Programme: M. Tech. (CSE)   Session: 2021-22

Semester: Second   Max. Time: 3 Hours

Course Title: Machine Learning   Max. Marks: 70

Course Code: MT CS 201

Instructions:

1. Question no. 1 has seven parts and students are required to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and student are required to answer any two parts of each question. Each part carries seven marks.

Q 1.   (4X3.5=14)

   a) Define the Machine Learning. Also explain the types of machine learning techniques.

   b) What are the main applications of Machine Learning.

   c) Explain the Term Overfitting. What is the significance of term fitting?

   d) What is the use of Kernel Methods.

   e) How LMS weight update rule.

   f) Differentiate between the training set and validation set.

   g) What is basic principle of the BAYES' theorem.

Q 2.   (2X7=14)

   a) Differentiate between the classification and regression techniques.

   b) Explain the Linear Regression method with suitable example & its significance.

   c) Explain the Supervised learning. What are its advantages & disadvantages?

Q3.   (2X7=14)

   a) What is Bias and Variance? Also illustrate their trade-offs.

   b) What is working principle of the gradient descent method for learning. What are the uses of gradient descent method?

   c) What is Representational Power of Perceptron? How it is helpful in solving linear problems, explain with example.

Q 4.   (2X7=14)

   a) Compare the Maximum Likelihood and Least Square Error Hypothesis

   b) Explain the concept of EM Algorithm & also discuss Gaussian Mixtures.

   c) How Principle Component Analysis works? Explain in detail with the help of suitable examples.

Q 5.   (2X7=14)

   a) Write short note on Back Propagation Algorithms?

   b) Explain the vectorization and its significance.

   c) What are various elements of reinforcement learning?

CENTRAL UNIVERSITY OF HARYANA

Second Semester Term End Examinations August-September 2022

Programme: M.Tech (Computer Science Engineering)   **Session: 2021-22**

Semester: Second   **Max. Time: 3 Hours**

Course Title: Cyber Security   **Max. Marks: 70**

Course Code: MT CS 207

Instructions:

1. Question no. 1 has seven parts and students are required to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and students are required to answer any two parts of each question. Each part carries seven marks.

Q 1.   (4X3.5=14)

   a) What is Cryptography and Steganography?

   b) Explain Primitive root of a prime number using an example.

   c) Write in detail about the Weierstrass equation.

   d) Write two advantages of elliptic curves cryptography.

   e) Define Bilinear Mapping and its advantages and disadvantages.

   f) Compare POP3 and IMAP protocol.

   g) Briefly explain the application of cloud security in E-Commerce.

Q 2.   (2X7=14)

   a) Discuss the three major goals of information security.

   b) Describe the Data Encryption Standard algorithm.

   c) Explain the procedure to encrypt and decrypt the message using RSA cryptosystem.

Q3.   (2X7=14)

   a) Write the key exchange algorithm using elliptic curves.

   b) The given points are P = (3, 10) and Q = (9, 7) on elliptic curve $E_{23}(1, 1)$. Find the value of point R= P + Q and 2P to the equation of the form $y^2=x^3+ax+b$.

   c) How the Elliptic curves works? Also explain its version of digital signature.

Q 4.   (2X7=14)

   a) Discuss Zero Knowledge Proof (ZKP) encryption scheme in detail.

   b) Write short notes on pairing based cryptography.

   c) Describe identity based encryption. Also discuss its advantages and disadvantages.

Q 5.   (2X7=14)

   a) S/MIME provides for four message-related services: authentication, confidentiality, compression, and email compatibility. Discuss these services in detail.

   b) Explain the significant differences between S/MIME and OpenPGP.

   c) Discuss the cloud security through PKI technique.

CENTRAL UNIVERSITY OF HARYANA

<u>Second Semester Term End Examinations August- September 2022</u>

Programme: M.Tech CSE

Semester: 2nd Semester

Course Title: Advanced Algorithms

Course Code: MT CS 202

Session: 2021-22

Max. Time: 3 Hours

Max. Marks: 70

Instructions:

1. Question no. 1 has seven parts and students are required to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and student arerequired to answer any two parts of each question. Each part carries seven marks.

Q 1. (4X3.5=14)

a) What do you mean by an asymptotic notations? Explain different types of asymptotic notations with suitable examples.

b) Explain P,NP,NP-Hard and NP Complete Problems. Also give the relationship between each of the class.

c) Differentiate Fractional and 0-1 Knapsack problem.

d) Describe about Product of polynomial. Also, demonstrate it with an example.

e) Explain Properties and requirement of good algorithm

f) Explain GCD

g) Explain Modular arithmetic

Q 2. (2X7=14)

a) What are greedy algorithms? what are their characteristics. Explain any greedy algorithm with suitable example.

b) Explain Quick sort algorithm in detail. Analyse its time complexity also.

c) What is Dynamic programming? Explain any of its applications in detail.

Q3. (2X7=14)

a) Describe Binary search Tree with three traversal patterns .Give suitable example with neat diagram for all three traversals of binary search Tree.

b) What is minimum spanning tree? Which approach of algorithm is used to generate a minimum spanning tree.

c) Explain how to find closest pair of points. Why closest pair of points are used?

Q 4. (2X7=14)

a) Explain in detail the implementation of Strassen's Matrix Multiplication with an example.

b) Explain Travelling Salesman problem with a suitable example.

c) Differentiate between Prims and Krushkal algorithm.

