Hall Ticket Number : | | | | | | | | | | |

Code: 23A0521T

B.Tech. II Semester Regular Examinations July 2024
Data Structures
(Common to CSE, AI&DS, CSE(AI), CSE(DS) and AI&ML)

Max. Marks: 70   Time: 3 Hours
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Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. In Part-A, each question carries **Two marks.**
3. Answer **ALL** the questions in **Part-A** and **Part-B**

PART-A
(Compulsory question)

1. Answer **all** the following short answer questions   (10 X 2 = 20M)

		CO	BL
a)	What is non-linear data structure?	1	L1
b)	Give examples of Abstract data types?	1	L1
c)	How is the end of a singly linked list represented?	2	L2
d)	Describe the structure of a node in a Double linked list.	2	L1
e)	How a Circular queue is different from Queue?	3	L2
f)	Write a short note of applying stack on reversing list.	3	L3
g)	Write a recursive function for pre-order traversal in a BST.	4	L2
h)	Define a graph. How does it differ from other data structures like trees?	4	L2
i)	What is a hash function?	5	L1
j)	What is a collision in the context of hashing?	5	L1

PART-B
Answer *five* questions by choosing one question from each unit (5 x 10 = 50 Marks)

			Marks	CO	BL

UNIT-I

2.	a)	Explain the key characteristics that distinguish an ADT from a data structure.	5M	1	L2
	b)	Write Time Complexity and Space Complexity of different linear data structures?	5M	1	L1

OR

3.	Explain the Stack Abstract Data Type (ADT) and discuss its primary functions. Provide detailed implementations of these functions using an array-based approach.	10M	1	L3

UNIT-II

4.	a)	Write the procedure to insert a node at the beginning, middle, and end of a doubly linked list.	6M	2	L2
	b)	"Node structure differ in a doubly linked list compared to a singly linked list", Justify your answer?	4M	2	L5

OR

5. a) Describe the process to search for a value in a singly linked list. What is the time complexity of this operation?   5M   2   L1

   b) Explain the Applications of LinkedList?   5M   2   L2

UNIT-III

6. a) What is Queue? Explain properties and different applications of it.   5M   3   L2

   b) Describe and write a program to implement queue using LinkedList and its operations?   5M   3   L2

OR

7. a) Apply the stack in expression evaluation with an example.   4M   3   L3

   b) What is De-queue? Illustrate the operations and applications of it.   6M   3   L2

UNIT-IV

8. a) Define a tree data structure. How is it different from other data structures like arrays or linked lists?   6M   4   L2

   b) Explain how to search for a node in a binary tree.   4M   4   L2

OR

9. a) Describe the process of insert and delete operations on Binary Search tree.   4M   4   L2

   b) Use the following binary search tree and find pre-order, in-order and post-order traversal of this tree.
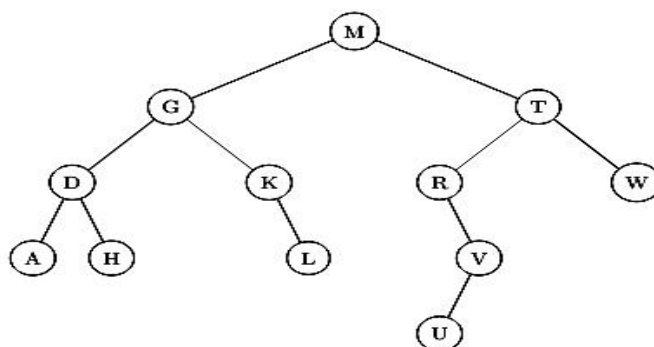
   6M   4   L3

UNIT-V

10. Describe how hashing can be applied to generate unique identifiers and provide examples of its applications.   10M   5   L3

OR

11. a) Given a set of keys {23, 12, 34, 54, 72, 15, 65}, insert them into a hash table of size 10 using chaining. Show the resulting hash table.   5M   5   L3

    b) Explain the process of searching for a key in a hash table.   5M   5   L2

*** End ***

R-23

Code: 23AHS21T

B.Tech. II Semester Regular Examinations July 2024
Differential Equations and Vector Calculus
(Common to All Branches)

Max. Marks: 70 Time: 3 Hours

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

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

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

PART-A
(Compulsory question)

