Write a case study on implementing AI in construction management. | CO5 | A | 6 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Identify the problems in Civil Engineering and solve using AI |
| CO2 | Formulate problems and make decisions |
| CO3 | Explain various search algorithms for problem solving |
| CO4 | Apply Artificial Intelligence in real time problems |
| CO5 | Participate in the design of systems that act intelligently and |
| CO6 | Assess the applicability, strengths and weaknesses of the basic |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 2 | 22 | 12 | - | - | - | 36 |
| CO2 | 1 | 6 | - | - | - | - | 7 |
| CO3 | 3 | 31 | - | - | - | - | 34 |
| CO4 | - | 21 | - | - | - | - | 21 |
| CO5 | 4 | 6 | 6 | - | - | - | 16 |
| CO6 | 9 | 1 | - | - | - | - | 10 |
|  | | | | | | | **124** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **20CE2031** | **Duration** | **3hrs** |
| **Course Name** | **CONCRETE TECHNOLOGY** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | Group the ingredients of cement. | | CO1 | U | 1 |
| 2. | Define binding material in concrete. | | CO1 | R | 1 |
| 3. | List the types of aggregate based on size. | | CO2 | R | 1 |
| 4. | Label the types of aggregate based on shape. | | CO2 | R | 1 |
| 5. | Group the properties of hardened concrete. | | CO3 | U | 1 |
| 6. | Recall the concept of workability. | | CO3 | R | 1 |
| 7. | Identify the stipulations required to design the mix proportion of concrete. | | CO4 | U | 1 |
| 8. | Quote the principle of mix proportioning. | | CO4 | R | 1 |
| 9. | Group the fibre materials used in FRC. | | CO5 | U | 1 |
| 10. | Extend SIFCON. | | CO6 | U | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | Illustrate the tests conducted on cement. | | CO1 | An | 3 |
| 12. | Classify the aggregates based on origin and density. | | CO2 | U | 3 |
| 13. | Categorize the tests conducted on fresh concrete. | | CO3 | An | 3 |
| 14. | Discuss about nominal mix. | | CO4 | U | 3 |
| 15. | Illustrate in detail about foam concrete | | CO5 | An | 3 |
| 16. | Explain in detail about RCPT test | | CO6 | U | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q.No 17 to 23, Q.No 24 is Compulsory)** | | | | | |
| 17. |  | Explain the manufacturing process of cement in both wet and dry method. | CO1 | U | 12 |
|  |  |  |  |  |  |
| 18. |  | Focus on the criteria of analyzing the sudden application of load, wear and tear and grading on aggregates and how it is tested. | CO2 | An | 12 |
|  |  |  |  |  |  |
| 19. |  | Compare test conducted on fresh concrete. | CO3 | An | 12 |
|  |  |  |  |  |  |
| 20. |  | Construct the mix design proportion for M30 grade for the following stipulations as per IS 456: 2000 and IS 10262 : 2009.   1. Type of cement = OPC 53 grade 2. Maximum nominal size of aggregate = 20mm 3. Slump = 75mm 4. Exposure condition = severe (RCC) 5. Method of concrete placing = pump 6. Degree of supervision = good   Type of aggregate = crushed angular aggregate. | CO4 | A | 12 |
|  |  |  |  |  |  |
| 21. |  | Illustrate in detail about the special concrete FRC, RMC and SCC. | CO5 | An | 12 |
|  |  |  |  |  |  |
| 22. |  | Explain detail about the physical and chemical properties of cement. | CO1 | U | 12 |
|  |  |  |  |  |  |
| 23. |  | Illustrate in detail about the special concrete GPC, bio-concrete and vacuum concrete. | CO5 | An | 12 |
| **COMPULSORY QUESTION** | | | | | |
| 24. |  | Classify and explain the types of tests used in NDT of structures. | CO6 | An | 12 |

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|  | **COURSE OUTCOMES** |
| CO1 | Categorize the construction materials, their components and manufacturing process |
| CO2 | Identify the quality control properties of concrete making materials |
| CO3 | Design the mix design of concrete based on various parameters |
| CO4 | Predict the properties of concrete in fresh and hardened concrete |
| CO5 | Adopt the different types of concrete in details |
| CO6 | Demonstrate non- destructive techniques on concrete structures |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| CO / BL | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 1 | 25 | - | 3 | - | - | 29 |
| CO2 | 2 | 3 | - | 12 | - | - | 17 |
| CO3 | 1 | 1 | - | 15 | - | - | 17 |
| CO4 | 1 | 4 | 12 | - | - | - | 17 |
| CO5 | - | 1 | - | 27 | - | - | 28 |
| CO6 | - | 4 | - | 12 | - | - | 16 |
|  | | | | | | | **124** |

IS 456 : 2000 and IS 10262 : 2009 are permitted

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **20CE2034** | **Duration** | **3hrs** |
| **Course Name** | **REPAIR AND REHABILITATION OF STRUCTURES** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | Classify the types of distress or failures in structures. | | CO1 | U | 1 |
| 2. | Examine the types of cracks visually. | | CO1 | R | 1 |
| 3. | Define quality assurance. | | CO2 | R | 1 |
| 4. | Reproduce the occurrence of corrosion in RCC structures. | | CO2 | R | 1 |
| 5. | Identify the equipment used in ultra-sonic pulse velocity test. | | CO3 | U | 1 |
| 6. | Quote the principle used in carbonation test. | | CO3 | R | 1 |
| 7. | Give examples for the types of shoring technique. | | CO4 | U | 1 |
| 8. | List the methods used in repair technique. | | CO4 | R | 1 |
| 9. | Generalize the criteria used in design philosophy of retrofitting method. | | CO5 | U | 1 |
| 10. | Cite the criteria used in demolition technique. | | CO6 | U | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | Differentiate the principle used in repair and rehabilitation. | | CO1 | An | 3 |
| 12. | Compare the types of failures in steel and concrete structures. | | CO2 | U | 3 |
| 13. | Categorize the types of tests used in NDT of structures. | | CO3 | An | 3 |
| 14. | Group and explain the principle involved in repair techniques. | | CO4 | U | 3 |
| 15. | Deduce why fire earthquake is caused. | | CO5 | An | 3 |
| 16. | Explain the sequence of operation in demolition technique. | | CO6 | U | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q.No 17 to 23, Q.No 24 is Compulsory)** | | | | | |
| 17. |  | Discuss the types of failures in masonry structures and explain in detail. | CO1 | U | 12 |
|  |  |  |  |  |  |
| 18. |  | You are visiting a low-rise steel tower for inspection. As a budding engineer observe and examine the failures in it. | CO2 | An | 12 |
|  |  |  |  |  |  |
| 19. |  | Classify and explain the types of tests used in SDT of structures. | CO3 | An | 12 |
|  |  |  |  |  |  |
| 20. |  | Predict the methods used for repairing and enhancing the properties of structural members and elaborate it in detail. | CO4 | A | 12 |
|  |  |  |  |  |  |
| 21. |  | As civil engineer you need to enhance the structural characteristics of beam and column. Sketch the appropriate retrofitting method used to enhance it. | CO5 | An | 12 |
|  |  |  |  |  |  |
| 22. |  | Discuss about maintenance and explain its need, feature and importance in detail. | CO1 | U | 12 |
|  |  |  |  |  |  |
| 23. |  | Explain in detail about carbonation and chloride penetration test. | CO2 | A | 12 |
| **COMPULSORY QUESTION** | | | | | |
| 24. |  | Focus on the demolition techniques and the operations and give an illustration with a case study. | CO6 | An | 12 |

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|  | **COURSE OUTCOMES** |
| CO1 | Understand distress and damages to concrete steel and masonry structures |
| CO2 | Inspect the structures for its maintenance |
| CO3 | Interpret damage of structures using various tests |
| CO4 | Apply of repair techniques to damage structures and various |
| CO5 | Evaluate the strength of structural elements |
| CO6 | Retrofit and strengthen RCC and Steel structures |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 1 | 25 | - | 3 | - | - | 29 |
| CO2 | 2 | 3 | 12 | 12 | - | - | 29 |
| CO3 | 1 | 1 | - | 15 | - | - | 17 |
| CO4 | 1 | 4 | 12 | - | - | - | 17 |
| CO5 | - | 1 | - | 15 | - | - | 16 |
| CO6 | - | 4 | - | 12 | - | - | 16 |
|  | | | | | | | **124** |



**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| **Course Code** | **20CE2036** | **Duration** | **3hrs** |
| **Course Name** | **MUNICIPAL WASTE MANAGEMENT** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | Explain two benefits of recycling. | | CO3 | U | 1 |
| 2. | Describe the composition of solid waste. | | CO1 | R | 1 |
| 3. | Identify two benefits of waste exchange. | | CO3 | R | 1 |
| 4. | Define composting. | | CO2 | R | 1 |
| 5. | List two examples of E-Waste. | | CO1 | R | 1 |
| 6. | State "Green" waste. | | CO1 | R | 1 |
| 7. | List two examples of biomedical waste. | | CO1 | R | 1 |
| 8. | Define waste segregation. | | CO3 | R | 1 |
| 9. | Identify one difference between processing and separation. | | CO3 | R | 1 |
| 10. | Define incineration technology. | | CO6 | R | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | Explain the types of composting according to their nature. | | CO6 | U | 3 |
| 12. | List three advantages of the biogas plant. | | CO2 | R | 3 |
| 13. | Explain the different types of transfer stations. | | CO1 | U | 3 |
| 14. | Describe the disadvantages of incineration. | | CO6 | R | 3 |
| 15. | Identify the diversion of waste based on the given scenario. | | CO2 | R | 3 |
| 16. | Explain the need for transfer operations. | | CO3 | U | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | |
| 17. |  | Articulate Swachh Bharat Mission for municipal solid waste by using any case study. | CO6 | A | 12 |
|  |  |  |  |  |  |
| 18. |  | Explain the key features of the Solid Waste Management Rule 2016 and articulate the need for solid waste management. | CO6 | U | 12 |
|  |  |  |  |  |  |
| 19. |  | Examine biomedical waste by comparing disposal methods and segregation practices, supported by relevant information. | CO5 | U | 12 |
|  |  |  |  |  |  |
| 20. |  | Explain the collection of solid waste and the types of collection systems using a neat and clean diagram. | CO1 | U | 12 |
|  |  |  |  |  |  |
| 21. |  | Illustrate solid waste disposal methods using neat and clean diagrams. | CO3 | U | 12 |
|  |  |  |  |  |  |
| 22. |  | Articulate labeling using a neat and clean diagram. | CO4 | A | 12 |
|  |  |  |  |  |  |
| 23. |  | Describe the types of biogas plants in detail, supported by a neat and clean diagram. | CO6 | R | 12 |
| **COMPULSORY QUESTION** | | | | | |
| 24. |  | Compare the advantages and disadvantages of incineration, emphasizing key factors for consideration. | CO6 | An | 12 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| **CO1** | Analyze the nature and characteristics of municipal solid wastes |
| **CO2** | Sort out the functional elements for solid waste management |
| **CO3** | Apply the techniques and methods used in transformation, conservation and recovery of materials from solid waste. |
| **CO4** | Identify and design waste containment systems. |
| **CO5** | Gain knowledge in regulatory requirements regarding municipal solid waste management |
| **CO6** | Apply the basic scientific principles for solving practical waste management challenges |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | 4 | 15 | - | - | - | - | 19 |
| **CO2** | 7 | - | - | - | - | - | 7 |
| **CO3** | 3 | 16 | - | - | - | - | 19 |
| **CO4** | - | - | 12 | - | - | - | 12 |
| **CO5** | - | 12 | - | - | - | - | 12 |
| **CO6** | 16 | 15 | 12 | 12 | - | - | 55 |
|  | | | | | | | **124** |