Q 5.   (2X7=14)

a) Explain the detail about the vertex- corner problem with an example.

b) Describe proof of NP-Hard and NP Completeness.

c) Explain randomization Algorithm with a suitable example.

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Second Semester Term End Examinations August-September 2022

Programme: M.Tech. (Structural Engineering) **Session: 2021-22**

Semester: Second Semester **Max. Time: 3 Hours**

Course Title: Structural Dynamics **Max. Marks: 70**

Course Code: MTCE 202

Instructions: IS1893:2002 Indian Standard Code is allowed in the Exam

1. Question no. 1 has seven parts and students are required to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and student are required to answer any two parts of each question. Each part carries seven marks.

Q 1. (7X2=14)

    a) What are the classifications of Earthquake?

    b) What is the difference between Magnitude and Intensity of an earthquake?

    c) Explain Duhamel's Integral?

    d) A vibrating system consisting of a mass of 50 kg and a spring of stiffness 4×10^4 N/m is viscously damped. The ratio of two consecutive amplitudes is 20:18. Determine the natural frequency of undamped system. Also determine the damping ratio and damped natural frequency.

    e) What are different types of seismic waves?

    f) What are the principles of earthquake-resistant design of RC buildings?

    g) Describe the ultrasonic pulse velocity method.

Q 2. (2X7=14)

    a) Briefly explain the different types of plate margins with examples.

    b) Derive expression for response of a SDOF system subjected to free vibration..

    c) An SDOF system consists of a mass with weight of 175 kg and a spring constant, k = 530 kN/m. While testing the system a relative velocity of 30 cm/s was observed on application of a force of 450 N. Determine the damping ratio, damped frequency of vibration, logarithmic decrement, and the ratio of two consecutive amplitudes.

Q3. (2X7=14)

    a) Derive expression for response of a SDOF system subjected to damped free vibration. Draw the plot showing response of the structure to damped free vibration explaining salient features involved

    b) Derive the expression for logarithmic decrement for damped free vibration of SDOF for (a) Two successive cycles (b) Two cycles of N cycle apart

c) Plan of a four-storey RCC building is shown in Figure. Dead load including self weight of slab, finishes, etc. can be assumed as 2 kN/m² and live load as 3 kN/m² on each floor. Determine the lateral forces and shears at different storey levels. Assuming $z = 0.24$, $I = 1$, $R = 5$, soil type = Medium, storey height = 3.0 m.
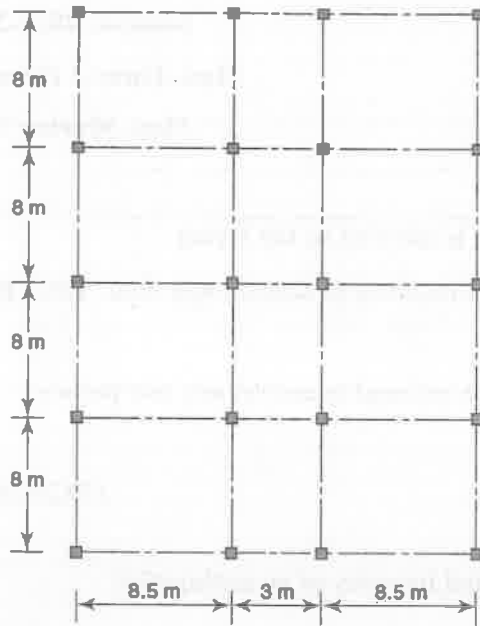
Q 4.   (2X7=14)

a) What are the local site effects which modifies the ground motion characteristics during an earthquake? Explain them briefly.

b) Explains the effects of Topography on ground motion characteristics.

c) What do you understand by diffraction of seismic waves? Explain the application of Huygens' principle in diffraction phenomenon.

Q 5.   (2X7=14)

a) What are different Non Destructive tests (NDT) performed for evaluation of Buildings?

b) Explain various types of vertical Irregularities in Irregular RCC Buildings with the help of diagrams.

c) Elaborate the quantitative methods of seismic evaluation of building.

CENTRAL UNIVERSITY OF HARYANA
Second Semester Term End Examinations September 2022

Programme: M.Tech (Civil) Structural Engineering
Session: 2021-22
Semester: 2ⁿᵈ Semester   **Max. Time: 3 Hours**
Course Title: Design of Bridges   **Max. Marks: 70**
Course Code: MTCE211

Instructions:
1. Question no. 1 has seven parts and students are required to answer any four. Each part carries three and half Marks.
2. Question no. 2 to 5 have three parts and students are required to answer any two parts of each question. Each part carries seven marks.
3. Use of **IRC: 5-1998, IRC: 6-2000, IRC: 112-2011,** and **IS: 456-2000** is allowed in the examination. Use of **Pigeaud's Design Charts, Steel tables and Graphs** is allowed in the examination. Assume any missing data suitably.

Q 1.   (4X3.5=14)
   a) Write a short note on identification of bridge. Also describe the length of bridge.
   b) Describe the requirements for an ideal bridge.
   c) Discuss the provision made for Secondary stresses as per IRC: 6-2000.
   d) Describe the criteria for limiting value of deflection in bridge deck slab as per IRC: 112-2011 and IS: 456-2000.
   e) Define bearing. Discuss the main function of bearing used in bridge structures.
   f) Describe the material used for construction of Piers and Abutments.
   g) Discuss the various different types of deep foundation adopted for bridges. Explain any one of them.

