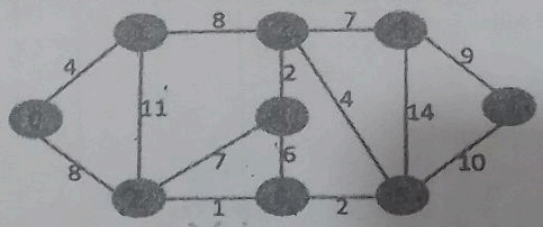
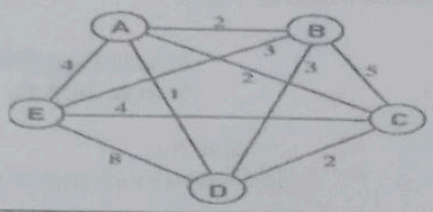
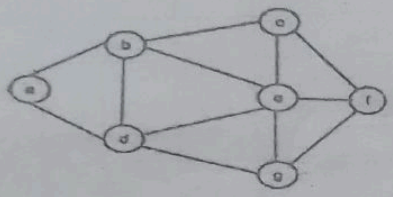
ABES Engineering College, Ghaziabad
B. Tech Odd Semester Sessional Test-3

Printed Pages:2
Session: 2023-24

Semester: III
Course Code: BCS 301
Course Name: Data Structure
Maximum Marks: 40
Roll No.:
Time: 1Hr 30 Min.

Instructions:
1. Attempt all sections.
2. If require any missing data, then choose suitably.

Q. No.	Question	Marks	CO	KL	PI
	Section-A	**Total Marks: 20**			
1	**Attempt ANY ONE part from the following**				
a)	Differentiate Between BFS and DFS. Explain Breadth First Search with suitable example of graph.	2+1+2	CO3	K2	1.6.1
b)	Write short notes on (With Example): i) Adjacency Matrix ii) Adjacency List iii) Transitive Closure	1.5+1.5+2	CO3	K2	1.6.1
2	**Attempt ANY ONE part from the following**				
a)	Insert the following sequence of elements into an AVL tree, starting with empty tree 71, 41, 91, 56, 60, 30, 40, 80, 50, 55. After insertion, delete the keys: 56, 71 and 40.	3+2	CO3	K3	2.1.2
b)	Show the results of inserting the keys F, S, Q, K ,C, L, H, T, V, W, M, R, N, P, A, B in order into a empty B-Tree of order 5, after insertion delete the R, H, P, Q keys from the B-Tree.	3+2	CO3	K3	3.2.2
3	**Attempt ANY ONE part from the following**				
a)	Use Dijkstra's algorithm to find the shortest paths from source node 0 to all other vertices in the following graph.  	10	CO3	K3	4.3.1
b)	Write an algorithm for Heap Sort. Use Heap sort algorithm to sort the following sequence in descending order: 18, 25, 45, 34, 36, 51, 43, and 24.	3+7	CO3	K3	4.2.1
	Section-B	**Total Marks: 20**			
4	**Attempt ANY ONE part from the following**				
a)	Construct a Binary Search Tree for the following set of data: 34,23,67,45,12,54,87,43,98,75,84,93,31 Convert the constructed tree into threaded binary tree.	3+2	CO3	K3	2.1.1

b)	Find the cost of minimum spanning tree using Prim's Algorithm 	5	CO3	K3	4.3.1
5	**Attempt ANY ONE part from the following**				
a)	The preorder traversal of a binary search tree is 15, 10, 12, 11, 20, 18, 16, 19. find out the post order traversal of tree. **[Gate 2020]**	5	CO3	K3	4.3.1
b)	Consider the following sequence of nodes for the undirected graph given below. 1. a b e f d g c 2. a b e f c g d 3. a d g e b c f 4. a d b c g e f A Depth First Search (DFS) is started at node a. The nodes are listed in the order they are first visited. Which all of the above is (are) possible output(s). Justify each sequence.  **[GATE 2018]**	5	CO3	K3	2.4.1
6	**Attempt ANY ONE part from the following**				
a)	Explain Huffman algorithm. Construct Huffman tree for MAHARASHTRA with its optimal code.	3+7	CO5	K3	4.3.2
b)	i) Define sparse Matrix. Suggest a space efficient representation for sparse matrix. Calculate Sparsity of following matrix. 5 0 0 2 0 0 6 0 0 0 0 0 0 1 9 0 8 2 0 5 0 0 0 0 0 2 0 0 0 0 0 0 0 7 0 9 ii) Define Expression tree and construct the same for the following algebraic expression: (a - b) / ((c * d) + e)	5 (1+2+2)+5(2+3)	CO5	K3	2.4.1