**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| **Course Code** | **20CE2037** | **Duration** | **3hrs** |
| **Course Name** | **NOISE POLLUTION AND ITS CONTROL** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | | |
| 1. | Describe the basic principles of noise pollution. | | CO1 | R | | 1 |
| 2. | State the difference between noise and sound pollution. | | CO1 | R | | 1 |
| 3. | List two challenges associated with outdoor sound propagation. | | CO1 | R | | 1 |
| 4. | Identify the primary sources of transportation noise. | | CO2 | R | | 1 |
| 5. | Explain the impact of noise pollution on human health. | | CO3 | R | | 1 |
| 6. | List some key noise mitigation approaches. | | CO4 | R | | 1 |
| 7. | Define noise pollution. | | CO4 | R | | 1 |
| 8. | Explain how strategic noise mapping helps in noise management. | | CO1 | U | | 1 |
| 9. | Enumerate industrial noise sources. | | CO4 | R | | 1 |
| 10. | List two current limitations and future research priorities in noise mitigation. | | CO4 | R | | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | | |
| 11. | Analyze the relationship between noise pollution and health issues. | | CO3 | An | | 3 |
| 12. | Explain the principles of noise pollution measurement. | | CO2 | U | | 3 |
| 13. | Recall the special case of low-frequency noise. | | CO2 | R | | 3 |
| 14. | List three sound-absorbent materials. | | CO5 | R | | 3 |
| 15. | Illustrate the decibel scale using a neat and clean diagram. | | CO2 | U | | 3 |
| 16. | Discuss the impact of transportation and industrial noise on public health. | | CO1 | U | | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | | |
| 17. |  | Describe the functionality of a Sound Level Meter, and provide a clear block diagram illustrating the components of a typical sound level meter. | CO1 | | R | 12 |
|  |  |  |  | |  |  |
| 18. |  | Illustrate noise pollution remedies with a neat diagram. | CO4 | | U | 12 |
|  |  |  |  | |  |  |
| 19. |  | Define the following:   * Auditory effects * Non-auditory effects | CO3 | | R | 12 |
|  |  |  |  | |  |  |
| 20. |  | Explain the functioning of a noise barrier and provide illustrations of several examples using clear diagrams. | CO5 | | U | 12 |
|  |  |  |  | |  |  |
| 21. |  | Explain the importance of public awareness on noise pollution and outline the strategies and significance of public education initiatives addressing this issue. | CO6 | | U | 12 |
|  |  |  |  | |  |  |
| 22. |  | Define any two of the following:   * Legislation and administrative functions. * Environmental Protection Act of 1986. * The Rajasthan Noise Control Act of 1963. | CO6 | | R | 12 |
|  |  |  |  | |  |  |
| 23. |  | Define  1. Noise assessment  2. Noise rating  3. Ldn  2. Noise management program | CO1 | | R | 12 |
| **COMPULSORY QUESTION** | | | | | | |
| 24. |  | Explain the Indian standards and guidelines for noise pollution. | CO6 | | U | 12 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| **CO1** | Identify the nature and characteristics of noise pollution |
| **CO2** | Analyze the noise pollution problems |
| **CO3** | Detect the various effects of noise pollution |
| **CO4** | Apply suitable preventive measures and identify the technologies and methods to control of noise |
| **CO5** | Choose suitable noise adsorbent materials |
| **CO6** | Gain knowledge about the various noise pollution regulations |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | 27 | 4 | - | - | - | - | 31 |
| **CO2** | 4 | 6 | - | - | - | - | 10 |
| **CO3** | 13 | - | - | 12 | - | - | 25 |
| **CO4** | 4 | 12 | - | - | - | - | 16 |
| **CO5** | 3 | 12 | - | - | - | - | 15 |
| **CO6** | 12 | 24 | - | - | - | - | 36 |
|  | | | | | | | **124** |



**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| **Course Code** | **20CE2038** | **Duration** | **3hrs** |
| **Course Name** | **ENVIRONMENTAL LAWS AND POLICY** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | | |
| 1. | Define ozone depletion. | | CO1 | | R | 1 |
| 2. | Infer transboundary movement. | | CO1 | | R | 1 |
| 3. | Define hazardous wastes (management and handling) rules. | | CO1 | | R | 1 |
| 4. | Identify the specific requirements outlined for the labeling of hazardous wastes. | | CO6 | | R | 1 |
| 5. | Explain noise pollution. | | CO6 | | U | 1 |
| 6. | List any two impact of air pollution. | | CO3 | | R | 1 |
| 7. | State the importance of the Environmental Protection Act. | | CO5 | | R | 1 |
| 8. | Define Air Act. | | CO1 | | R | 1 |
| 9. | Describe the importance of umbrella act. | | CO1 | | R | 1 |
| 10. | Infer International Law. | | CO1 | | U | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | | |
| 11. | Infer penalties imposed for offenses under the Air Act. | | CO4 | | U | 3 |
| 12. | Describe the concept of common but differentiated responsibility as per International Environmental Law. | | CO3 | | U | 3 |
| 13. | Illustrate the function of state board for Air Act. | | CO2 | | U | 3 |
| 14. | Enumerate the mitigation of major accidents under the hazardous wastes rules. | | CO4 | | R | 3 |
| 15. | Explain the benefits of environmental protection act 1986. | | CO6 | | U | 3 |
| 16. | List the salient features and provisions of water act. | | CO2 | | R | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | | |
| 17. |  | Explain the Indian standards and guidelines for noise pollution. | | CO6 | U | 12 |
|  |  |  | |  |  |  |
| 18. |  | Trace the historical development of International Environmental Law, highlighting key treaties and pivotal moments that have shaped its evolution. | | CO6 | R | 12 |
|  |  |  | |  |  |  |
| 19. |  | Evaluate the impact of the Environmental Protection Act of 1981 on industry location restrictions. | | CO3 | An | 12 |
|  |  |  | |  |  |  |
| 20. |  | Articulate the Hazardous Wastes (Management and Handling) Rules concerning accident reporting, appeals, storage, manufacturing, major accident mitigation, safety reports, and emergency plans, focusing on their effectiveness in ensuring environmental safety. | | CO5 | A | 12 |
|  |  |  | |  |  |  |
| 21. |  | Illustrate the objectives and drawbacks of the Environmental Protection Act of 1981. | | CO4 | A | 12 |
|  |  |  | |  |  |  |
| 22. |  | Describe chapters and sections of the Environmental Protection Act of 1981 detailing regulations pertaining to environmental conservation and management. | | CO5 | U | 12 |
|  |  |  | |  |  |  |
| 23. |  | Articulate the Kyoto Protocol's effectiveness and challenges in combating climate change. | | CO6 | A | 12 |
| **COMPULSORY QUESTION** | | | | | | |
| 24. |  | Discuss the Vienna Convention on the Law of Treaties (1969) and its influence on international treaty law. | | CO6 | U | 12 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

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|  | **COURSE OUTCOMES** |
| **CO1** | Recall different policies and rules framed for the environmental protection |
| **CO2** | Recognize the formation of boards at different levels |
| **CO3** | Discuss the functions of central pollution board and the state pollution boards. |
| **CO4** | Know about different duties of pollution control boards |
| **CO5** | Assess about the actions taken by government for the violation of rules |
| **CO6** | Enumerate about the prevention of advanced pollution |

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| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | 5 | 1 | - | - | - | - | 6 |
| **CO2** | 3 | 3 | - | - | - | - | 6 |
| **CO3** | 1 | 3 | - | 12 | - | - | 16 |
| **CO4** | 3 | 3 | 12 | - | - | - | 18 |
| **CO5** | 1 | 12 | 12 | - | - | - | 25 |
| **CO6** | 13 | 28 | 12 | - | - | - | 53 |
|  | | | | | | | **124** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **20CE2039** | **Duration** | **3hrs** |
| **Course Name** | **IRRIGATION ENGINEERING AND HYDRAULIC STRUCTURES** | **Max. Marks** | **100** |

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| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **Marks** |
| **PART – A (10 X 1 = 10 MARKS)**  **(Answer all the questions)** | | | | | |
| 1. | List some examples for rainfed crops. | | CO1 | R | 1 |
| 2. | Define intensity of irrigation. | | CO1 | R | 1 |
| 3. | Elaborate sodium absorption ratio. | | CO2 | R | 1 |
| 4. | Differentiate capillary water and hygroscopic water. | | CO2 | U | 1 |
| 5. | State the purpose of cross regulator in an irrigation system. | | CO4 | U | 1 |
| 6. | Define base period. | | CO3 | R | 1 |
| 7. | Enumerate participatory irrigation management. | | CO6 | U | 1 |
| 8. | Elaborate dead storage in reservoirs | | CO5 | R | 1 |
| 9. | List the various types of crossdrainage works. | | CO5 | R | 1 |
| 10. | Mention the components of onfarm development works. | | CO6 | R | 1 |
| **PART – B (6 X 3 = 18 MARKS)**  **(Answer all the questions)** | | | | | |
| 11. | Differentiate check flooding and border flooding methods. | | CO1 | U | 3 |
| 12. | State the advantages of sprinkler irrigation. | | CO2 | U | 3 |
| 13. | List the types of canals based on quantity of flow. | | CO3 | R | 3 |
| 14. | State the relationship between duty and delta. | | CO3 | U | 3 |
| 15. | Discuss Canal irrigation and its advantages. | | CO4 | U | 3 |
| 16. | State the pricing methods followed for drinking water in different states of India. | | CO6 | U | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q.No. 17 to 23, Q.No. 24 is Compulsory)** | | | | | |
| 17. | a. | Discuss the factors and methods to improve the duty. | CO1 | An | 6 |
|  | b. | Explain the necessity of optimal use of water for the purpose of irrigation. | CO1 | A | 6 |
|  |  |  |  |  |  |
| 18. | a. | Elaborate the various irrigation efficiencies. | CO2 | U | 6 |
|  | b. | Compare canal irrigation and lift irrigation stating the advantages and disadvantages. | CO2 | A | 6 |
|  |  |  |  |  |  |
| 19. |  | A stream of 0.14 m3/s was diverted from a canal and 0.11 m3/s were delivered to the field. An area of 1.65 hectares was irrigated in eight hours. The effective depth of root zone was 1.85 m. The runoff loss in the field was 435 m3. The depth of water penetration varied linearly from 1.85 at the head end of the field to 1.25 m at the tail end. Available moisture holding capacity of the soil is 25cm/m depth of soil. Determine the water conveyance efficiency, water application efficiency, water distribution efficiency and water storage efficiency, irrigation was started at a moisture extraction level of 50 percent of the available moisture. | CO3 | A | 12 |
|  |  |  |  |  |  |
| 20. |  | Elaborate in detail about drip irrigation system and also highlight the effective utilization of IoT and sensors in this system. | CO3 | U | 12 |
|  |  |  |  |  |  |
| 21. | a. | Explain the different types of culverts and their types. | CO4 | U | 6 |
|  | b. | Discuss canal falls highlighting its purposes and types. | CO4 | U | 6 |
|  |  |  |  |  |  |
| 22. | a. | Classify dams based on material and function with detailed diagrams. | CO5 | U | 6 |
|  | b. | Elaborate the forces that are considered for the design of a gravity dam. | CO5 | U | 6 |
|  |  |  |  |  |  |
| 23. |  | Describe the factors in selecting sites and suitable types of cross-drainage works. | CO5 | A | 12 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Explain the purpose and functions of water users associations. | CO6 | A | 6 |
|  | b. | Explain the types of canals based on alignment. | CO6 | A | 6 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | state the concepts of duty, crop and crop seasons |
| CO2 | classify the irrigation methods |
| CO3 | demonstrate the irrigation methods |
| CO4 | examine irrigation structures |
| CO5 | appraise and design of impounding structures and cross drainage works |
| CO6 | construct and operate the irrigation projects |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 2 | 3 | 6 | 6 | - | - | 17 |
| CO2 | 1 | 10 | 6 | - | - | - | 17 |
| CO3 | 4 | 15 | 12 | - | - | - | 31 |
| CO4 | - | 16 | - | - | - | - | 16 |
| CO5 | 2 | 12 | 12 | - | - | - | 26 |
| CO6 | 1 | 4 | 12 | - | - | - | 17 |
|  | | | | | | | **124** |



**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **20CE2041** | **Duration** | **3hrs** |
| **Course Name** | **BASICS OF REMOTE SENSING AND GEOGRAPHICAL INFORMATION SYSTEM** | **Max. Marks** | **100** |