Q 2.   (2X7=14)
   a) Describe briefly the load characteristics of IRC Class AA and IRC Class 70 R wheeled and Tracked vehicle loading with neat and clean sketch
   b) Define Bridge. Draw the various component of Bridge with neat and clean sketch. Describe the classification of bridges on various parameters.
   c) What do you mean by Economical span? Derive an equation for the economical span of bridge stating clearly the assumption made in derivation.

Q3.   (2X7=14)
   a) Design a reinforced concrete slab culvert for a National highway crossing to suit the following data:
      Carriage way- Two lane (7.5 m wide);   Foot paths -1 m on either side
      Clear Span= 6m;   Wearing coat = 80 mm
      Width of bearing = 400mm
      Materials: M-25 Grade Concrete and Fe 415 Grade HYSD bars
      Design the reinforced concrete slab deck conform to the specification of IRC: 6-2014 and IRC: 112-2011.
   b) Briefly explain the various types of bridge decks slab generally adopted in different types of high way bridges.
   c) With the help of Pigeaud's Curves find out the dispersion of wheel load for wearing coat only, dispersion of wheel load through wearing coat and structural slab at 45°, dispersion of wheel load through wearing coat and structural slab at 85.9° for the following data: IRC Class A wheel load= W= 57 kN; wheel contact dimensions= 500mm by 250mm; Thickness of wearing coat = D= 80 mm; Thickness of Structural Slab =H= 200 mm; Dimension of slab: L =4m and B=2m, Poisson's ratio= μ= 0.15

Q 4.   (2X7=14)
   a) Estimate the different quantity like Weight of vertical side walls, Soil pressure, uniform lateral pressure due to effect of superimposed dead load and live surcharge, uniform lateral pressure due to effect of superimposed dead load surcharge only and intensity of water pressure for a reinforced box culverts having a clear vent way of 3m*3 m. the superimposed dead load on the culvert is 12.8 kN/m². The live load is

estimated is 50 kN/m². Density of soil at site is 18 kN/m³. Angle of repose is 30°. Adopt M-20 grade concrete and Fe 415 HYSD bars.

b) Design a R.C.C. T beam girder to suit the following data:

a) Clear width of carriage way = 7.5

b) Span (Centre to centre of bearing) = 16 m

c) Kerbs on either side = 600 by 300 mm

d) Live Load: IRC Class AA tracked vehicle

e) Thickness of wearing coat = 80 mm

f) Material M-25 grade and Fe 415 HYSD reinforcement

Using the Courbon's Method, compute the design moments and shear force for the deck slab conforming to the specifications of IRC 6-2014 and IRC: 112-2011.

c) Briefly discuss the typical structural elements of a reinforced concrete T beam and slab bridge deck and their function. Under what situation you would prefer to adopt reinforced concrete T beam and slab bridge deck for highway crossing.

Q 5.   (2X7=14)

a) Describe with sketches the types of piers used for R.C.C bridges. List the various forces acting on pier. How do you evaluate these forces?

b) Briefly explain the necessity of using Abutments. Also discuss the method of checking the stability of abutment subjected to dead load, live load and earth pressure from backfill.

c) A Pier shown in fig 1 supports the deck forming a major highway. The various forces acting on the Pier are listed below:

a) Dead load from each span = 2000 kN

b) Reaction due to Live load on one span = 1000 kN

c) Braking forces = 140 kN

d) Wind pressure on Pier = 2.4 kN.m²

e) Material of Pier = 1:3:6 cement concrete

f) Density of Concrete = 24 kN/m³
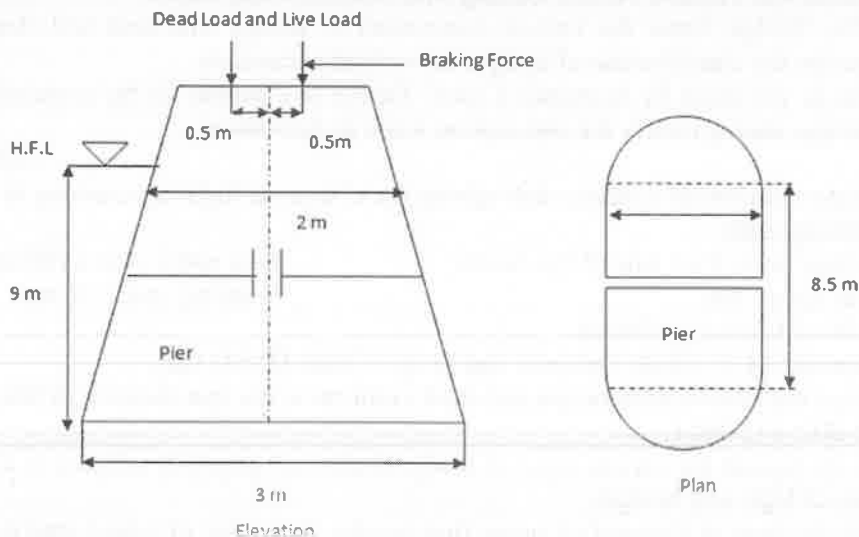
Fig.No.1

Calculate the stress developed at the base of the Pier due to the following cases: **1)** Dead load and self weight of the Pier; **2)** Effect of buoyancy **3)** Due to eccentricity of live load; **4)** Due to longitudinal braking forces. Also estimate the maximum and minimum stresses developed at the base of the Pier due to critical combination of the various loads.