1. Answer *all* the following short answer questions (10 X 2 = 20M)   CO   BL

		CO	BL
a)	Solve $(2x + y + 1)dx + (x + 2y + 1) = 0$.	CO1	L3
b)	State Newton's Law of Cooling.	CO1	L1
c)	Solve $(D^2 + 4D + 4)y = 0$.	CO2	L3
d)	Find PI of $(D^2 + 5D + 6)y = e^{3x}$.	CO2	L3
e)	Form the partial differential equation by eliminating arbitrary constants a, b from $z = ax + by + a^2 + b^2$.	CO3	L3
f)	Solve $p\sqrt{x} + q\sqrt{y} = \sqrt{z}$.	CO3	L3
g)	Find *grad f,* where $f = x^2yz + xy^2z + xyz^2$.	CO4	L1
h)	Show that $\bar{f}$ is solenoidal, where $\bar{f} = 3y^2z^2\,\hat{\imath} + 3x^2z^2\,\hat{\jmath} + 3x^2y^2\,\hat{k}$	CO4	L1
i)	Evaluate the line integral $\int_c (x^2 + xy)dx + (x^2 + y^2)dy$, where C is the square formed by the lines $x = \pm 1$ and $y = \pm 1$.	CO5	L3
j)	State Green's theorem	CO5	L1

PART-B
Answer *five* questions by choosing one question from each unit (5 x 10 = 50 Marks)

            Marks   CO   BL

UNIT-I

			Marks	CO	BL
2.	a)	Solve $\frac{dy}{dx} + y\tan x = y^3 \sec x$.	5M	CO1	L3
	b)	Solve $(4xy + 3y^2 - x^2)dx + x(x + 2y)dy = 0$.	5M	CO1	L3

OR

			Marks	CO	BL
3.	a)	Solve $xy(1 + xy^2)\frac{dy}{dx} = 1$.	5M	CO1	L3
	b)	If the temperature of the air is $30^\circ C$ and the substance cools from $100^\circ C$ to $70^\circ C$ in 15 minutes. Find when the temperature will be $40^\circ C$.	5M	CO1	L3

UNIT-II

4. Solve $(D-2)^2 y = 8(e^{2x} + \sin 2x + x)$ 10M CO2 L3

OR

5. Solve the simultaneous equations $\frac{dx}{dt} + 2y + \sin t = 0$,
$\frac{dy}{dt} - 2x - \cos t = 0$, given that $x = 0$ and $y = 1$ when $t = 0$.   10M CO2 L3

UNIT-III

6. a) Form the partial differential equation by eliminating arbitrary constants a, b and c from
$(x-a)^2 + (y-b)^2 + z^2 = c^2$ 5M CO3 L3

   b) Form the partial differential equation by eliminating arbitrary functions f and g from $z = f(y + 2x) + g(y - 3x)$.   5M CO3 L3

OR

7. Solve $(x^2 - yz)p + (y^2 - zx) = z^2 - xy$.   10M CO3 L3

UNIT-IV

8. a) If $\vec{F} = \nabla(x^3 + y^3 + z^3 - 3xyz)$, find $\operatorname{curl}(\vec{F})$.   5M CO4 L3

   b) Find the directional derivative of $\phi = x^2yz + 4xz^2$ at
(1,-2,-1) in the direction of the vector 2i-j-2k.   5M CO4 L3

OR

9. a) Find the angle between the surfaces $x^2 + y^2 - z^2 = 6$ and
$z = x^2 + y^2 - 13$ at (2,1,2).   5M CO4 L3

   b) Find the values of a,b,c
if $\vec{F} = (x+y+az)\hat{i} + (bx+2y-z)\hat{j} + (x+cy+2z)\hat{k}$ is irrotational   5M CO4 L3

UNIT-V

10. Find the work down by a force $\vec{F} = 3x\hat{i} + (2xz - y)\hat{j} + z\hat{k}$
along the straight line from $(0, 0, 0)$ to $(2, 1, 3)$.   10M CO5 L3

OR

11. Verify the Green's theorem for $\int_C (xy + y^2)dx + x^2 dy$,
where C is bounded by $y = x$ and $y = x^2$.   10M CO5 L3

*** End ***

R-23

Code: **23A0121T**

B.Tech. II Semester Regular Examinations July 2024
Basic Civil & Mechanical Engineering
(Common to EEE, ECE, AI&DS and CSE(AI))

Max. Marks: 70   Time: 3 Hours

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Note: 1. Question Paper consists of two parts (**Part-1** and **Part-2)**
2. Use separate Answer booklets for **Part-1 and Part-2**
3. Part-1 & Part-2 of question paper consists of Part-A & Part-B
4. In Part-A, each question carries **One marks.**
5. Answer **ALL** the questions in **Part-A** and **Part-B**

PART-1

PART-A
(Compulsory question)

1. Answer **all** the following short answer questions (5 X 1 = 5M)   CO   BL

a) Mention any four construction materials.   CO1   L2
b) Define- Porosity.   CO1   L2
c) What is meant by estimation?   CO2   L2
d) Write the use of levelling instruments.   CO2   L2
e) What is Rigid pavement?   CO3   L2