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| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | Express about Remote Sensing. | | CO1 | U | 1 |
| 2. | Define Spectral signature. | | CO1 | R | 1 |
| 3. | Tabulate the types of Platforms. | | CO2 | R | 1 |
| 4. | List the types of Sensors. | | CO2 | R | 1 |
| 5. | Summarize the types of image interpretation. | | CO3 | U | 1 |
| 6. | Define Digital Image Processing. | | CO3 | R | 1 |
| 7. | Annotate Map projections. | | CO4 | U | 1 |
| 8. | List the components of GIS. | | CO4 | R | 1 |
| 9. | Compare vector and raster data. | | CO5 | U | 1 |
| 10. | Infer on deformation studies of deflection. | | CO6 | U | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | Examine the significance of wavelength regions on remote sensing technique. | | CO1 | An | 3 |
| 12. | Compare the orbit types. | | CO2 | U | 3 |
| 13. | Integrate the types of data products and their application. | | CO3 | An | 3 |
| 14. | Summarize the basic components of a GIS. | | CO4 | U | 3 |
| 15. | Articulate the data input by digitization and scanning. | | CO5 | An | 3 |
| 16. | Comment on the landslide Risk analysis. | | CO6 | U | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | |
| 17. |  | Categorize the various spectral regions of Electromagnetic spectrum and their significance in remote sensing techniques with neat sketch. | CO1 | U | 12 |
|  |  |  |  |  |  |
| 18. | a. | Discuss the various types of resolution of sensors and their salient features. | CO2 | A | 6 |
|  | b. | Discuss the airborne and space-borne remote sensing systems. | CO2 | A | 6 |
|  |  |  |  |  |  |
| 19. |  | Integrate the principle of digital image processing and their logical sequence of image processing with neat sketch. | CO3 | A | 12 |
|  |  |  |  |  |  |
| 20. |  | Compare the data type of spatial and non-spatial data and their significance in data analysis with a typical example. | CO4 | U | 12 |
|  |  |  |  |  |  |
| 21. |  | Apply the modeling using RS & GIS in Highway studies. | CO5 | A | 12 |
|  |  |  |  |  |  |
| 22. |  | Summarize the basic elements of image interpretation with neat sketches. | CO3 | U | 12 |
|  |  |  |  |  |  |
| 23. |  | Prepare the land information system using GIS with a typical case study. | CO5 | A | 12 |
| **COMPULSORY QUESTION** | | | | | |
| 24. |  | Examine the site suitability analysis for transport infrastructure using RS and GIS. | CO6 | A | 12 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| **CO1** | Recall the principles of remote sensing and GIS. |
| **CO2** | Describe the analysis methods RS and GIS data. |
| **CO3** | Interpret the data for modeling applications. |
| **CO4** | Distinguish sensors and satellite data’s for specific applications. |
| **CO5** | Appraise the usage of data models. |
| **CO6** | Formulate methods of solve issues related to environment using RS and GIS techniques. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | 1 | 13 | - | 3 | - | - | 17 |
| **CO2** | 2 | 3 | 12 | - | - | - | 17 |
| **CO3** | 1 | 13 | 12 | 3 | - | - | 29 |
| **CO4** | 1 | 16 | - | - | - | - | 17 |
| **CO5** | - | 1 | 24 | 3 | - | - | 28 |
| **CO6** | - | 4 | 12 | - | - | - | 16 |
|  | | | | | | | **124** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **20CE2044** | **Duration** | **3hrs** |
| **Course Name** | **SUSTAINABLE DESIGN OF CAMPUS** | **Max. Marks** | **100** |

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| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **Marks** |
| **PART – A (10 X 1 = 10 MARKS)**  **(Answer all the questions)** | | | | | |
| 1. | Explain thermal comfort. | | CO5 | U | 1 |
| 2. | Recall 3R’s. | | CO1 | R | 1 |
| 3. | Illustrate the examples of water sources. | | CO6 | An | 1 |
| 4. | Explain sick building syndrome. | | CO6 | A | 1 |
| 5. | Name any two energy saving tips. | | CO2 | R | 1 |
| 6. | Recall the factors of production resources. | | CO3 | R | 1 |
| 7. | Define water conservation. | | CO4 | R | 1 |
| 8. | Give examples for inorganic waste recycling. | | CO1 | U | 1 |
| 9. | Define conservation of energy. | | CO2 | R | 1 |
| 10. | List out the elements of sustainable agriculture. | | CO3 | R | 1 |
| **PART – B (6 X 3 = 18 MARKS)**  **(Answer all the questions)** | | | | | |
| 11. | Identify the disposal methods. | | CO1 | U | 3 |
| 12. | Explain waste to energy. | | CO2 | U | 3 |
| 13. | Classify the dimension of food security. | | CO3 | U | 3 |
| 14. | Summarize the typical activities for health promotion. | | CO5 | U | 3 |
| 15. | Discuss about the sustainable agriculture. | | CO3 | U | 3 |
| 16. | List out the types of sanitation. | | CO6 | U | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | |
| 17. |  | Discuss the types and methods of organic waste recycling in detail. | CO1 | U | 12 |
|  |  |  |  |  |  |
| 18. |  | Describe the factors of sustainable agriculture in detail. | CO4 | U | 12 |
|  |  |  |  |  |  |
| 19. | a. | Classify the process in sewage treatment plant. | CO1 | U | 6 |
|  | b. | Summarize the benefits of sustainable agriculture. | CO3 | U | 6 |
|  |  |  |  |  |  |
| 20. |  | Explain the program models for health promotion. | CO5 | U | 12 |
|  |  |  |  |  |  |
| 21. | a. | Describe the advantages and disadvantages of waste to energy | CO2 | U | 6 |
|  | b. | Illustrate the program of European union for agriculture. | CO4 | U | 6 |
|  |  |  |  |  |  |
| 22. |  | Explain the types of sanitation in detail. | CO5 | U | 12 |
|  |  |  |  |  |  |
| 23. | a. | Discuss about the targets of sustainable health. | CO5 | U | 6 |
|  | b. | Summarize the strategies in health promotion. | CO5 | U | 6 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Identify the disease prevention program process measures. | CO5 | U | 6 |
|  | b. | List out the sustainability planning. | CO6 | R | 6 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL

|  |  |
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|  | **COURSE OUTCOMES** |
| CO1 | Identify the Waste management concepts in the institute |
| CO2 | Apply sustainability principles for Energy |
| CO3 | Analyze the importance of food and sustainability |
| CO4 | Apply Water related sustainability concepts |
| CO5 | Analyze the concepts related to health and sustainability |
| CO6 | Evaluate a strategy for developing sustainable institute |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 1 | 22 | - | - | - | - | 23 |
| CO2 | 2 | 9 | - | - | - | - | 11 |
| CO3 | 2 | 12 | - | - | - | - | 14 |
| CO4 | 1 | 18 | - | - | - | - | 19 |
| CO5 | - | 46 | - | - | - | - | 46 |
| CO6 | 6 | 3 | 1 | 1 |  |  | 11 |
|  | | | | | | | **124** |



**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| **Course Code** | **20CE2051** | **Duration** | **3hrs** |
| **Course Name** | **GLOBAL CLIMATE CHANGE AND ITS IMPACT** | **Max. Marks** | **100** |

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| --- | --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | | |
| 1. | Describe the characteristics of storms. | | | CO2 | R | 1 |
| 2. | State the concept of climate-compatible development. | | | CO1 | R | 1 |
| 3. | List two advantages of renewable resources. | | | CO1 | R | 1 |
| 4. | Identify two methods to ensure food security. | | | CO1 | R | 1 |
| 5. | Explain the lapse rate in meteorology. | | | CO2 | U | 1 |
| 6. | List two potential consequences of climate change on forests. | | | CO3 | R | 1 |
| 7. | Define climate change. | | | CO3 | R | 1 |
| 8. | Interpret the impacts of global warming. | | | CO3 | U | 1 |
| 9. | Enumerate green economy. | | | CO1 | R | 1 |
| 10. | List two benefits of water harvesting techniques. | | | CO1 | R | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | | |
| 11. | Explain the Earth System Model. | | | CO5 | U | 3 |
| 12. | Illustrate the Saffir-Simpson hurricane scale. | | | CO2 | U | 3 |
| 13. | Recall the greenhouse effect and list two greenhouse gases. | | | CO3 | R | 3 |
| 14. | List three environmental impact of fossil fuels. | | | CO3 | R | 3 |
| 15. | Classify the dimensions related to food security. | | | CO3 | U | 3 |
| 16. | Given the following temperature and elevation data, determine the stability of the atmosphere.  Elevation (m) Temperature (oC)  2.00 14.35  324.00 11.13 | | | CO5 | A | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | | |
| 17. |  | Examine the influences and feedbacks of hydrological changes on climate using climate modeling. | CO3 | | A | 12 |
|  |  |  |  | |  |  |
| 18. |  | Assess the effects of climate change on food security and human health. | CO3 | | U | 12 |
|  |  |  |  | |  |  |
| 19. |  | Evaluate the impact of greenhouse gases on the ozone layer and global warming. | CO3 | | An | 12 |
|  |  |  |  | |  |  |
| 20. |  | Compare and contrast internal and external forcing mechanisms of climate change. | CO5 | | U | 12 |
|  |  |  |  | |  |  |
| 21. |  | Explain the importance of water resources and their adaptation to climate change. | CO4 | | U | 12 |
|  |  |  |  | |  |  |
| 22. |  | Identify the causes and effects of acid rain and potential solutions for prevention. | CO3 | | R | 12 |
|  |  |  |  | |  |  |
| 23. |  | Illustrate a diagram illustrating global wind systems and their role in climate. | CO4 | | U | 12 |
| **COMPULSORY QUESTION** | | | | | | |
| 24. |  | Analyze the role of Governments, industries, and individuals in addressing climate change, using Indian case studies. | CO6 | | An | 12 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| **CO1** | Understand the climate and its change |
| **CO2** | List the factors affecting global climate change |
| **CO3** | Analyze the impacts of global climate change |
| **CO4** | Explain the importance of climate change in various fields |
| **CO5** | Develop Climate Change Models |
| **CO6** | Appreciate the importance of policies and regulations for mitigation of climate change |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | 5 | - | - | - | - | - | 5 |
| **CO2** | 1 | 4 | - | - | - | - | 5 |
| **CO3** | 20 | 16 | 12 | 12 | - | - | 60 |
| **CO4** | - | 24 | - | - | - | - | 24 |
| **CO5** | - | 15 | 3 |  | - | - | 18 |
| **CO6** | - | - | - | 12 | - | - | 12 |
|  | | | | | | | **124** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **20CE2052** | **Duration** | **3hrs** |
| **Course Name** | **GREEN BUILDINGS** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **Marks** |
| **PART – A (10 X 1 = 10 MARKS)**  **(Answer all the questions)** | | | | | |
| 1. | Define green building. | | CO1 | R | 1 |
| 2. | List any two SDGs. | | CO1 | R | 1 |
| 3. | State water conservation. | | CO1 | R | 1 |
| 4. | Identify a suitable example of a line sources. | | CO1 | R | 1 |
| 5. | Describe incineration. | | CO5 | U | 1 |
| 6. | List the benefits of biogas. | | CO5 | R | 1 |
| 7. | Define SMOG. | | CO6 | R | 1 |
| 8. | Identify the general effects of air pollution. | | CO6 | R | 1 |
| 9. | Define ozone depletion. | | CO1 | R | 1 |
| 10. | List any two type of acoustic material. | | CO6 | R | 1 |
| **PART – B (6 X 3 = 18 MARKS)**  **(Answer all the questions)** | | | | | |
| 11. | Discuss site selection criteria for green building. | | CO3 | U | 3 |
| 12. | Explain benefits of green buildings. | | CO1 | U | 3 |
| 13. | Define objectives of GRIHA. | | CO2 | R | 3 |
| 14. | Differentiate point sources and area sources of air pollution. | | CO6 | U | 3 |
| 15. | Explain the benefits of using low VOC product. | | CO6 | U | 3 |
| 16. | List the benefits of net zero energy buildings. | | CO4 | R | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q.No. 17 to 23, Q.No. 24 is Compulsory)** | | | | | |
| 17. |  | Report any objectives and outcomes for platinum / gold / silver buildings as a case study. | CO1 | U | 12 |
|  |  |  |  |  |  |
| 18. |  | Explain green project management and certification. | CO2 | U | 12 |
|  |  |  |  |  |  |
| 19. |  | Write about sustainable development goals. | CO1 | A | 12 |
|  |  |  |  |  |  |
| 20. |  | Articulate treatment methods for organic waste using a suitable diagram. | CO1 | A | 12 |
|  |  |  |  |  |  |
| 21. |  | Illustrate solar energy and its application in green buildings. | CO4 | U | 12 |
|  |  |  |  |  |  |
| 22. |  | Interpret green and cost control energy in the context of green buildings. | CO2 | U | 12 |
|  |  |  |  |  |  |
| 23. |  | Determine the effective height of a stack, if the stack is 203 m tall with 1.07 m inside diameter. Wind velocity is 3.56 m/s. Air temperature is 13 °C. Barometric pressure is 1000 millibars. Stack gas velocity is 9.14 m/s having 149 °C temperature. | CO6 | A | 12 |
| **COMPULSORY QUESTION** | | | | | |
| 24. |  | Summarize green building rating systems. | CO2 | U | 12 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Understand the factors influencing the Green building concept |
| CO2 | Identify and Compare different rating system |
| CO3 | Select the proper site and adopt green building techniques |
| CO4 | Plan energy-efficient building envelopes and reduce the carbon foot print |
| CO5 | Select the Building material and reduce, reuse and recycle waste |
| CO6 | Evaluate the performance of Green buildings and enhance indoor air quality |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / P** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 5 | 15 | 24 | - | - | - | 44 |
| CO2 | 3 | 36 | - | - | - | - | 39 |
| CO3 | - | 3 | - | - | - | - | 3 |
| CO4 | 3 | 12 | - | - | - | - | 15 |
| CO5 | 1 | 1 | - | - | - | - | 2 |
| CO6 | 3 | 6 | 12 | - | - | - | 21 |
|  | | | | | | | **124** |