Programme: M.Tech. (Structural Engineering)   Session: 2021-22

Semester: Second   Max. Time: 3 Hours

Course Title: Earth Retaining Structures   Max. Marks: 70

Course Code: MT CE 214

Instructions:

1. Question no. 1 has seven parts and students are required to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and student are required to answer any two parts of each question. Each part carries seven marks.

Q 1.   (4x3.5=14)

 a) What are different types of retaining walls? Discuss in brief with neat sketches.

 b) A sandy loam backfill has a cohesion of $12kN/m^2$ and $\phi = 20°$. The unit weight is 17 kN/m^3 and the height of retaining wall is 6m. What is the depth of tension cracks? Also sketch the distribution of active earth pressure.

 c) How do you calculate the depth of embedment of sheet pile in cohesive soil? Briefly discuss step by step procedure and draw the pressure distribution diagram.

 d) A cantilever sheet pile retains soil to a height of 5 m. Find the depth to which the pile should be driven. Take $\gamma = 19 \ kN/m^3$ and $\phi = 30°$. Use approximate method.

 e) Briefly discuss about the proportioning of the cantilever retaining wall.

 f) Write a brief critical note on Taylor's Stability Number.

 g) Draw the earth pressure distribution diagram for a retaining wall with (a) inclined backfill (b) stratified cohesionless backfill. Assume passive earth pressure conditions.

Q 2.   (2x7=14)

 a) A 4m high vertical retaining wall supports a saturated cohesive soil ($\phi = 0$) with horizontal surface. The top 2.5 m of the backfill has bulk density of 17.6 kN/m^3 and apparent cohesion of 15 kN/m^2. The bulk density and apparent cohesion of the bottom 1.5 m is 19.2 kN/m^2 and 20 kN/m^3 respectively. If tension crack develop, what would be total active pressure on the wall? Also determine the line of action of resultant thrust.

 b) An 8 m high retaining wall supports a 5.5 m deep sand ($\gamma_d = 18.5 \ kN/m^3$, $\phi = 34°$) overlying a saturated sandy clay ($\gamma_{sat} = 20.3 \ kN/m^3$. $\phi = 28°$, c= 17 kPa). The groundwater level is located t the interface of two layers. Sketch the lateral stress distribution up to a depth of 8 m for an active condition.

 c) With suitable illustration. describe the Culmann's trial wedge method of graphical construction for non-cohesive backfill under active earth pressure conditions.

Q3.   (2X7=14)

a) Differentiate critically the classical earth pressure theories of Rankine and Coulomb.

b) What are different modes of failure of retaining walls? Explain with the help of sketches.

c) What are the design criteria to be satisfied for the stability of the gravity retaining wall? Indicate briefly how will you ensure the same.

Q 4.   (2X7=14)

a) An anchored sheet pile is to be designed to retain a granular backfill of 9 m height above the dredge level. The anchor rod is provided at a depth of 1 m below the top level of the fill. Assuming that the water table is 2 m below the top of the fill and that the soil of fill as well as below the dredge level to have same properties: $c = 0$, $\gamma = 17$ kN/m^3, $\gamma' = 10$ kN/m^3 and $\phi = 30°$, compute the depth of embedment and force in the anchor rod. Assume free earth support conditions and increase the computed depth of embedment by 40%.

b) The height of a cantilever sheet pile from the top of the dredge level is 9 m. The water level in the backfill is at 2 m from the top. Find the depth of penetration required for a factor of safety equal to 1. Assume that above water table, the soil is dry. The other properties of the soil are: $\gamma_{sat} = 2$ t/m^3, $\phi = 30°$, $G_s = 2.6$.

c) What is cofferdam? Give classification of cofferdam with neat diagrams.

Q 5.   (2X7=14)

a) What do you understand by an earthen dam? Discuss classification of earthen dam with neat diagram.

b) Explain the method of slices for the stability analysis of finite slopes.

c) Briefly discuss the stability of earth dam during steady seepage and rapid drawdown condition with suitable illustration.

Course Code: MTCE 201   **Max Time: 3 hrs.**
Course Title: Advanced Structural Analysis   **Max Marks: 70**

Instructions:
1. Question Number **one (PART-I)** is compulsory and carries 14 marks in total (Each PART carries 3.5 Marks). Attempt any 4 questions out of 7.
2. Question Numbers **2(two) to 5(five)** carry 14 marks each with internal choice. Attempt any 2 questions of your choice if question (**from Q2 to Q5**) carries 3 sub-parts of 7 marks each.

PART -I

Q1 Write a short note on following –   **(3.5×4=14 marks)**
   a) What do mean by indeterminacy of a structure and also explain its relation with the stability of structure.
   b) Write down the differences between stiffness and flexibility methods of Structural Analysis.
   c) What do you understand by static indeterminacy? Illustrate with sketch 1 & 2 degree statically indeterminate frames internal & external.
   d) What are the Local or Global co-ordinates? Explain briefly with neat sketches.
   e) Write down the properties of a Flexibility Matrix.
   f) Derive the expression for transformation of stiffness matrix from local to global coordinates.
   g) What are the differences between Force and Displacement method of structural a analysis? Explain briefly with the Example.