PART-B
Answer *five* questions by choosing one question from each unit (3 x 10 = 30 Marks)

		Marks	CO	BL

UNIT-I

2. What are the ingredients of cement concrete? Explain the process of making various types of concrete in detail.   10M   CO1   L3

OR

3. Discuss the scope of Water resources Engineering and Environmental Engineering in detail.   10M   CO1   L2

UNIT-II

4. Explain the following with suitable example.
(i) Angular measurements. (ii)Contour mapping.   10M   CO2   L3

OR

5. Explain the following with respect to a room of dimensions 3metres x 3metres x 3metres.
(i) Detailed estimate. (ii) Abstract estimate.   10M   CO2   L3

UNIT-III

6. Explain the applications of Rigid pavements and Flexible pavements with examples.   10M   CO3   L3

OR

7. Explain the following with suitable example. (i) Rain water harvesting. (ii) Types of dams and Reservoirs.   10M   CO3   L2

PART-2

PART-A
(Compulsory question)

1. Answer **all** the following short answer questions   (5 X 1 = 5M)   CO   BL

   a) Write industrial applications of non-ferrous metals.   4   1
   b) What is the use of riser in a casting pattern?   5   1
   c) Write the full form of CNC.   5   1
   d) Draw the *p-V* diagram of an Otto cycle.   5   1
   e) Write any two applications of robotics?   6   1

PART-B
Answer *five* questions by choosing one question from each unit (3 x 10 = 30 Marks)

		Marks	CO	BL

UNIT-I

2. a) Briefly explain the role of a mechanical engineer in the following sectors: (i) Automotive and (ii) Marine.   6M   4   1
   b) What is the role of a mechanical engineering in aerospace industry?   4M   4   1

OR

3. a) What are the advantages and limitations of using composite materials in aerospace industry compared to conventional materials?   6M   4   1
   b) Name any two smart materials and describe their applications.   4M   4   1

UNIT-II

4. a) Briefly explain the casting process. Why it is required?   6M   5   3
   b) Briefly explain steps/stages involve in 3D printing.   4M   5   2

OR

5. a) With a neat *T-s* diagram, explain the working principle of a vapour compression refrigeration cycle. Write the formula for its COP.   5M   5   2
   b) What are the differences between SI and CI engines?   5M   5   2

UNIT-III

6. a) With a neat sketch explain the working of a Diesel power plant.   6M   6   3
   b) What are the challenges in running hydro power plants?   4M   6   2

OR

7. a) What are the different power transmission devices? Explain working of belt drive transmission with a neat sketch.   5M   6   2
   b) What are the basic laws of robotics? Explain.   5M   6   2

*** End ***

R-23

Code: 23AHS24T

B.Tech. II Semester Regular Examinations July 2024

Chemistry

(Common to EEE, ECE, AI&DS and CSE(AI))

Max. Marks: 70   Time: 3 Hours

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

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

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

PART-A

(Compulsory question)

1. Answer *all* the following short answer questions   (10 X 2 = 20M)   CO   BL

		CO	BL
a)	Calculate the bond order for Oxygen molecule.	CO1	L3
b)	Define and ^{2}.	CO1	L2
c)	Write two applications of super conductors.	CO2	L1
d)	What are p-type and n-type semiconductors? Give examples.	CO2	L1
e)	Describe the components of a conductivity cell.	CO3	L2
f)	Draw the construction of H_2-O_2 fuel cell.	CO3	L4
g)	Differentiate between thermosets and thermoplastics	CO4	L2
h)	How is Bakelite prepared?	CO4	L1
i)	What is the importance of IR spectroscopy?	CO5	L1
j)	Describe the basic principle of chromatography.	CO5	L2

PART-B

Answer *five* questions by choosing one question from each unit (5 x 10 = 50 Marks)

		Marks	CO	BL

UNIT-I

2.	Give a detailed account of Molecular Orbital theory. Draw molecular energy level diagrams of O2 and CO molecules.	10M	CO1	L4

OR

3.	Derive Schrodinger wave equation and explain the significance of and ^{2}	10M	CO1	L3

UNIT-II

4.	Describe the properties of any two Nanomaterials in detail. List out their significant applications in various fields.	10M	CO2	L2

OR

5. Explain the types and properties of supercapacitors. Discuss their practical applications in various fields of engineering. 10M CO2 L2

UNIT-III

6. Derive Nernst equation and explain its significance in calculating cell potentials. 10M CO3 L3

OR

7. a) Explain the principle and applications of Polymer Electrolyte Membrane Fuel cell (PEMFC). 5M CO3 L2

b) What are the potentiometric sensors? Explain their practical applications with suitable examples. 5M CO3 L1