**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| **Course Code** | **20CE2053** | **Duration** | **3hrs** |
| **Course Name** | **SMART BUILDINGS** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | | |
| 1. | Define the term BMS. | | CO1 | | R | 1 |
| 2. | State the objective of integrating ICT in smart buildings. | | CO1 | | R | 1 |
| 3. | Describe sensors as a component of BAS. | | CO2 | | R | 1 |
| 4. | Explain thermal comfort. | | CO2 | | U | 1 |
| 5. | Infer the role of ventilation. | | CO1 | | U | 1 |
| 6. | Describe wet pipe systems. | | CO2 | | R | 1 |
| 7. | Define evacuation drills. | | CO5 | | R | 1 |
| 8. | Explain active RFID tags. | | CO5 | | U | 1 |
| 9. | Name the frequencies that have long-range, high-speed readings, ideal for inventory management. | | CO1 | | R | 1 |
| 10. | Define the term PLC in the context of building automation. | | CO4 | | R | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | | |
| 11. | Differentiate between building information based on narrow sense and broad sense. | | CO2 | | U | 3 |
| 12. | Interpret the advantages and challenges of centralized architecture. | | CO3 | | U | 3 |
| 13. | Summarize the application of DDC. | | CO4 | | U | 3 |
| 14. | List the basic components of fire detectors. | | CO5 | | R | 3 |
| 15. | Explain the common components of the security system. | | CO5 | | U | 3 |
| 16. | Describe the communication principles commonly used in satellite communication systems in relevance to smart building technologies. | | CO6 | | U | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | | |
| 17. | a. | Explain the core function and application of the Building Management System (BMS). | | CO1 | A | 8 |
|  | b. | Describe the challenges faced by smart buildings. | | CO3 | U | 4 |
|  |  |  | |  |  |  |
| 18. | a. | Summarize the components of the BMS system. | | CO2 | U | 6 |
|  | b. | Describe the decentralized architecture and mention its advantages and challenges. | | CO2 | U | 6 |
|  |  |  | |  |  |  |
| 19. |  | Interpret the transmission of wireless electricity and mention near and far techniques with neat diagrams. | | CO4 | A | 12 |
|  |  |  | |  |  |  |
| 20. | a. | Write about the stages of fire with a neat diagram. | | CO5 | A | 6 |
|  | b. | Explain the main tasks performed by fire alarm control panels. | | CO5 | A | 6 |
|  |  |  | |  |  |  |
| 21. |  | Determine the purpose of the Perimeter Intrusion Detection System (PIDS), its application, technologies, methods, and examples for each types. | | CO5 | A | 12 |
|  |  |  | |  |  |  |
| 22. |  | Compare microprocessor-based control systems used in smart buildings, including key components and their functions. | | CO4 | AN | 12 |
|  |  |  | |  |  |  |
| 23. | a. | Describe the benefits and limitations of using CCTV systems for security monitoring. | | CO5 | U | 6 |
|  | b. | Write about the sensors and technologies commonly used in Structural Health Monitoring (SHM) systems. | | CO6 | A | 6 |
| **COMPULSORY QUESTION** | | | | | | |
| 24. | a. | Explain the advantages of using fiber optic backbones over traditional copper wiring in building networks. | | CO3 | U | 6 |
|  | b. | Analyze the impact of IoT, cloud computing, and digital ceiling applications on modern smart buildings. | | CO6 | AN | 6 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| **CO1** | Understand the system of Smart Technology |
| **CO2** | Implement the design principles and strategy in Smart buildings |
| **CO3** | Illustrate philosophy of building automation systems |
| **CO4** | Analyze the intelligent building design concepts |
| **CO5** | Design fire safety and security systems for intelligent buildings |
| **CO6** | Integrate the building management systems and adopt them in intelligent buildings |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | 3 | 1 | 8 |  |  |  | 12 |
| **CO2** | 2 | 16 |  |  |  |  | 18 |
| **CO3** |  | 7 |  | 6 |  |  | 13 |
| **CO4** | 1 | 3 | 12 | 12 |  |  | 28 |
| **CO5** | 4 | 10 | 24 |  |  |  | 38 |
| **CO6** |  | 3 | 6 | 6 |  |  | 15 |
|  | | | | | | | **124** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **20CE3003** | **Duration** | **3hrs** |
| **Course Name** | **STRUCTURAL DYNAMICS AND EARTHQUAKE ENGINEERING** | **Max. Marks** | **100** |

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| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (5 X 16 = 80 MARKS)**  **(Answer any five from the following)** | | | | | |
| 1. | a. | Determine the natural frequency of the simply supported beam shown in figure. The beam is 100mm wide and 10 mm deep  K=1000N/m  M -300kg  70 mm    E=2.1 \*105N/mm2 | CO1 | An | 6 |
|  | b. | A SDOF system consists of a mass of 400kg and a spring stiffness of 300kN/m. By testing it was found that a force of 100N produces a relative velocity 12 cm/s. Find i. Damping ratio ii. logarithmic decrement, iii. ratio of two consecutive amplitudes. | CO1 | Ap | 10 |
|  |  |  |  |  |  |
| 2. | a. | Derive the expression for forcing function and steady state response of a SDoF system for the given loading function.  -1.5  F(t)  1.5  T in sec    T/2 T/2 | CO3 | Ap | 16 |
|  |  |  |  |  |  |
| 3. | a. | For a two storey shear building verify the orthogonality conditions between the modes. m1= 24000 kg, m2 = 11500 kg, a11= 1.00, a21= 1.263, a12 = 1.00 a22 = -1.629. | CO2 | An | 8 |
|  | b. | Explain the step by step procedure for the solution of equilibrium equation in dynamic analysis using Newmark method. | CO3 | U | 8 |
| 4. | a. | For the multistory building shown in figure, obtain frequencies and modes of vibration. Assume *m* = 5 x 104 kg, k= 5 x 109 N/m.  m/2    2k 2k    m  2k 2k  2m  2k 2k | CO2 | An | 16 |
|  |  |  |  |  |  |
| 5. | a. | Estimate the storey Shear force for a 3 storey school building located in Delhi resting on medium soil. The building is designed as RCC moment resisting frame with brick infills. The Time period and mode shape is given in the table below. The seismic weight of the each floor is 3000 kN and the floor height is 3 m. | CO5 | An | 16 |
|  |  |  |  |  |  |
| 6. | a. | Mention the cause of earthquake and explain the types of tectonic plates. | CO4 | A | 10 |
|  | b. | Differentiate magnitude and intensity. | CO4 | U | 6 |
|  |  |  |  |  |  |
| 7. | a. | Discuss on the seismic design philosophy and explain the codal provision for ductile detailing of the RC beam, column and joints. | CO5 | A | 16 |
|  |  |  |  |  |  |
| **PART – B (1 X 20 = 20 MARKS)**  **(Compulsory Question)** | | | | | |
| 8. | a. | “A structural control system has its oscillation frequency tuned to the [resonant frequency](https://en.wikipedia.org/wiki/Resonant_frequency) while weighing much less than the structure”. Identify the system and explain the principle behind it with a suitable case study building. | CO6 | An | 10 |
|  | b. | Explain the principle of jacketing of columns. | CO6 | A | 10 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Identify the elements of vibratory system and develop mathematical models |
| CO2 | Determine the fundamental frequency and mode of vibration of structural elements |
| CO3 | Estimate the response of structures subjected to dynamic forces |
| CO4 | Apply theory of dynamics to structures subjected to seismic forces |
| CO5 | Illustrate the codal provisions for seismic resistant design |
| CO6 | Recommend suitable alternate techniques and retrofitting methods |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / BL** | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 |  |  | 10 | 6 |  |  | 16 |
| CO2 |  |  |  | 24 |  |  | 24 |
| CO3 |  | 8 | 16 |  |  |  | 24 |
| CO4 |  | 6 | 10 |  |  |  | 16 |
| CO5 |  |  | 16 | 16 |  |  | 32 |
| CO6 |  |  | 10 | 10 |  |  | 20 |
|  | | | | | | | **132** |



**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| **Course Code** | **20CE3004** | **Duration** | **3hrs** |
| **Course Name** | **FINITE ELEMENT METHODS IN CIVIL ENGINEERING** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | | **CO** | **BL** | | **M** |
| **PART – A (5 X 16 = 80 MARKS)**  **(Answer any five from the following)** | | | | | | | |
| 1. |  | The differential equation of a physical phenomenon is given by  Trial function  Boundary Conditions are , y (0) = 0  y (10) = 0  Solve the trial function and find the value of the parameters a1 by the following methods:   1. Point collocation method. 2. Subdomain Collocation method 3. Least squares method | CO1 | | A | 16 | |
|  |  |  |  | |  |  | |
| 2. |  | For the isoparametric four noded quadrilateral element shown in fig, determine the cartesian co-ordinates of point P which has local coordinates ξ = 0.5 and η = 0.5 | CO2 | | E | 16 | |
|  |  |  |  | |  |  | |
| 3. |  | Develop element stiffness matrix for the rigid frame shown in fig. Also explain how do you proceed further to solve problem.  Take E = 200 GN/m2, Io = 4 x 10-6 m4 and A = 4 x 10-3 m2 | CO3 | | A | 16 | |
|  |  |  |  | |  |  | |
| 4. | a. | Develop the shape function for ZIB 8 elements. | CO2 | | A | 13 | |
|  | b. | Compare constant strain triangle and Linear strain triangle. | CO3 | | U | 3 | |
|  |  |  |  | |  |  | |
| 5. |  | Explain stiffness matrix formulation for rectangular plate element with 12 Degrees of freedom. | CO5 | | U | 16 | |
|  |  |  |  | |  |  | |
| 6. |  | For the constant strain triangular element shown in figure. Assemble strain-displacement matrix. Take t = 20 mm , E = 2 x 105 N/mm2 | CO4 | | A | 16 | |
|  |  |  |  | |  |  | |
| 7. | a. | Using serendipity concept develops shape function for 4 noded rectangular elements. | CO4 | | A | 8 | |
|  | b. | Explain how to calculate shape function using natural coordinate systems. | CO3 | | U | 8 | |
| **PART – B (1 X 20 = 20 MARKS) [Compulsory Question]** | | | | | | | |
| 8. | a. | Explain H, P and R method of mesh refinement. | CO6 | | U | 10 | |
|  | b. | Outline the sequential process for modeling and analyzing structures using Finite Element Method (FEM) software. | CO6 | | U | 10 | |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Identify the principles for the development of finite element models |
| CO2 | Develop shape function, strain displacement relation, stiffness matrix and consistent load vector matrix |
| CO3 | Explain the finite element procedure for structural element |
| CO4 | Analyze one, two and three dimensional problems |
| CO5 | Choose appropriate finite element for analysis depending on the nature of problem |
| CO6 | Develop finite element models using suitable software |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 |  |  | 16 |  |  |  | 16 |
| CO2 |  |  | 13 |  | 16 |  | 29 |
| CO3 |  | 11 | 16 |  |  |  | 27 |
| CO4 |  |  | 24 |  |  |  | 24 |
| CO5 |  | 16 |  |  |  |  | 16 |
| CO6 |  | 20 |  |  |  |  | 20 |
|  | | | | | | | **132** |