PART –II

Q2 (a) Briefly explain different types of coordinate systems with neat sketches in matrix analysis   **(07 marks)**
(b) Generate the flexibility matrix for a cantilever beam span L, flexural. rigidity EI, subjected to actions A1 and A2 at the free end in below Fig.1   **(07 marks)**
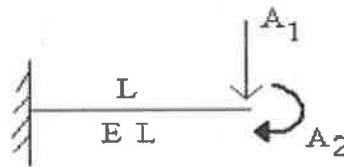

Fig. 1

(c)Write down the procedure for the construction of stiffness matrix using a cantilever beam with a point load on free end.   **(07 marks)**

Q3 Analyze the truss given below in Fig. 2 by Stiffness matrix method. Take EI as constant throughout the span   **(14 marks)**

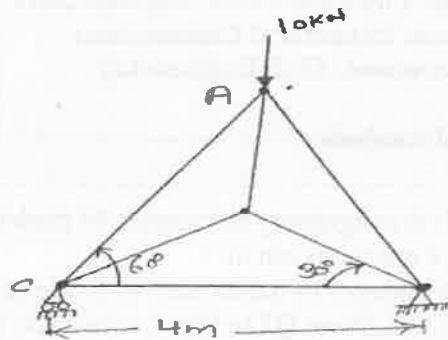Fig. 2

or

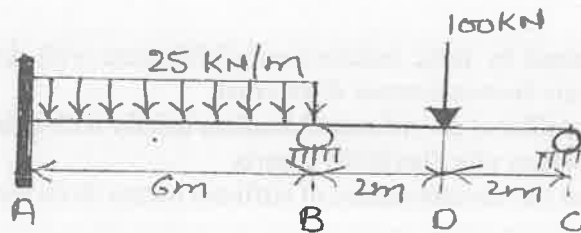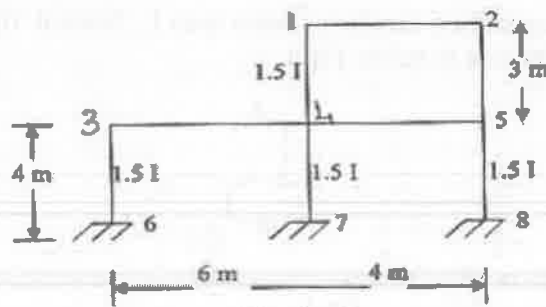**Q3** Analyze the Beam given in fig.3 below by Flexibility matrix method. Take EI=constant throughout the span.   **(14 marks)**

Fig. 3

Q4 Determine the global stiffness matrix for the structure in fig.4. Neglect axial deformations in columns. Assume horizontal displacements of node 1 and node 2 as same and assume equal horizontal displacement at nodes 3, 4, and 5.   **(14 Marks)**

Fig . 4

or

Q4 Analyze the Frame given in Fig. 5 by Flexibility matrix method. Take EI as constant throughout the span **(14 marks)**
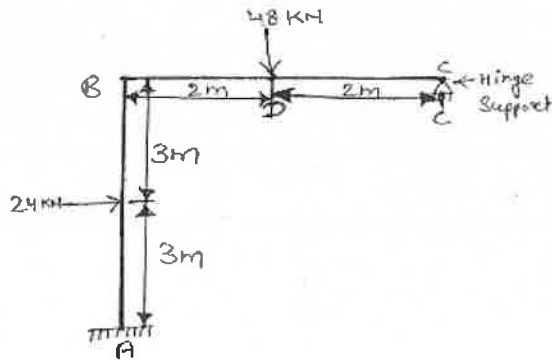

Fig. 5

Q5 (a) Discuss the role of computer programming in Matrix method of Structural Analysis?
(07 Marks)
(b) How Matrix Method is dependant on Indeterminacy of a Structure. Discuss with the suitable example. **(07 Marks)**
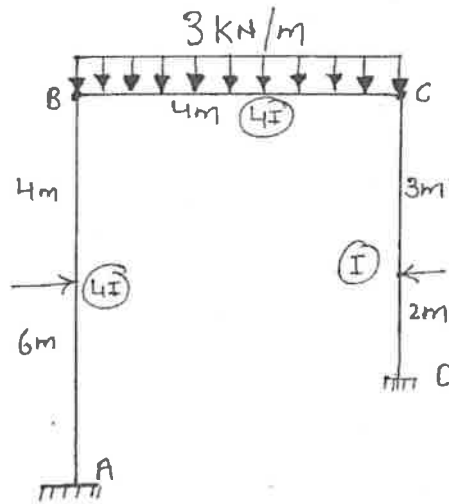(c) Construct the Stiffness matrix by structure approach for the Portal Frame given in Fig.6. Take EI as constant throughout the span. **(07 Marks)**

Fig.6

<u>**Second Semester Term End Examinations September 2022**</u>

Programme: M. Tech	**Session: 2021-22**
Semester: Third	**Max. Time: 3 Hours**
Course Title: Disaster Management	**Max. Marks: 70**
Course Code: MT AU 102	

Instructions:

1. Question no. 1 has seven parts and students are required to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and student arerequired to answer any two parts of each question. Each part carries seven marks.

Q 1.   (4X3.5=14)

    a) Given the names of areas prone to flood, avalanches and cyclone in India?

    b) What are the structural non structural mitigations of disaster?

    c) What are the disaster risks? Describe their concepts and elements?

    d) Describe the oil spill with two suitable examples in details?

    e) Explain what would be the strategy of survival in the period of disaster?

    f) What would be the technique of disaster risk assessment?

    g) Give the details account of Bhopal Gas Tragedy?