CO Course Outcomes mapped with respective question
KL Bloom's knowledge Level (K1, K2, K3, K4, K5, K6)
K1-Remember, K2-Understand, K3-Apply, K4-Analyze, K5: Evaluate, K6-Create

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ABES Engineering College, Ghaziabad
B. Tech Odd Semester Sessional Test-3

Printed Pages: 2
Session: 2023-24

Semester: III
Course Code: BAS301
Course Name: Technical Communication
Maximum Marks: 40

Roll No.:
Time: 1Hr 30 Min.

Instructions:
1. Attempt all sections.
2. If require any missing data, then choose suitably.

Q. No.	Question	Marks	CO	KL	PI
	Section-A	**Total Marks : 20**			
1	**Attempt ANY ONE part from the following**	***Same K Levels Questions***			
a)	What is the role of communication in leadership? Explain.	5	CO4	K2	9.2.1
b)	What is the difference between Tact & Intelligence?	5	CO4	K2	9.2.1
2	**Attempt ANY ONE part from the following**	***Same K Levels Questions***			
a)	Describe the various types of Thinking Skills?	5	CO4	K2	9.2.1
b)	Write a short note on "The role of Emotional Intelligence in professional life."	5	CO4	K2	9.2.1
3	**Attempt ANY ONE part from the following**	***Same K Levels Questions***			
a)	How can one provide and receive feedback in the communication process? Explain it with the help of a diagram of the process of communication.	5+5	CO4	K2	10.3.2
b)	Define Communication & Social competence. Describe the role of context, feelings, intentions, and behaviors.	5+5	CO4	K2	10.3.2
	Section-B	**Total Marks : 20**			
4	**Attempt ANY ONE part from the following**	***Same K Levels Questions***			
a)	What are the essential elements for an E-mail writing? Explain.	5	CO5	K2	10.1.2
b)	Define Personality. Describe the professional personality attributes and give examples.	2+3	CO5	K2	9.2.4
5	**Attempt ANY ONE part from the following**	***Same K Levels Questions***			
a)	What is Maslow's Motivation theory? Explain.	5	CO5	K2	9.2.4
b)	Elaborate on the concept of ID, Super ego and Ego given by Freud.	5	CO5	K2	9.2.4
6	**Attempt ANY ONE part from the following**	***Same K Levels Questions***			
a)	How can one use social media effectively and ethically using Text & Technique? Give details.	10	CO5	K2	10.3.2

5 | CO5 | 2 | 2.2.1

b)	According to Swami Vivekanand, "If you want to develop your personality, it will not start from external but from deeper, and that is mind." Explain it with the concept of Personality.	10	CO5	K2	9.2.4

CO Course Outcomes mapped with respective questions.
KL Bloom's knowledge Level (K1, K2, K3, K4, K5, K6)
K1-Remember, K2-Understand, K3-Apply, K4-Analyze, K5: Evaluate, K6-Create

ABES Engineering College, Ghaziabad
B. Tech Odd Semester Sessional Test-3

Printed Pages: 2
Session: 2023-24

Semester: III (AIML, DS, EN, CSE, ELCE)
Course Code: BAS-303
Course Name: Mathematics-IV
Maximum Marks: 40

Univ. Roll No.:
Time: 1Hr 30 Min.

Instructions:
1. Attempt all sections.
2. If require any missing data, then choose suitably.