**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| **Course Code** | **20CE3006** | **Duration** | **3hrs** |
| **Course Name** | **DESIGN OF SUBSTRUCTURES** | **Max. Marks** | **100** |

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| **Q. No.** | | **Questions** | | | **CO** | **BL** | | **M** | | |
| **PART – A (5 X 16 = 80 MARKS)**  **(Answer any five from the following)** | | | | | | | | | | |
| 1. |  | | Analyse the purpose and different stages of subsoil exploration. | CO4 | | | An | | 16 | |
|  |  | |  |  | | |  | |  | |
| 2. |  | | Develop and design a pile under a column transmitting an axial load of 900kN. The pile is to be driven to a hard stratum available at a depth of 9.5m. Use M35 concrete and FE 500 steel. | CO6 | | | C | | 16 | |
|  |  | |  |  | | |  | |  | |
| 3. |  | | Generalise design principles of well foundation. | CO2 | | | U | | 16 | |
|  |  | |  |  | | |  | |  | |
| 4. |  | | Construct a design for a cantilever retaining wall for a height of 5m above the ground with the following data. Density of soil =18kN/m2 , SBC = 200kN/m2, Fck = M20, Fy = 415N/mm2, Angle of internal friction = 200, Coefficient of friction between soil and concrete = 0.55. | CO3 | | | A | | 16 | |
|  |  | |  |  | | |  | |  | |
| 5. |  | | Memorize basic principles of design of machine foundation. | CO1 | | | R | | 16 | |
|  |  | |  |  | | |  | |  | |
| 6. | a. | | Examine group effects and settlements of pile foundation. | CO3 | | | A | | 8 | |
|  | b. | | Describe in detail combined raft and pile foundation. | CO1 | | | R | | 8 | |
|  |  | |  |  | | |  | |  | |
| 7. | a. | | Discuss about types of machine foundation and vibration analysis of machine foundation. | CO2 | | | U | | 8 | |
|  | b. | | Reproduce short notes on foundations under uplifting loads and open cuts. | CO1 | | | R | | 8 | |
| **PART – B (1 X 20 = 20 MARKS) [Compulsory Question]** | | | | | | | | | |
| 8. |  | | Summarize about coffer dams and its different types. | CO5 | | | E | | 20 | |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Identify the methods of subsoil exploration |
| CO2 | Evaluate the soil shear strength parameters |
| CO3 | Determine the load carrying capacity of different foundation types |
| CO4 | Analyse the concepts of settlement analysis. |
| CO5 | Select appropriate foundations type based on available soil conditions. |
| CO6 | Design suitable foundations based on the soil conditions |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 32 | - | - | - | - | - | 32 |
| CO2 | - | 24 | - | - | - | - | 24 |
| CO3 | - | - | 24 | - | - | - | 24 |
| CO4 | - | - | - | 16 | - | - | 16 |
| CO5 | - | - | - | - | 20 | - | 20 |
| CO6 | - | - | - | - | - | 16 | 16 |
|  | | | | | | | **132** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **20CE3014** | **Duration** | **3hrs** |
| **Course Name** | **RISK ASSESSMENT AND PROBABILISTIC ANALYSIS** | **Max. Marks** | **100** |

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| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **Marks** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Describe the basic components and end states of a PRA. | CO3 | R | 10 |
|  | b. | For the bivariate probability distribution of (X,Y) given below, find  (i) (X≤1) (ii) P(Y≤3) (iii)P(X≤1,Y≤ 3) (iv)P(X≤1/Y≤3) (v) P(X+Y≤4)   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | y x | 1 | 2 | 3 | 4 | 5 | 6 | | 0 | 0 | 0 | 1/32 | 2/32 | 2/32 | 3/32 | | 1 | 1/16 | 1/16 | 1/8 | 1/8 | 1/8 | 1/8 | | 2 | 1/32 | 1/32 | 1/64 | 1/64 | 0 | 2/64 | | CO3 | E | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | A lot consists of 10 good articles, 4 with minor defects and 2 with major defects.  Two articles are chosen at random. Find the probability that  (i) both are good (ii)both have major defects (iii) exactly one is good  (iv) neither is good (v)one with minor defect and minor with major defect. | CO3 | E | 10 |
|  | b. | Find correlation coefficient from the following data:   |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | X | 68 | 64 | 75 | 50 | 64 | 80 | 70 | 40 | 55 | 64 | | Y | 62 | 58 | 68 | 45 | 81 | 60 | 68 | 48 | 50 | 70 | | CO3 | A | 10 |
|  |  |  |  |  |  |
| 3. |  | Explain the comments on the first Order, Second Moment Mean Value, Reliability Index. | CO2 | U | 20 |
|  |  | **(OR)** |  |  |  |
| 4. |  | Discuss on Hasofer Lind Reliability and write its detailed procedure. | CO2 | U | 20 |
|  |  |  |  |  |  |
| 5. |  | Explain any two methods for time-variant reliability analysis. | CO4 | U | 20 |
|  |  | **(OR)** |  |  |  |
| 6. |  | Discuss in detail about issues and challenges faced in structural failure of buildings with examples. | CO1 | U | 20 |
|  |  |  |  |  |  |
| 7. |  | Explain Multistage decision-making with examples. | CO4 | U | 20 |
|  |  | **(OR)** |  |  |  |
| 8. |  | Analyze the Axioms of rational behavior, Preferences, and Utility. | CO6 | An | 20 |
| **PART – B (1 X 20 = 20 MARKS)**  **COMPULSORY QUESTION** | | | | | |
| 9. |  | Write in detail about the Cost-Benefit Analysis with an example. | CO5 | A | 20 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Concept of failure of a structure. |
| CO2 | Extend reliability analysis concepts from structural elements to structural systems. |
| CO3 | Interpret the tools of risk analysis. |
| CO4 | Use appropriate tools for decision making. |
| CO5 | Estimate the cost-benefit analysis. |
| CO6 | Application in real time problems. |

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| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | - | 20 | - | - | - | - | 20 |
| CO2 | - | 40 | - | - | - | - | 40 |
| CO3 | 10 | - | 10 | - | 20 | - | 40 |
| CO4 | - | 40 | - | - | - | - | 40 |
| CO5 | - | - | 20 | - | - | - | 20 |
| CO6 | - | - | - | 20 | - | - | 20 |
|  | | | | | | | **180** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **20CE3015** | **Duration** | **3hrs** |
| **Course Name** | **BRIDGE ENGINEERING** | **Max. marks** | **100** |

**PART – A (5 X 16 = 80 MARKS)**

**(Answer any five from the following)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** |  | **Questions** | **CO** | **BL** | **M** |
| 1. | a. | How would you compare the different Railway Loads as per Bridge Rules (Ministry of Railways). | CO1 | U | 4 |
| b. | Design the longitudinal girder for a RCC Tee beam bridge for the following data.  Clear width of roadway - 7.5m  Wearing coat - 80mm  No. of main girders - 3  Span (c/c of bearing) - 15m  Spacing of cross girder - 5m c/c  Loading - IRC Class AA tracked vehicle  M20 grade of concrete  Fe 415 grade steel is use | CO4 | A | 12 |
|  |  | | | | |
| 2. | a. | Distinguish between a Culvert and Bridge. | CO1 | U | 4 |
| b. | Design a post- tensioned prestressed concrete slab bridge for a national highway crossing to suit the following data:  Width of carriage way = 7.5m  Foot path = 1m on either side  Kerbs = 600mm wide  Clear Span = 8 m  Type of loading = IRC Class AA or Class A whichever gives the worst effect  Materials – M40 grade concrete and 7mm diameter high tensile wires with an ultimate tensile strength of 1500 N/mm2 housed in cables with 12 wires and anchored by Freyssinet anchorages of 150mm diameter. Compressive strength at transfer, fci = 35 N/mm2. Loss ratio = 0.8. | CO4 | A | 12 |
|  |  |  |  |  |  |
| 3. | a. | How would you apply Pigeaud’s curves in the analysis and design of a deck slab of a concrete T beam bridge? (write the procedure only) | CO2 | A | 4 |
|  | b. | Design a suitable section for the longitudinal girder of a post tensioned prestressed concrete T Beam Bridge for a National Highway crossing to suit the following data:  Effective span - 15m  Equivalent Live load - 20kN/m  Adopt M45 grade of concrete with cube strength at transfer as 40 N/mm2 and 7mm HTS wires initially stretched to 1200MPa. Loss ratio - 0.80. | CO4 | A | 12 |
|  |  | | | | |
| 4. | a. | How would you determine the impact factor for steel bridges? | CO1 | R | 4 |
|  | b. | The effective span of a through type trussed girder two lane highway bridge is 40m. The reinforced concrete slab is 250mm thick inclusive of the wearing coat. The footpaths are provided on both the sides of the carriageway. The cross girders are provided at 5m c/c. The spacing between main girders is 11m. Find the forces in the central vertical and diagonal members. Adopt Class A loading.  EUDLL for mainline loading (15m span) = 1606 kN & IF = 0.691  EUDLL for mainline loading (20m span) = 2027 kN & IF = 0.588 | CO3 | An | 12 |
| 5. | a. | Can you list the disadvantages of continuous bridge? | CO2 | U | 4 |
|  | b. | The effective span of a through type plate girder railway bridge is 30m. The stringers are spaced 2m between centerlines. 0.60 kN per meter stock rails and 0.40 kN per metre checkrails are provided. Sleepers are spaced at 0.45m from center to center and are of size 2.8 m x 250 mm 250 mm. The weight of timber may be assumed as 7.5 kN/m3. The spacing between main girders is 9.8m. Design the maximum section of the plate girder, if the bridge is to carry standard main lane loading for broad gauge track.  EUDLL for mainline loading (30m span) = 2800 kN & IF = 0.455 | CO3 | An | 12 |
|  |  | | | | |
| 6. | a. | Classify the different types of foundations used in bridges | CO2 | U | 4 |
|  | b. | Verify the adequacy of the dimensions for the pier as shown in Fig.1. The following details are available.  Top width of the pier = 1.8m  Height of the pier upto springing level = 12m  C/c of bearings on either side = 1.00m  Side batter = 1 in 10  High flood level = 1m below bearing level  Span of the bridge = 16m  Loading on span = IRC Class AA  Road: Two-lane road with 1m wide foot path on either side  SuperStructure: Consists of three longitudinal girders of 1.3m depth with a Deck slab of 200mm depth. Rib width of girders = 300mm.  Material of the pier = Concrete M20 | CO5 | E | 12 |
|  |  | | | | |
| 7. | a. | Classify the different types of bearings in a bridge. | CO1 |  | 4 |
|  | b. | Design a well foundation for an abutment of 10m x 5m base dimensions as shown in Fig.2. The well is founded on a sandy soil. The data available are as follows:  **Height of bearing above maximum scour level : 28m**  Permissible horizontal displacement of the bearing level is 50mm  **Height of the abutment = 6.0m**  Total vertical load including weight of the abutment and well (considering  buoyancy effect) = 20,000kN  **Total lateral load at the scour level = 400kN**  Submerged unit weight of soil = 9.5 kN/m3 | CO4 |  | 12 |
| **PART – B (1 X 20 = 20 MARKS) [Compulsory Question]** | | | | | |
| 8. | a. | Interpret the outcome of a typical case study on failure of a major bridge with salient details. | CO6 |  | 20 |

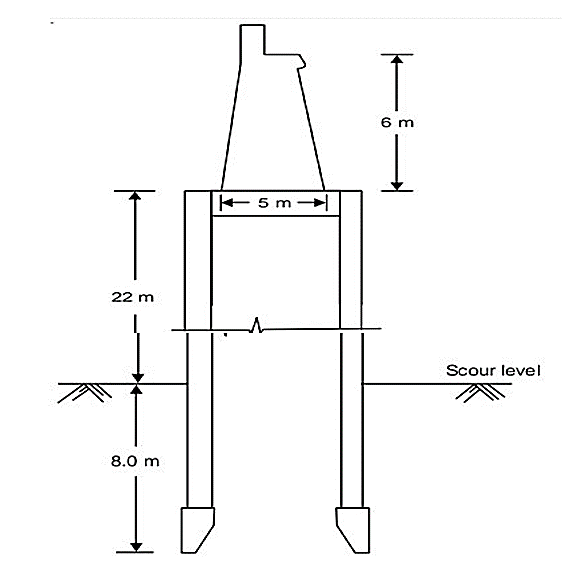


Fig. 2

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Classify bridges according to loading and site conditions |
| CO2 | Explain the behaviour of different types of bridges |
| CO3 | Analyze different types of bridges |
| CO4 | Design the different components of bridges |
| CO5 | Appraise on the quality investigation of bridge structures |
| CO6 | Investigate the reasons for the failure of bridge structures |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 4 | 12 |  |  |  |  | 16 |
| CO2 |  | 8 | 16 |  |  |  | 24 |
| CO3 |  |  |  | 24 |  |  | 24 |
| CO4 |  |  | 36 |  |  |  | 36 |
| CO5 |  |  |  |  | 12 |  | 12 |
| CO6 |  |  |  |  | 20 |  | 20 |
|  | | | | | | | **132** |