Q 2.   (2X7=14)

    a) What is remote sensing? Describe the applications in details?

    b) What are the disaster risks: concept and elements, Disaster risk reduction, global and National disaster risk situations?

    c) Give brief account of the meaning, concept and strategy of disaster mitigation? Emerging trend in mitigation?

Q3.   (2X7=14)

    a) How to do disaster management? What could be the possible post disaster action taken by individual and government body discuss in details?

    b) What are the landslide and avalanches? Their causes, impact on environment discuss in details?

    c) What is earthquake? Causes of earthquake, Seismic waves and seismic zones in Indian scenario discuss in details?

Q 4.   (2X7=14)

    a) What is volcanism, factors and impact on environment?

    b) Define the flood, types and their impact on individual and environment discuss in details?

    c) Give the detailed explanation of Man-made and natural disaster and also provide the details of at least two examples for both?

Q 5.   (2X7=14)

a) What is the drought define the causes, impact on man and environment explain in details?

b) What is the tsunami, define the causes and impact on environment?

c) Define the disaster, factors and significance, difference between hazard and disaster, nature types and magnitudes of disaster?

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Second Semester Term End Examinations August- September 2022

Programme: M.Tech. (Structural Engineering)   **Session: 2021-22**

Semester: Second   **Max. Time: 3 Hours**

Course Title: Advanced Concrete Technology   **Max. Marks: 70**

Course Code: MTCE 203

Instructions:

1. Question no. 1 has seven parts and students are required to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and student is required to answer any two parts of each question. Each part carries seven marks.

Q 1.   (4X3.5=14)

   a) Define stress-strain behaviour of Concrete with the help of diagram.

   b) Define Ready mix concrete and its advantages.

   c) Define pozzolanic materials and enlist any three different types of pozzolanic materials.

   d) Define rheology of fresh concrete and write an equation for linear and non-rheological model.

   e) Explain Air entrained concrete and its advantages.

   f) Define rebound number and its application in concrete technology.

   g) Define ferro-cement materials and its application areas.

Q 2.   (2X7=14)

   a) Enlist classification of construction materials. Explain any five in detail.

   b) Define green buildings. Explain in detail the criteria of green building in accordance to CPWD green rating manual 2019.

   c) Differentiate between chemical and mineral admixtures. Explain with the help of examples.

Q3.   (2X7=14)

   a) Explain in detail various methods of handling and placing of concrete.

   b) Explain the concept of variability in concrete strength. Discuss the IS guidelines for acceptance criteria of concrete cubes.

c) State the physical significance of rheology of concrete. Also, explain the effects of rheological parameters on pumping of the concrete.

Q 4.   (2X7=14)

   a) Write the classification of construction methods. Explain in detail any four modern construction methods.

   b) Define bridge construction including segmental construction. Write and explain classification of segmental bridges.

   c) Define mechanism of corrosion in concrete structures subjected to different environments.

Q 5.   (2X7=14)

   a) Define distress. Explain the mechanism of deterioration in concrete.

   b) Define Self-Compacting Concrete. Explain the acceptance criteria of SCC in accordance to EFNARC 2002 and EFNARC 2005.

   c) Define UPV. Explain in detail the method of calibration of UPV test to determine the strength of concrete.

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Second Semester Term End Examinations August- September 2022

Programme: M. Tech   Session: 2021-22

Semester: Second   Max. Time: 3 Hours

Course Title: Disaster Management   Max. Marks: 70

Course Code: MT AU 102

Instructions:

1. Question no. 1 has seven parts and students are required to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and student arerequired to answer any two parts of each question. Each part carries seven marks.

Q 1.   (4X3.5=14)

    a) Given the names of areas prone to flood, avalanches and cyclone in India?

    b) What are the structural non structural mitigations of disaster?

    c) Describe the various causes & the effects of landslides.

    d) Describe the oil spill with two suitable examples in details?

    e) Explain what would be the strategy of survival in the period of disaster?

    f) What would be the technique of disaster risk assessment?

    g) Give the details account of Bhopal Gas Tragedy?

Q 2.   (2X7=14)

    a) What is remote sensing? Describe the applications in details?

    b) What are the disaster risks: concept and elements, Disaster risk reduction, global and National disaster risk situations?

    c) Give brief details of meaning, concept and strategy of disaster mitigation? Emerging trend in mitigation?

Q3.   (2X7=14)

    a) How to do disaster management? What could be the possible post disaster action taken by individual and government body discuss in details?

    b) What are the landslide and avalanches? Their causes, impact on environment discuss in details?

    c) What is earthquake? Causes of earthquake, Seismic waves and seismic zones in Indian scenario discuss in details?

Q 4.   (2X7=14)

    a) Give in the details what is volcanism, factors and impact on environment?

    b) Define the flood, types and their impact on individual and environment discuss in details?

c) Give the detailed explanation of Man-made and natural disaster provide the details of at least two examples for both?

Q 5.   (2X7=14)

a) What is the drought, causes, impact on man and environment explain in details?

b) Discuss in details about the tsunami, causes and impact on environment?

c) Define the disaster, factors and significance, difference between hazard and disaster, nature types and magnitudes of disaster?