UNIT-IV

8. a) Explain chain growth and step growth polymerization techniques with suitable examples. 5M CO4 L2

b) Give an account of the preparation and properties of elastomers. 5M CO4 L4

OR

9. Explain the mechanism of conduction in conducting polymers and discuss their practical applications. 10M CO4 L2

UNIT-V

10. Describe various electronic transitions induced by UV-Visible radiation and explain the significance of Beer-Lambert's law in UV-Vis spectroscopy 10M CO5 L2

OR

11. Draw the setup of HPLC chromatography and write a detailed account of its working mechanism. 10M CO5 L4

*** End ***

B.Tech. II Semester Regular Examinations July 2024
Communicative English
(Common to EEE, ECE, AI&DS and CSE(AI))

Max. Marks: 70   Time: 3 Hours

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

PART-A
(Compulsory question)

1. Answer *all* the following short answer questions   (10 X 2 = 20M)   CO   BL

a)	What did Della do with her hair and why?	CO1	L2
b)	What kind of landscape is described in the first three stanzas in the poem "The Book'?	CO1	L2
c)	Write the meanings of the following words: i. coot ii. evaluate iii. deliberate iv. squadron	CO2	L2
d)	Briefly describe two of business ventures of Elon Musk.	CO1	L4
e)	Explain Note-making.	CO3	L2
f)	What is a Chronological Resume?	CO3	L2
g)	What announcement by the National Peace Council does Elizabeth show her brother?	CO1	L2
h)	List out types of Essays.	CO3	L2
i)	What is self-esteem?	CO3	L2
j)	Define technical jargon and provide any four examples.	CO2	L1

PART-B
Answer *five* questions by choosing one question from each unit (5 x 10 = 50 Marks)

Marks   CO   BL

UNIT-I

2. a) How do Jim's and Della's actions symbolise the strength of their love for each other.   5M   CO1   L4

   b) Write a note on the different ways the financial situation of the couple in the story "The Gift of the Magi".   5M   CO1   L2

OR

3. a) Write a Formal Dialogue between two officials in an office "Introducing each Other".   5M   CO1   L1

   b) Write the meaning and one example for the following Root Words: i.bio   ii.extra   iii. gram   iv. glot v. neo vi. mega   5M   CO3   L3

UNIT-II

4. a) Write an elaborate paragraph on "*Superstitions*".   5M   CO3   L1

   b) **Fill in the blanks with suitable Prepositions:**   5M   CO3   L3

      i. He lives _____ 19 Tower Road.

      ii. I will arrive _____ eight o' clock.

      iii. I have known her _____ last year.

      iv. Missing the bus is no excuse _____ being late.

      v. People often make fun _____ what they do not understand.

      vi. We will take a survey _____ the participants.

OR

5. How has the poet described landscape, flowers, plants and colours in the poem? How does it make you feel as a reader? Substantiate your answer with examples form the poem. 10M CO1 L3

UNIT-III

6. In what way has Musk proved to be a visionary leader of cutting–edge technology? Discuss with relevant examples. 10M CO1 L4

OR

7. a) **Fill in the blanks with suitable *verb* forms:** 5M CO3 L3
   i. Keep _____ (guess) the answers till you get them right.
   ii. Were you _____ (pay) attention to what was being said?
   iii. I have _____ (read) many books in the last one year.
   iv. How have you been _____?(do)
   v. Asif _____ (teach) for six years at the computer institute by the time his father retires.
   vi. Raman _____ (live) in Chennai for 10 years.

   b) **Fill in the blanks with Collocation words:** 5M CO4 L4
   i. We couldn't take up another assignment as we were_____.
   ii. My work hours are flexible. I don't need to begin at a ____.
   iii. John asked his boss, 'I know you're busy, but can you____ for me this week? I need to discuss something with you'.
   iv. Tsering was so eager to finish that he got done in_____.
   v. We have _____ before the train arrives.
   vi. Vishnu has been through some_____.

UNIT-IV

8. a) Describe how the children found an exciting way to play with their new to play with their new non-violent toys. 5M CO1 L4

   b) Write a letter to the Principal to organize a workshop on A I to resolve the A I future doubts. 5M CO4 L3

OR

9. a) Do you think Harvey and Elizabeth's experiment failed? Justify your answer. 5M CO1 L4

   b) Prepare a resume for applying a job as software developer in IT industry. 5M CO4 L3

UNIT-V

10. a) What are the different ways in which Interpersonal Communication helps improve everyday life? 5M CO3 L1

    b) Write six to eight presentation tips in making a presentation. 5M CO3 L2

OR

11. Write an Essay on the topic : " The impact of social media on youth". 10M CO3 L3

*** End ***