Q. No.	Question	Marks	CO	KL	PI
	Section-A	**Total Marks : 20**			
1	**Attempt ANY ONE part from the following**	***Same K Levels Questions***			
1a)	Solve $x^2(y-z)p + y^2(z-x)q = z^2(x-y)$	5	CO1	K2	1.11
1b)	Use Cauchy's method of characteristics to solve the partial differential equation $\frac{\partial u}{\partial x} - \frac{\partial u}{\partial y} = 0 \; ; \; u(x,0) = 0$	5	CO1	K2	2.41
2	**Attempt ANY ONE part from the following**	***Same K Levels Questions***			
2a)	Solve $(D^2 + DD' - 6D'^2)z = y\cos x$	5	CO1	K3	2.41
2b)	Solve $(D - 3D' - 2)^2 z = 2e^{2x}\tan(y + 3x)$	5	CO1	K3	2.41
3	**Attempt ANY ONE part from the following**	***Same K Levels Questions***			
3a)	Solve by Charpit's method. $px + qy = pq$	10	CO1	K3	2.41
3b)	Solve the linear partial differential equation $x^2\frac{\partial^2 z}{\partial x^2} - y^2\frac{\partial^2 z}{\partial y^2} = xy$	10	CO1	K3	2.41
	Section-B	**Total Marks : 20**			
4	**Attempt ANY ONE part from the following**	***Same K Levels Questions***			
4a)	Solve by method of separation of variables: $4\frac{\partial u}{\partial t} + \frac{\partial u}{\partial x} = 3u, \quad u(x,0) = 3e^{-x} - e^{-5x}$	5	CO2	K3	2.41
4b)	An insulated rod of length l has its ends A and B maintained at $0°C$ and $100°C$ respectively until steady state condition prevails. If the temperature at the end B is suddenly reduced to $0°C$ and maintained at $0°C$, find the temperature at a distance x from end A at time t.	5	CO2	K3	1.31

5	**Attempt ANY ONE part from the following**	*Same K Levels Questions*			
5a)	Use separation of variables method to solve the Laplace equation $\frac{\partial^2 u}{\partial x^2}+\frac{\partial^2 u}{\partial y^2}=0$, subject to conditions $u(0,y)=u(l,y)=u(x,0)=0$ *and* $u(x,a)=\sin\frac{n\pi x}{l}$.	5	CO2	K3	2.41
5b)	Find the Fourier sine transform of $\frac{e^{-ax}}{x}$, a> 0. Hence find Fourier Sine transform of $\frac{1}{x}$.	4+1	CO2	K3	1.31
6	**Attempt ANY ONE part from the following**	*Same K Levels Questions*			
6a)	A string is stretched and fastened to two points l apart. Motion is started by displacing the string in the form $y=A\sin\frac{\pi x}{l}$ from which it is released at time t=0. Show that the displacement of any point at a distance x from one end at time t is given by $y(x,t)=A\sin\frac{\pi x}{l}\cos\frac{\pi ct}{l}$.	10	CO2	K3	2.4
6b)	The temperature u in the semi infinite rod $0<x<\infty$ is determined by the differential equation $\frac{\partial u}{\partial t}=k\frac{\partial^2 u}{\partial x^2}$ subject to the conditions $u=0$ *when* $t=0, x\geq 0$ $\frac{\partial u}{\partial x}=-\mu$ (*a constant*) when x= 0 and t > 0 Making use of cosine transform, show that $u(x,t)=\frac{2\mu}{\pi}\int_0^\infty \frac{\cos px}{p^2}(1-e^{-kp^2t})dp$	10	CO2	K3	1

Either of Q 1, 2, 4 & 5 one should be Previous Year GATE Question if applicable.

CO Course Outcomes mapped with respective question

KL Bloom's knowledge Level (K1, K2, K3, K4, K5, K6)

K1-Remember,K2-Understand,K3-Apply,K4-Analyze,K5: Evaluate,K6-Create

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ABES Engineering College, Ghaziabad
B. Tech Odd Semester Sessional Test-3

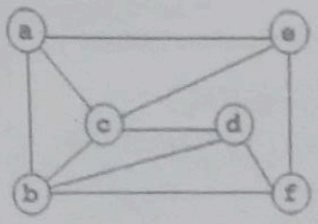
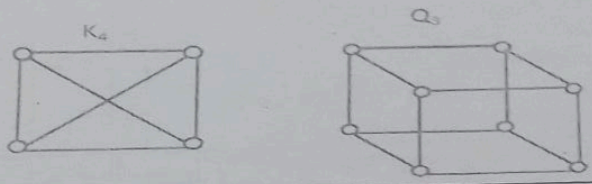
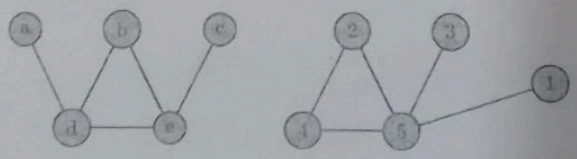
Printed Pages:
Session: 2023-24