CENTRAL UNIVERSITY OF HARYANA

Second Semester Term End Examinations August-September 2022

Programme: M.Tech. (Energy Systems & Management)   Session: 2021-22

Semester: II   Max. Time: 3 Hours

Course Title: Power Quality   Max. Marks: 70

Course Code: MTESM-204

Instructions:

1. Question no. 1 has seven parts and students are required to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and student are required to answer any two parts of each question. Each part carries seven marks.

Q 1.   (4X3.5=14)

    a) What are the causes for interruptions?

    b) Define THD and TDD of harmonic spectrum?

    c) Explain about flicker?

    d) What are the causes for swells and interruptions?

    e) Write different types of DG technologies?

    f) Describe capacitor for voltage regulation?

    g) Explain passive filters?

Q 2.   (2X7=14)

    a) What is the impact of transient on power quality? Classify the transients that occurs in power systems?

    b) Write down the IEEE power quality standards?

    c) What are the Power Quality (PQ) problems? Draw the flow chart for the PQ problems in any industry?

Q3.   (2X7=14)

    a) Explain the effects of harmonic distortion on (i) Transformers and (ii) Motors.

    b) Explain briefly about various harmonic characterization on power systems.

    c) Explain the significance of harmonic index. Explain the general harmonic indices used universally in analyzing harmonic distortion.

Q 4.   (2X7=14)

    a) Discuss how the capacitors are used for voltage regulation in power systems in shunt and series configuration.

    b) List out the Power Quality (PQ) problems created by drives system.

    c) Discuss the impacts of harmonics on capacitors and transformers.

Q 5.   (2X7=14)

    a) Explain about passive filters and active filters.

    b) Explain the principle of three phase voltage source converter with neat diagram.

    c) With the help of a neat diagram. explain the control method for single phase Active Power Factor Correction (APFC).

CENTRAL UNIVERSITY OF HARYANA

Programme: M.Tech (Energy System and Management)   **Session: 2021-22**

Semester: II   **Max. Time: 3 Hours**

Course Title: Solar Thermal Technologies and applications   **Max. Marks: 70**

Course Code: **MTESM-202**

Instructions:

1. Question no. 1 has seven parts and students need to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and students need to answer any two parts of each question. Each part carries seven marks.

Q 1.   (4X3.5=14)

  a) List the renewable energy resources which find their origin in the Sun.

  b) Define the terms: (i) Clarity index, (ii) Concentration ratio.

  c) What is Green-house effect? Explain in short note.

  d) Define 'solar thermal energy'.

  e) What do you mean by Evacuated collector?

  f) What is the function of an 'energy storage system'?

  g) What is "Solar pond"?

Q 2.   (2X7=14)

  a) Describe the major components for design of a solar energy system.

  b) Explain the types of solar selective coatings in details.

  c) What is flat plate collector? Explain its operation and uses.

Q3.   (2X7=14)

  a) Explain the design parameters of a concentrating collector in a solar system and its importance.

  b) Write a review on thermal analysis of concentrating collectors in a solar system.

  c) Differentiate the advantages and disadvantages of concentrating collectors.

Q 4.   (2X7=14)

  a) Explain the construction and working principle of solar thermal power plant.

  b) What is Rankine cycle in power plant and how does a solar thermal Rankine cycle works?

  c) What is the function of a parabolic trough and how solar energy is harvested using parabolic trough?

Q 5.   (2X7=14)

  a) Describe the Integration of solar thermal system with industrial processes.

  b) Explain the economic parity of solar for industrial process heat.

  c) Explain the Solar thermal energy storage and its types.

CENTRAL UNIVERSITY OF HARYANA

Second Semester Term End Examinations August-September 2022

Programme: M.Tech   Session: 2021-22

Semester: II   Max. Time: 3 Hrs

Course Title: NON-LINEAR AND DIGITAL CONTROL SYSTEMS   Max. Marks: 70

Course Code: MTESM-210

Instructions:

1. Question no. 1 has seven parts and students are required to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and student are required to answer any two parts of each question. Each part carries seven marks.

Q 1.   (4X3.5=14)

   a) Differentiate between linear and non-linear control system.

   b) Explain autonomous and non-autonomous systems.

   c) What are typical non-linearities? Explain.

   d) What do you mean by sampling process?

   e) Compare digital control over conventional control.

   f) What is bilinear transformation?

   g) What is state transition matrix?

Q 2.   (2X7=14)

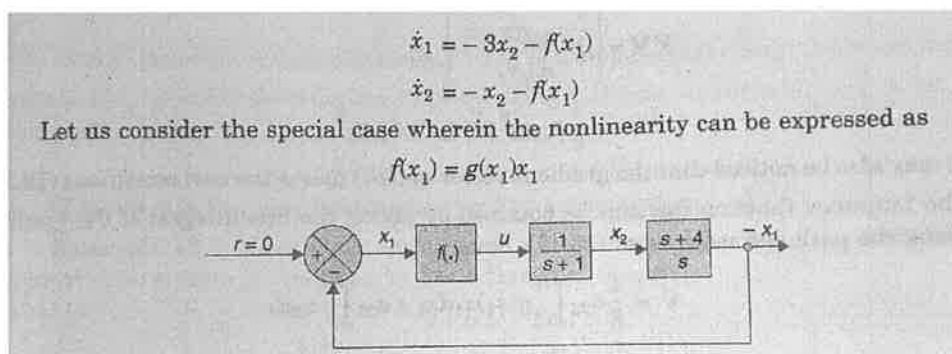   a) A discrete-time control system is characterized by the following difference equation,

$$y[n] = x^2(n) - x(n-1).x(n+1);$$

     where x(n) and y(n) denote the output and input of the discrete-time system, check whether is the system linear or non-linear?

   b) Explain stable node, unstable node and saddle point with suitable diagram.

   c) State and explain Liapunov's stability criterion for autonomous systems.