**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **20CE3016** | **Duration** | **3hrs** |
| **Course Name** | **CONDITIONAL ASSESSMENT OF EXISTING STRUCTURES** | **Max. Marks** | **100** |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Q. No.** | | **Questions** | | | **CO** | | **BL** | | **M** |
| **PART – A (5 X 16 = 80 MARKS)**  **(Answer any five from the following)** | | | | | | | | | |
| 1. | a. | | Explain in detail the structural distress of building during its service life. | CO2 | | A | | 8 | | |
|  | b. | | Explain step by step procedure in conditional assessment of existing structure. | CO1 | | A | | 8 | | |
|  |  | |  |  | |  | |  | | |
| 2. | a. | | Discuss in brief the on-site and off-site investigation of structure located in off-shore area. | CO1 | | U | | 8 | | |
|  | b. | | Discuss the process involved in preliminary analysis, reporting, and decision making. | CO2 | | U | | 8 | | |
|  |  | |  |  | |  | |  | | |
| 3. | a. | | Recall the role of Non-Destructive Techniques in Condition Assessment. | CO4 | | R | | 8 | | |
|  | b. | | Compare the merits and demerits of Destructive & Non-destructive testing. | CO4 | | U | | 8 | | |
|  |  | |  |  | |  | |  | | |
| 4. | a. | | Enumerate the challenges involved in retrofitting fire damaged structure. | CO6 | | R | | 8 | | |
|  | b. | | Explain the step by step procedure involved in structural assessment of fire damaged structure. | CO6 | | A | | 8 | | |
|  |  | |  |  | |  | |  | | |
| 5. | a. | | Discuss any four durability studies in off-shore buildings. | CO3 | | U | | 8 | | |
|  | b. | | Explain the remedial measures to safeguard the structure affected by corrosion and alkali-silica reaction. | CO3 | | A | | 8 | | |
|  |  | |  |  | |  | |  | | |
| 6. | a. | | Explain different types of cracks developed in concrete and masonry surface. | CO3 | | A | | 8 | | |
|  | b. | | Explain the factor to be considered while planning repair in the concrete. | CO3 | | A | | 8 | | |
|  |  | |  |  | |  | |  | | |
| 7. | a. | | Compare the difference between local and global failure in a building with an example. | CO6 | | U | | 8 | | |
|  | b. | | Discuss proactive and reactive strategies in the field of structural engineering. | CO5 | | U | | 8 | | |
| **PART – B (1 X 20 = 20 MARKS) [Compulsory Question]** | | | | | | | | | | |
| 8. |  | | Explain HVAC, plumbing and electrical system in commercial building. | CO1 | | A | | 20 | | |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Understand the procedure for identifying the structure exposed to aggressive environment |
| CO2 | Apply the guidelines for structural condition assessment of existing buildings |
| CO3 | Identify techniques for evaluating concrete masonry and wood |
| CO4 | Select the destructive and non-destructive techniques to suite the projects |
| CO5 | Interpret and use destructive and nondestructive test results |
| CO6 | Evaluate and report the conditional assessment of existing structure |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | - | 8 | 28 | - | - | - | 36 |
| CO2 | - | 8 | 8 | - | - | - | 16 |
| CO3 | - | 8 | 24 | - | - | - | 32 |
| CO4 | 8 | 8 | - | - | - | - | 16 |
| CO5 | - | 8 | - | - | - | - | 8 |
| CO6 | 8 | 8 | 8 | - | - | - | 24 |
|  | | | | | | | **132** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **20CE3016** | **Duration** | **3hrs** |
| **Course Name** | **CONDITIONAL ASSESSMENT OF EXISTING STRUCTURES** | **Max. Marks** | **100** |

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| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | List the factors to be considered while planning repair in the concrete. Explain in detail. | CO1 | U | 10 |
|  | b. | Describe the detailed procedure to be followed to test the Core samples as per IS 456:2000 in RCC building, also explain the procedure to interpret the data. | CO3 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 2. |  | Explain any two different nondestructive testing methods adopted for conditional assessments. | CO4 | A | 20 |
|  |  |  |  |  |  |
| 3. | a. | Differentiate between proactive and reactive strategies in risk assessment. | CO2 | U | 10 |
|  | b. | Discuss the key criteria and considerations that determine when a detailed assessment becomes mandated for evaluating damage or deterioration in buildings. | CO2 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 4. |  | Write short notes on the following terms   1. Visual Inspection 2. Corrosion 3. Durability of concrete | CO6 | A | 20 |
|  |  |  |  |  |  |
| 5. |  | Describe in detail the procedure adopted for assessing structural strength of a RCC column. | CO3 | E | 20 |
|  |  | **(OR)** |  |  |  |
| 6. |  | Discuss the key factors causing building distress, and how do they collectively impact a building's long-term structural integrity and safety. | CO5 | U | 20 |
|  |  |  |  |  |  |
| 7. |  | Analyze the various techniques involved in measuring the corrosion potential of concrete elements. | CO6 | An | 20 |
|  |  | **(OR)** |  |  |  |
| 8. |  | Explain the most reliable and effective testing methods and techniques for accurately assessing the extent and severity of corrosion and carbonation in concrete and metal structures. | CO5 | U | 20 |
| **COMPULSORY QUESTION** | | | | | |
| 9. |  | Classify different types of structural and non-structural cracks that develop in buildings with examples. Also explain the causes and its effects in detail with neat sketches. | CO4 | R | 20 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Understand the procedure for identifying the structure exposed to aggressive environment. |
| CO2 | Apply the guidelines for structural condition assessment of existing buildings. |
| CO3 | Identify techniques for evaluating concrete masonry and wood. |
| CO4 | Select the destructive and non-destructive techniques to suite the projects. |
| CO5 | Interpret and use destructive and nondestructive test results. |
| CO6 | Evaluate and report the conditional assessment of existing structure. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | - | 10 | - | - | - | - | 10 |
| CO2 | - | 20 | - | - | - | - | 20 |
| CO3 | 10 | - | - | - | 20 | - | 30 |
| CO4 | 20 | - | 20 | - | - | - | 40 |
| CO5 | - | 40 | - | - | - | - | 40 |
| CO6 | - | - | 20 | 20 | - | - | 40 |
|  | | | | | | | **180** |



**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **20CE3022** | **Duration** | **3hrs** |
| **Course Name** | **CEMENT AND CONCRETE CHEMISTRY** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **Marks** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Classify the cements based on its chemical composition, also explain the applications of different types of cement. | CO1 | U | 20 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Analyze the different phase systems of cement chemistry. | CO3 | An | 20 |
|  |  |  |  |  |  |
| 3. | a. | Explain the rheological properties and strength characteristics of cement paste. | CO2 | U | 20 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Write short notes on the following   1. Permeability of cement paste 2. Interfacial transition zone | CO5 | A | 20 |
|  |  |  |  |  |  |
| 5. | a. | Discuss the microstructure properties of hardened cement paste. | CO3 | U | 20 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Write short notes on the following   1. i) Cement paste – aggregate bond 2. Paste – reinforcement bond | CO3 | A | 20 |
|  |  |  |  |  |  |
| 7. | a. | Explain the following   1. Effect of w/c ration on age of concrete 2. Effcet of w/c ration on curing and strength of concrete | CO2 | U | 20 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Classify different types of pores in fresh concrete system, also discuss the effect of pores on strength of concrete. | CO1 | R | 20 |
| **PART – B (1 X 20 = 20 MARKS)**  **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Explain the different advanced analyzing techniques involved to study the microstructure of cement paste | CO6 | U | 20 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Classify the phase system of cement |
| CO2 | Explain the cement hydration process |
| CO3 | Analyse the properties of cement paste and concrete |
| CO4 | Illustrate the hydration of cement with mineral admixtures |
| CO5 | Examine the properties of hardened paste |
| CO6 | Adopt modern micro structure analysis technique |

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| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 20 | 20 | - | - | - | - | 40 |
| CO2 | - | 40 | - | - | - | - | 40 |
| CO3 |  | 20 | 20 | 20 | - | - | 60 |
| CO4 | - | - | - | - | - | - | -- |
| CO5 | - | - | 20 | - | - | - | 20 |
| CO6 | - | 20 | - | - | - | - | 20 |
|  | | | | | | | **180** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| **Course Code** | **20CE3024** | **Duration** | **3hrs** |
| **Course Name** | **SUSTAINABLE CONSTRUCTION** | **Max. Marks** | **100** |

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| **Q. No.** | | **Questions** | | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | | | |
| 1. | a. | | Discuss in detail the various principles of sustainable construction. | CO1 | | U | 16 |
|  | b. | | List the five aspects of sustainability that impinge on the development of human settlements. | CO1 | | R | 4 |
|  |  | | **(OR)** |  | |  |  |
| 2. | a. | | Determine how the human and economic facets are integrated throughout the life cycle of infrastructure. | CO2 | | A | 20 |
|  |  | |  |  | |  |  |
| 3. | a. | | Explain in detail the need of sustainable design. | CO2 | | U | 10 |
|  | b. | | Explain in detail the impact of buildings on the environment. | CO3 | | U | 10 |
|  |  | | **(OR)** |  | |  |  |
| 4. | a. | | Recommend some of the strategies employed in sustainable building design for the conservation of water, exploring both innovative and established approaches to minimize water usage and promote efficient resource management. | CO4 | | E | 20 |
|  |  | |  |  | |  |  |
| 5. | a. | | Discuss the impact of energy-efficient and environment-friendly buildings on indoor air quality and human health. | CO3 | | U | 20 |
|  |  | | **(OR)** |  | |  |  |
| 6. | a. | | Discuss the strategies of water conservation in sustainable building design. | CO4 | | U | 20 |
|  |  | |  |  | |  |  |
| 7. | a. | | Write the key findings and insights derived from a review and reflection on the implementation of lean construction practices, and how can these insights inform future construction projects and improve overall project outcomes. | CO3 | | A | 20 |
|  |  | | **(OR)** |  | |  |  |
| 8. | a. | | Define Green Building and explain the key features that make it sustainable. | CO5 | | U | 10 |
|  | b. | | Enumerate the benefits of constructing green building. | CO5 | | R | 10 |
| **COMPULSORY QUESTION** | | | | | | |
| 9. | a. | | Recommend the sustainable construction practices to be implemented in the development of new office building in an urban area to minimize environmental impact and maximize resource efficiency, economic viability and meeting the needs of occupants. | CO6 | | E | 20 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Identify sustainable design aspects |
| CO2 | Evaluate the life cycle assessment |
| CO3 | Design building based on environmental aspects |
| CO4 | Incorporate energy efficiency in design of buildings |
| CO5 | Design environmental friendly buildings |
| CO6 | Apply green building ratings |

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| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 4 | 16 | - | - | - | - | 20 |
| CO2 | - | 10 | 20 | - | - | - | 30 |
| CO3 | - | 30 | 20 | - | - | - | 50 |
| CO4 | - | 20 | - | - | 20 | - | 40 |
| CO5 | 10 | 10 | - | - | - | - | 20 |
| CO6 | - | - | - | - | 20 | - | 20 |
|  | | | | | | | **180** |