Semester: III
Course Code: BCS303
Course Name: DSTL
30 Min.
Maximum Marks: 40

Roll No.:
Time: 1Hr

Instructions:
1. **Attempt all sections.**
2. **If require any missing data, then choose suitably.**

Q. No.	Question	Marks	CO	KL	PI
	Section-A	**Total Marks : 20**			
1	**Attempt ANY ONE part from the following**	***Same K Levels Questions***			
a)	Let G = {1,-1, i, -i} be a group with the operation of ordinary multiplication on G be an algebraic structure, where $i=\sqrt{-1}$. 1)Determine whether G is abelian. 2)Determine the order of each element in G. 3)Determine whether G is a cyclic group, if G is a cyclic group, then determine the generator/generators of the group G	1.5+1.5 +2	CO4	K2	1.1.1
b)	i) . Justify that "The union of any two subgroup of a group (G, *) is again a subgroup of (G,*)". ii). Justify that "If a,b are the arbitrary elements of a group G then $(ab)^2 = a^2 b^2$ if and only if G is Abelian.	2.5+2.5	CO4	K2	1.1.1
2	**Attempt ANY ONE part from the following**	***Same K Levels Questions***			
a)	(i). State Ring with example. (ii). State and prove Lagrange's Theorem.	2+3	CO4	K2	1.3.1
b)	What do you mean by Cosets of a subgroup? Consider the group Z of integers under addition and the subgroup H = {…., -12, -6, 0, 6 12, ……} considering of multiple of 6. Find the Left and right Cosets of H in Z.	5	CO4	K2	2.2.1
3	**Attempt ANY ONE part from the following**	***Same K Levels Questions***			
a)	When is a group said to be cyclic? Prove whether the group $(G, +_6)$ where G = { 0,1,2,3,4,5} is cyclic or not? If yes, then find all the generators.	4+6	CO4	K3	2.2.1
b)	State Group with example. Prove that the set {0,1,2,3,4} is a finite Abelian group of order 5 under addition modulo 5 as composition.	4+6	CO4	K3	2.2.2
	Section-B	**Total Marks : 20**			
4	**Attempt ANY ONE part from the following**	***Same K Levels Questions***			
a)	[illegible] discuss different types of interrupts.	5	CO5	2	2.2.1

a)	Determine the chromatic number of the following graph. GATE 2018 	5	CO5	K2	1.2.1
b)	K4 and Q3 are graphs with the following structures. Which one of the following statements is TRUE in relation to these graphs. GATE 2015 (i). K4 is planer while Q3 is not. (ii). Both K4 and Q3 are planar. (iii). Q3 is planer while K4 is not. (iv). Neither Q3 and K4 is planar. 	5	CO5	K2	1.4.1
5	**Attempt ANY ONE part from the following**	***Same K Levels Questions***			
a)	(i) Justify that "In an undirected graph the total number of odd degree vertices is even". (ii) Justify that "In a graph, the sum of all the degrees of all the vertices is equal to twice the number of edges".	2.5*2	CO5	K2	1.1.1
b)	Explain Pigeonhole principle. Find the minimum number of students in a class to be sure that 4 out of them are born in the same month.	5	CO5	K2	1.1.1
6	**Attempt ANY ONE part from the following**	***Same K Levels Questions***			
a)	Explain the following terms with suitable example graph representation: (i). Euler Graph and Hamiltonian Graph. (ii). Regular Graph. (iii). Chromatic Number of a graph. (iv). Walk and path. (v). Bipartite Graph.	2*5	CO5	K2	1.1.1
b)	(i). Define Planer Graph. Is K5 planer or not? Justify your answer with an example graph representation. (ii). Define Isomorphic graphs. Are the two given graphs isomorphic? Justify your answer. 	5*2	CO5	K2	1.1.2

ABES Engineering College, Ghaziabad
B. Tech Odd Semester Sessional Test-3

Printed Pages:
Session: 2023-24

Semester:3rd
Course Code: BCC 302
Course Name: Python Programming
Maximum Marks: 40

Roll No.:
Time:1Hr 30 Min.

Instructions:
1. Attempt all sections.
2. If require any missing data, then choose suitably.