Q3.   (2X7=14)

   a) State and prove the direct method of Liapunov for linear system. How it will be used to check the stability of non-linear systems

   b) For the non-linear system shown in figure below the state equations are given, analyze the stability of the system using suitable Liapunov's function.


$$\dot{x}_1 = -3x_2 - f(x_1)$$
$$\dot{x}_2 = -x_2 - f(x_1)$$

Let us consider the special case wherein the nonlinearity can be expressed as

$$f(x_1) = g(x_1)x_1$$

c) What are phase trajectories? Explain the analytical method of construction of phase trajectories.

Q 4.   (2X7=14)
a) What do you mean by sampling, quantization and zero-order hold (ZOH)? Find the expression for quantization error and the transfer function of ZOH.
b) Find the range of K for which the unity feedback digital control system with plant transfer function G(s) is stable, where G(s)=K/(s(s+5)(s+1)
c) Explain the state space modelling and its solution for a discrete-time control system using z-transform.

Q 5.   (2X7=14)
a) Find the steady state error, for a unity feedback digital control system with plant transfer function G(s), where G(s)=K/s(s+5), sampling period T=1s and the reference signal is sum of unit step and unit ramp.
b) For the given sampled-data control system as shown in figure determine the characteristics equation in the z-domain and ascertain its stability via bilinear transformation.

$\delta_T(T = 1 \text{ sec})$

$r(t)$ $e(t)$ $e^*(t)$ $\dfrac{5}{s(s+1)(s+2)}$ $c(t)$
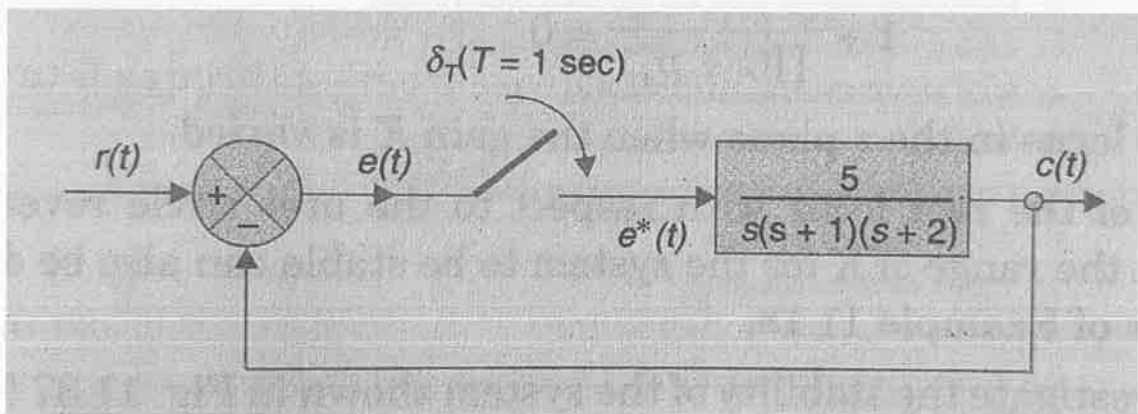
c) Give some recent applications of Digital Control and explain its advantages over classical control.

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Programme:	M.Tech (Energy System and Management)	**Session: 2021-22**
Semester:	II	**Max. Time: 3 Hours**
Course Title:	Management of Rural Energy System	**Max. Marks: 70**
Course Code:	**MTESM-201**	

Instructions:

1. Question no. 1 has seven parts and students need to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and students need to answer any two parts of each question. Each part carries seven marks.

Q 1. (4X3.5=14)

a) How many type of transmission line are there?

b) What is the load management system? Explain with example.

c) Defines: (i) Line-line fault, (ii) line-ground fault.

d) Which materials are used in transmission pole?

e) Explain the radial distribution networks?

f) Which methods are used in different faults detection?

g) Explain the precautions during the maintenance of line.

Q 2. (2X7=14)

a) Design the Route survey and profiling of distribution line with a suitable example.

b) Discuss the importance and technique of rural load management system.

c) What are the route surveys and profiling? Analyze the Route survey and profiling of transmission line with a suitable example.

Q3. (2X7=14)

a) Categorize the selection of insulators in power system with neat and clean diagram.

b) Explain with suitable diagram of types of Electric Poles in Overhead Transmission Lines.

c) Describe the basic types of distribution system designs in electrical power system and explain at least three problems, which arise during the design.

Q 4. (2X7=14)

a) Describe the operating principle, constructional features of Air Circuit Breaker and Air Blast Circuit Breaker for calculation of faults.

b) Explain the Load flow methods for transmission and distribution system with a suitable example.

c) Write a review of Fault Diagnosing Methods in Power Transmission Systems.

Q 5. (2X7=14)

a) Importance and methods of Maintenance of transmission and distribution lines in a power system.

b) Describe the Co-ordination between power and tele-communication lines.

c) Write a review on a distribution lines Case study of a typical system.