**END SEMESTER EXAMINATION – APRIL / MAY 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **21CE1001** | **Duration** | **3hrs** |
| **Course Name** | **ENGINEERING MECHANICS** | **Max. Marks** | **100** |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | |
| 1. | How would you define a Scalar Quantity? | CO1 | R | 1 |
| 2. | How would you represent the resultant of two forces in magnitude and direction by Parallelogram law of forces? | CO2 | R | 1 |
| 3. | Compare the restraints in a fixed and hinged support. | CO1 | U | 1 |
| 4. | Differentiate between a Moment and Moment Couple. | CO2 | An | 1 |
| 5. | Recognise the method by which forces in few members of a bridge truss can be determined. | CO3 | A | 1 |
| 6. | Relate limiting force of friction (F) and normal reaction (R). | CO2 | U | 1 |
| 7. | Define ‘Solid friction’. | CO1 | R | 1 |
| 8. | Estimate the value of moment of inertia of a triangle with a base width of 5cm and height of 7cm about it base. | CO3 | E | 1 |
| 9. | Can you state the equation for determining final velocity of body in dynamics? | CO3 | R | 1 |
| 10. | How would you relate linear velocity with angular velocity? | CO2 | U | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | |
| 11. | State ‘Triangular law of forces’ | CO1 | U | 3 |
| 12. | Three parallel forces F1, F2 and F3 are acting on a body as shown in Figure and the body is in equilibrium. If force F₁ = 250 N and F3 = 1000 N and the distance between F₁ and F2 = 1.0 m, then determine the magnitude of force F2 and the distance of F2 from force F3  F1 = 250 N  F3 = 1000 N  B  C  A  F2  1.0 m  x | CO3 | An | 3 |
| 13. | A body of weight 80 Newton is placed on a rough horizontal plane. Determine the co-efficient of friction if a horizontal force of 50 Newton just causes the body to slide over the horizontal plane. | CO3 | An | 3 |
| 14. | How would you apply parallel axis theorem in the determination of Moment of Inertia of plane figures? | CO1 | A | 3 |
| 15. | How would you determine Polar Moment of Inertia? | CO1 | An | 3 |
| 16. | Distinguish between momentum and angular momentum. | CO2 | An | 3 |

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| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | |
| 17. | a. | The three like parallel forces of magnitude 50 N, F and 100 N are shown figure given below. If the resultant R = 250 N and is acting at a distance of 4 m from A, then find  (i) Magnitude of force F. (ii) Distance of F from A. | CO3 | An | 6 |
|  | b. | The five forces F1, F2, F3, F4 and F5 are acting at a point on a body as shown in the figure, and the body is in equilibrium. If F1= 18 N, F₂ = 22.5 N, F3 = 15 N and F4 = 30 N, find the force F5 in magnitude and direction. | CO3 | An | 6 |
|  |  |  |  |  |  |
| 18. | a. | Two forces P and Q are acting at a point O as shown in the figure. The force P = 264.9 N and force Q = 195.2 N. If the resultant of the forces is equal to 400 N then find the values of angles β, γ, α | CO3 | An | 6 |
|  | b. | A system of parallel forces are acting on a rigid bar as shown in the figure. Reduce this system to: (i) a single force, (ii) a single force and a couple at A and (iii) a single force and a couple at B. | CO3 | A | 6 |
|  |  |  |  |  |  |
| 19. |  | Determine the forces in all the members of the truss given below by selecting a suitable method. | CO6 | An | 12 |
|  |  |  |  |  |  |
| 20. |  | Evaluate the moment of Inertia of an I section as shown in figure about xx axis and yy axis. | CO3 | E | 12 |
|  |  |  |  |  |  |
| 21. | a. | State the Laws of Coulomb Friction. | CO1 | U | 6 |
|  | b. | The force required to pull a body of weight 50 N on a rough horizontal plane is 15 N. Determine the co-efficient of friction if the force is applied at an angle of 15° with the horizontal. | CO3 | An | 6 |
|  |  |  |  |  |  |
| 22. | a. | A body of weight 500 N is pulled up an inclined plane, by a force of 350 N. The inclination of the plane is 30° to the horizontal and the force is applied parallel to the plane, Determine the co-efficient of friction. | CO3 | An | 6 |
|  | b. | A uniform ladder of length 10 m and weighing 20 N is placed against a smooth vertical wall with its lower end 8 m from the wall. In this position the ladder is just to slip. Determine:  (i) the co-efficient of friction between the ladder and the floor, and  (ii) frictional force acting on the ladder at the point of contact between ladder and floor. | CO3 | An | 6 |
|  |  |  |  |  |  |
| 23. | a. | Prove that the angular momentum of a rotating body is equal to the product of moment of inertia and angular velocity. | CO2 | E | 4 |
|  | b. | Find the work done in drawing a body:  (i) Weighing 500 N. through a distance of 5 m along a horizontal surface by a horizontal force of 250 N and (ii) Weighing 500 N through a distance of 5 m along a horizontal surface by a force of 200 N whose line of action makes an angle of 30° with the horizontal. | CO3 | An | 8 |
| **COMPULSORY QUESTION** | | | | | |
| 24. |  | Derive the mathematical expression for angular velocity, angular acceleration, Relation between Linear and Angular velocity, Angular acceleration, Relation between linear and angular acceleration, Equation of Angular displacement and equation for angular displacement in terms of initial and final velocities. | CO1 | A | 12 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| **CO1** | Illustrate the concepts and principles of Engineering Mechanics |
| **CO2** | Explain the behavior of structural elements |
| **CO3** | Analyze the structural members for various forces |
| **CO4** | Estimate the response of the elements |
| **CO5** | Develop suitable response intricacies |
| **CO6** | Adapt suitable analysis procedure |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | 2 | 10 | 15 | 3 |  |  | 30 |
| **CO2** | 1 | 2 | - | 4 | 4 |  | 11 |
| **CO3** | 1 | - | 7 | 50 | 13 |  | 71 |
| **CO4** |  |  |  |  |  |  | - |
| **CO5** |  |  |  |  |  |  | - |
| **CO6** | - | - | - | - | 12 |  | 12 |
|  | | | | | | | **124** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **21CE3003** | **Duration** | **3hrs** |
| **Course Name** | **ADVANCED DESIGN OF CONCRETE STRUCTURAL SYSTEMS** | **Max. Marks** | **100** |

IS 456, IS 1893 PI, IS 875 PIII, IS 13920 Codes are permitted

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (5 X 16 = 80 MARKS)**  **(Answer any five from the following)** | | | | | |
| 1. | a. | Analyse and Design the deep beam for the following data  Span of the beam – 3.5m  Effective depth – 2.5m  Loading – 50kN/m  M40 grade of concrete and Fe550 steel | CO4 | An | 16 |
|  |  |  |  |  |  |
| 2. | a. | Compute the design wind pressure for the following data  Size of the RC building 25X25 m  Total height of the building – 12m  Bay width in X-dir – 5m  Bay width in Y-dir – 5m  Bay height in Z-dir – 3m (height)  Location – Chennai, Consider the proposed building is closely surrounded by many structures. | CO2 | An | 16 |
|  |  |  |  |  |  |
| 3. | a. | Compute the base shear of building frame located in Delhi for the following data, Also distribute the base shear along the height of the frame  Size of the building 25X40 m  Total height of the building – 12m  Bay width in X-dir – 5m  Bay width in Y-dir – 5m  Bay height in Z-dir – 4m (height)  Thickness of slab – 150 mm and Floor finish – 1kN/m2  Live load - 3kN/m2  Size of beam 230x350mm, Size of column 230x500mm  Type of soil - Medium | CO2 | An | 16 |
|  |  |  |  |  |  |
| 4. | a. | Evaluate the design strength of shear wall of length 4.5m and thickness of 175mm for the following data, Check the requirements of Boundary elements.  Axial load (DL+LL) – 2200kN  Bending moment (DL+LL) – 320kNm, Bending moment (EL) – 2500kNm  Base shear (EL) – 1400kN  EL – Earthquake load  Grade of concrete – M30, Grade of steel – Fe550 | CO5 | E | 16 |
|  |  |  |  |  |  |
| 5. | a. | Assess the load carrying capacity of corbel for the following data  Load on the corbel – 1200kN  Distance of loading point from the surface of column – 250mm  Size of column –500x500mm  M30 grade of concrete and Fe550 steel | CO4 | E | 16 |
|  |  |  |  |  |  |
| 6. | a. | Evaluate the details ductile reinforcement for a beam of size 230x500mm, subjected to the following loads. Span – 6m, M30 concrete and Fe 500 steel, as per IS 13920.   |  |  |  |  | | --- | --- | --- | --- | |  | DL | LL | SL | | Moment (kNm) | 140 | 70 | 300 | | Shear (kN) | 130 | 55 | 130 | | CO4 | E | 16 |
|  |  |  |  |  |  |
| 7. | a. | Analyse and Design the Flat slab structural system for the following details.  Panel size – 6x6m  Live load- 6kN/m2  Size of column – 500x500mm  M50 grade of concrete and Fe550 steel  Provide suitable drop panel | CO3 | An | 16 |
| **PART – B (1 X 20 = 20 MARKS)**  **(Compulsory Question)** | | | | | |
| 8. | a. | Discuss the ductile design and detailing considerations of compression members with suitable examples. | CO5 | U | 20 |

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|  | **COURSE OUTCOMES** |
| CO1 | Identify the behavior of structural elements |
| CO2 | Analyse the structure for different loading system |
| CO3 | Design the RC structures for its behaviour |
| CO4 | Design and detail the structural elements |
| CO5 | Adopt suitable structural systems to ensure the stability |
| CO6 | Understand the reasons for the failure of structural system |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| CO / P | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | - | - | - | - | - | - | - |
| CO2 | - | - | - | 32 | - | - | 32 |
| CO3 | - | - | - | 16 | - | - | 16 |
| CO4 | - | - | - | 16 | 32 | - | 48 |
| CO5 | - | 20 | - | - | 16 | - | 36 |
| CO6 | - | - | - | - | - | - | - |
|  | | | | | | | **132** |



**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| **Course Code** | **21CE3004** | **Duration** | **3hrs** |
| **Course Name** | **ADVANCED DESIGN OF STEEL STRUCTURES** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (5 X 16 = 80 MARKS)**  **(Answer any five from the following)**  **IS 800, IS 801, IS 875, SP 6 and Steel Tables are permitted** | | | | | |
| 1. |  | Write short notes on the following.   1. Failure modes of bolted connection 2. Lateral torsional buckling | CO2  CO6 | A  A | 8  8 |
|  |  |  |  |  |  |
| 2. |  | Analyze the bending capacity of laterally restrained beam section for the dead and live load of 25kN/m. Span of beam 6m. Fe 250 grade steel. | CO3 | An | 16 |
|  |  |  |  |  |  |
| 3. |  | Design bolted connection for the following data. Dia of bolt -16mm, Gauge of 75mm, pitch 50mm, edge and end distance of 40mm. Also, predict the least load carrying capacity of the bolt. | CO4 | U | 16 |
|  |  |  |  |  |  |
| 4. |  | Evaluate the moment and shear capacity of welded plate girder beam section in a pre-engineered building. Span of the beam is 6m. Assume the beam is fixed at both ends.  Width of flange – 250mm  Thickness of flange – 10mm  Depth of web – 400mm  Thickness of web – 8mm | CO3 | E | 16 |
|  |  |  |  |  |  |
| 5. |  | A column section ISHB 400 carries a factored compressive load of 1000kN. Estimate the capacity of base plate and its connection. Grade of concrete M30. | CO4 | U | 16 |
|  |  |  |  |  |  |
| 6. |  | Calculate the Axial load capacity of column for the following data Axial load on column – 500KN, Pin ended column of length 3m. Assume suitable data (if any). | CO3 | A | 16 |
|  |  |  |  |  |  |
| 7. |  | Analyze the truss for the following data.  Determine the critical loads on the pitched roof truss for the following data (Dead, live and wind load)  Height of the column –6m  Span of the truss - 12m  Height of the truss - 3m  Spacing of the truss - 4.5m  Spacing b/w purlin - 1.5m c/c  Assume the roof covered with GI sheets and the building located in Delhi. | CO3 | An | 16 |
| **PART – B (1 X 20 = 20 MARKS)**  **(Compulsory Question)** | | | | | |
| 8. |  | Two channels of 180mmx80mm section with bent lips are connected with webs to act as beam. The thickness of the plate is 2.5mm and the depth of the lip is 25mm. The beam has an effective span of 4.5m. Evaluate the load carrying capacity of beam. Take fy-235N/mm2 | CO4 | E | 20 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
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|  | **COURSE OUTCOMES** |
| CO1 | Identify appropriate structural steel section |
| CO2 | Explain the behavior of different steel structural elements |
| CO3 | Perform analysis of steel structures |
| CO4 | Design the components of steel structural elements and connections |
| CO5 | Appraise on the quality parameters for steel structures |
| CO6 | Investigate the reasons for failure of a steel structure |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | - | - | - | - | - | - | - |
| CO2 | - | - | 8 | - | - | - | 8 |
| CO3 | - | - | 16 | 32 | 16 | - | 64 |
| CO4 | - | 32 | - | - | 20 | - | 52 |
| CO5 | - | - | - | - | - | - | - |
| CO6 | - | - | 8 | - | - | - | 8 |
|  | | | | | | | **132** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| **Course Code** | **22CE2002** | **Duration** | **3hrs** |
| **Course Name** | **SMART CITIES: THE FUTURE OF CITY LIFE** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **Marks** |
| **PART – A (10 X 1 = 10 MARKS)**  **(Answer all the questions)** | | | | | |
| 1. | Define green building. | | CO1 | R | 1 |
| 2. | List any two SDGs. | | CO1 | R | 1 |
| 3. | State RFID. | | CO2 | R | 1 |
| 4. | Identify the year that India launched 100 Indian smart cities by prime minister. | | CO1 | R | 1 |
| 5. | Describe mobile cloud computing. | | CO2 | U | 1 |
| 6. | List the benefits of smart cities. | | CO1 | R | 1 |
| 7. | Define IoT. | | CO2 | R | 1 |
| 8. | Define solar photovoltaic. | | CO3 | R | 1 |
| 9. | Define geocoding. | | CO3 | R | 1 |
| 10. | List the benefits of wind energy. | | CO3 | R | 1 |
| **PART – B (6 X 3 = 18 MARKS)**  **(Answer all the questions)** | | | | | |
| 11. | Explain project management phases. | | CO3 | U | 3 |
| 12. | Interpret machine to machine technology. | | CO4 | U | 3 |
| 13. | List any three disadvantages of RFID. | | CO2 | R | 3 |
| 14. | Illustrate application of mobile cloud computing. | | CO2 | U | 3 |
| 15. | Explain need of smart cities. | | CO1 | U | 3 |
| 16. | List IoT application in smart cities. | | CO3 | R | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | |
| 17. |  | Report recent trend of solar energy for smart village as a case study. | CO3 | U | 12 |
|  |  |  |  |  |  |
| 18. |  | Explain policies involved in smart cities. | CO5 | U | 12 |
|  |  |  |  |  |  |
| 19. |  | Write about sustainable development goals. | CO1 | A | 12 |
|  |  |  |  |  |  |
| 20. |  | Articulate low arbitrary satellite imagery using neat and clean diagram. | CO6 | A | 12 |
|  |  |  |  |  |  |
| 21. |  | Summarize the application of social media. | CO4 | U | 12 |
|  |  |  |  |  |  |
| 22. |  | Interpret urban poverty in reference to smart cities. | CO6 | U | 12 |
|  |  |  |  |  |  |
| 23. |  | Write about city building as industries in the context of Government of India. | CO5 | A | 12 |
| **COMPULSORY QUESTION** | | | | | |
| 24. |  | Determine application of computer vision for smart cities. | CO6 | U | 12 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL

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|  | **COURSE OUTCOMES** |
| CO1 | Illustrate the concept of smart cities |
| CO2 | Classify the components of smart city |
| CO3 | Examine the sustainability requirements for the various components |
| CO4 | Design the systems required for smart city |
| CO5 | Apply the regulations and policies |
| CO6 | Summarize the performance of various systems |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 4 | 3 | 12 | - | - | - | 19 |
| CO2 | 5 | 4 | - | - | - | - | 9 |
| CO3 | 6 | 15 | - | - | - | - | 21 |
| CO4 | - | 15 | - | - | - | - | 15 |
| CO5 | - | 12 | 12 | - | - | - | 24 |
| CO6 | - | 24 | 12 | - | - | - | 36 |
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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **23CE3001** | **Duration** | **3hrs** |
| **Course Name** | **CONTROL OF CORROSION IN CONCRETE STRUCTURES** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. |  | Explain the mechanism of corrosion with neat sketches. | CO1 | U | 20 |
|  |  | **(OR)** |  |  |  |
| 2. |  | Classify different types of corrosion, also discuss the factors affecting the effects of corrosion. | CO2 | R | 20 |
|  |  |  |  |  |  |
| 3. |  | Write the causes and effects of corrosion. | CO6 | A | 20 |
|  |  | **(OR)** |  |  |  |
| 4. |  | Discuss in detail the following types of test,  i) Acid attack  ii)Chloride attack  iii)Carbonation | CO3 | U | 20 |
|  |  |  |  |  |  |
| 5. |  | Analyze the influencing parameters that affects the corrosion performance of concrete structures as per the code guidelines. | CO6 | An | 20 |
|  |  | **(OR)** |  |  |  |
| 6. |  | Explain the corrosion mechanism evaluation and resistance of fiber reinforced high strength cementitious composites. | CO5 | U | 20 |
|  |  |  |  |  |  |
| 7. |  | Describe the types of corrosion protection methods with a detailed procedure. | CO3 | R | 20 |
|  |  | **(OR)** |  |  |  |
| 8. |  | List different types of materials and its application that are used for corrosion resistance in construction of RCC buildings. | CO4 | R | 20 |
| **PART – B (1 X 20 = 20 MARKS)**  **COMPULSORY QUESTION** | | | | | |
| 9. |  | Evaluate the corroded concrete member with any two types of suitable test methods. | CO5 | E | 20 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
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|  | **COURSE OUTCOMES** |
| CO1 | Identify the corrosion mechanism |
| CO2 | Classify the types of corrosion |
| CO3 | Select the appropriate methodology for testing the corrosion |
| CO4 | Adopt the suitable materials for corrosion protection |
| CO5 | Evaluate the corrosion damaged structures |
| CO6 | Analyse the extent of corrosion in concrete element |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | - | 20 | - | - | - | - | 20 |
| CO2 | 20 | - | - | - | - | - | 20 |
| CO3 | 20 | 20 | - | - | - | - | 40 |
| CO4 | 20 | - | - | - | - | - | 20 |
| CO5 | - | 20 | - | - | 20 | - | 40 |
| CO6 | - | - | 20 | 20 | - | - | 40 |
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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **23CE3002** | **Duration** | **3hrs** |
| **Course Name** | **ADVANCED CONCRETE TECHNOLOGY** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **Marks** |
| **PART – A (5 X 16 = 80 MARKS)**  **(Answer any five from the following)**  **IS 456:2000, IS 13311, IS 10262:2019 and ACI 211 are permitted** | | | | | |
| 1. | a. | Explain the steps involved in dry manufacturing process of cement. | CO1 | U | 8 |
|  | b. | Write different types of tests and its procedure used to check the cement quality. | CO1 | A | 8 |
|  |  |  |  |  |  |
| 2. | a. | List various types of aggregates used for concreting. | CO1 | R | 12 |
|  | b. | Describe Bingham model with neat sketches. | CO1 | R | 4 |
|  |  |  |  |  |  |
| 3. | a. | Examine the chemistry behind the hydration process. | CO2 | R | 12 |
|  | b. | Summarize the process involved in maturity of concrete and its influencing factors. | CO2 | U | 4 |
|  |  |  |  |  |  |
| 4. | a. | Discuss in detail the laboratory tests used for assessing self-compacting concrete. | CO3 | U | 12 |
|  | b. | Analyze the key influencing factors that affects the concrete mix design. | CO5 | A | 4 |
|  |  |  |  |  |  |
| 5. | a. | Explain the durability properties of concrete as per IS 456:2000. | CO3 | U | 8 |
|  | b. | Define the term Creep in concrete and write the factors affecting creep in concrete. | CO3 | R | 8 |
|  |  |  |  |  |  |
| 6. | a. | Discuss in detail about the evaluation of bond strength in concrete. | CO4 | A | 4 |
|  | b. | Write the procedure involved in non-destructive testing of concrete as per standards. | CO4 | A | 12 |
|  |  |  |  |  |  |
| 7. | a. | Design a concrete mix of grade M40 using Indian Standard Method  Zone of Fine aggregate – II  Specific gravity of fine aggregate – 2.52  Specific gravity of coarse aggregate – 2.92  Slump – 76 mm  Use 12.5 mm aggregate | CO5 | An | 10 |
|  | b. | Write the steps involved in designing the concrete based on British standards. | CO5 | R | 6 |
| **PART – B (1 X 20 = 20 MARKS)**  **(Compulsory Question)** | | | | | |
| 8. | a. | Briefly explain under water concreting and mass concreting with suitable examples. | CO6 | U | 10 |
|  | b. | Discover how green concrete and 3-D printed concrete construction lead to sustainable development. | CO6 | A | 10 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Recall the properties and testing procedure of concrete materials |
| CO2 | Identify suitable admixtures for concreting |
| CO3 | Determine the properties of fresh and hardened concrete |
| CO4 | Explain the field application of non-destructive testing of concrete |
| CO5 | Design concrete mix as per IS standard |
| CO6 | Describe the proportion for high performance concrete |

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| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 16 | 8 | 8 | - | - | - | 32 |
| CO2 | 12 | 4 |  |  |  |  | 16 |
| CO3 | 8 | 20 |  |  |  |  | 28 |
| CO4 |  |  | 16 |  |  |  | 16 |
| CO5 | 6 |  | 4 | 10 |  |  | 20 |
| CO6 |  | 10 | 10 |  |  |  | 20 |
|  | | | | | | | **132** |

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**END SEMESTER EXAMINATION – APRIL / MAY 2024**

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| --- | --- | --- | --- |
| **Course Code** | **23CE3002** | **Duration** | **3hrs** |
| **Course Name** | **ADVANCED CONCRETE TECHNOLOGY** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)**  **IS 456:2000, ACI 211 and IS 10262:2019 are permitted** | | | | | |
| 1. | a. | Explain the key stages involved in the cement manufacturing process. How does each stage contribute to the production of cement, and what are the primary materials and energy sources used? | CO1 | U | 10 |
|  | b. | Explain the different types of tests conducted to assess the quality of cement. | CO1 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 2. |  | Explain various types of admixtures used to modify the concrete performance. | CO1 | U | 20 |
|  |  |  |  |  |  |
| 3. |  | Describe the chemical reactions involved in the hydration process of cement. Explain the role of hydration products such as calcium silicate hydrate (C-S-H) and calcium hydroxide (CH) in the setting and hardening of concrete. | CO2 | U | 20 |
|  |  | **(OR)** |  |  |  |
| 4. |  | Discuss the different failure modes that can occur in concrete structures. Explain the factors contributing to each failure mode and discuss potential preventive measures to mitigate these failures. | CO2 | A | 20 |
|  |  |  |  |  |  |
| 5. | a. | Evaluate the factors responsible for the strength properties of Hardened concrete. | CO3 | U | 10 |
|  | b. | Define creep in concrete and briefly explain its significance in structural engineering. | CO3 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 6. |  | Describe workability in the context of concrete and elaborate on two specific methods used to assess the workability of concrete in detail. | CO3 | A | 20 |
|  |  |  |  |  |  |
| 7. | a. | Summarize the procedure involved in ultra-sonic pulse velocity and rebound hammer tests used to assess the concrete performance. | CO4 | U | 10 |
|  | b. | Briefly explain the methodology used for conducting rebar bar locator and corrosion analyzer tests in off-shore structures. | CO4 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 8. |  | Design the concrete mix for the following data as per IS 10262:2009  Characteristics strength of concrete – M30  Type of cement – OPC 53  Specific gravity of sand – 2.70  Specific gravity of coarse aggregate – 2.80  Size of coarse aggregate – 20mm  Water absorption – Nil  Grading of fine aggregate – Zone III  Workability - 100mm (slump)  Exposure condition - Moderate | CO5 | A | 20 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Briefly explain under water concrete and mass concreting with suitable examples. | CO6 | U | 10 |
|  | b. | Discover how green concrete and 3-D printed concrete lead to sustainable development. | CO6 | A | 10 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Recall the properties and testing procedure of concrete materials |
| CO2 | Identify suitable admixtures for concreting |
| CO3 | Determine the properties of fresh and hardened concrete |
| CO4 | Explain the field application of non-destructive testing of concrete |
| CO5 | Design concrete mix as per IS standard |
| CO6 | Describe the proportion for high performance concrete |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 |  | 40 |  |  |  |  | 40 |
| CO2 |  | 20 | 20 |  |  |  | 40 |
| CO3 |  | 20 | 20 |  |  |  | 40 |
| CO4 |  | 10 | 10 |  |  |  | 20 |
| CO5 |  |  | 20 |  |  |  | 20 |
| CO6 |  | 10 | 10 |  |  |  | 20 |
|  | | | | | | | **180** |