Q. No.	Question	Marks	CO	KL	PI
	Section-A **Total Marks: 20**				
1	**Attempt ANY ONE part from the following**	*Same K Levels Questions*			
a)	Explain the working of the seek() and tell () methods in file handling with examples.	2.5+2.5	CO4	K2	1.3.1
b)	Define pickling in Python. Explain serialization & deserialization of Python objects.	2+3	CO4	K2	1.3.1
2	**Attempt ANY ONE part from the following**	*Same K Levels Questions*			
a)	Differentiate between: i) text file and binary file ii) readline() and readlines() iii) write() and writelines()	1+2+2	CO4	K2	2.1.3
b)	How to append a line of text to an existing file named "output.txt." and count and display the total number of words on the console.	3+2	CO4	K2	2.1.3
3	**Attempt ANY ONE part from the following**	*Same K Levels Questions*			
a)	Describe file I/O in python. How to perform open, read, write and close into a file? Write a python program to read a line-by-line store it into a variable **[Company Specific]**	5+5	CO4	K3	3.2.2
b)	Demonstrate the file handling procedure in detail. Write a python code to create a file with "p.txt" name and write your name, Father's Name, Address and Contact number in this file and then print this file to print it. **[Company Specific]**	5+5	CO4	K3	3.2.2
	Section-B **Total Marks: 20**				
4	**Attempt ANY ONE part from the following**	*Same K Levels Questions*			
a)	How are NumPy arrays better than Python's lists? Explain.	5	CO5	K2	2.1.3
b)	Discuss various geometry managers in Tkinter, such as pack (), grid(), and place().	5	CO5	K2	2.1.3
5	**Attempt ANY ONE part from the following**	*Same K Levels Questions*			
a)	Given a CSV file named "sales_data.csv" containing sales data for a company. Each row represents a sale, with columns 'Date', 'Product', 'Quantity', and 'Revenue'. Write Python code to perform the following tasks: • Load the data from the CSV file into a Pandas **DataFrame.**	5	CO5	K3	2.1.2

	• Display the first 10 rows of the **DataFrame.** **[Company Specific]**				
b)	Write a python program to create a line plot using matplotlib that displays the population growth of a city over 10 years.	5	CO5	K3	2.1.2
6	**Attempt ANY ONE part from the following**	*Same K Levels Questions*			
a)	What are ndarrays in **NumPy**? What are ways of creating 1D, 2D and 3D arrays in NumPy? Implement matrix multiplication using NumPy arrays. **[Company Specific]**	10	CO5	K2	2.1.2
b)	Describe the event-driven programming paradigm in the context of **Tkinter** and explain how it differs from traditional procedural programming. **[Company Specific]**	10	CO5	K2	2.1.2

CO Course Outcomes mapped with respective question
KL Bloom's knowledge Level (K1, K2, K3, K4, K5, K6)
K1-Remember, K2-Understand, K3-Apply, K4-Analyze, K5: Evaluate,K6-Create

B. Tech Odd Semester Sessional Test-3

Printed Pages:
Session: 2023-24

Semester: 3
Course Code: BCS302
Course Name: Computer Organization and Architecture
Maximum Marks: 40

Roll No.:
Time: 1Hr 30 Min.

Instructions:
1. Attempt all sections.
2. If require any missing data, then choose suitably.

Q. No.	Question	Marks	CO	KL	PI
	Section-A	**Total Marks: 20**			
1	**Attempt ANY ONE part from the following**	***Same K Levels Questions***			
a)	Discuss 2D RAM and 2.5D RAM with a suitable diagram.	5	CO4	2	1.1.2
b)	Calculate the page fault for a given string with the help of LRU & FIFO page replacement algorithm, Size of frames = 4 and string 1 2 3 4 2 1 5 6 2 1 2 3 7 6 3 2 1 2 3 6.	5	CO4	2	2.1.3
2	**Attempt ANY ONE part from the following**	***Same K Levels Questions***			
a)	Consider a direct mapped cache of size 32 KB with a block size 32 bytes. The CPU generates a 32-bit address. The number of bits required for cache indexing and Tag bit respectively. **GATE 2005**	5	CO4	3	2.1.3
b)	An eight-way set associative cache consists of a total of 256 blocks. The main memory contains 8192 blocks, each consisting of 128 words. (a.) How many bits are there in the main memory address? (b)How many bits are there in TAG, SET and WORD fields? **UGC Net 2012**	5	CO4	3	2.3.2
3	**Attempt ANY ONE part from the following**	***Same K Levels Questions***			
a)	Discuss the Memory Hierarchy in computer systems with regard to Speed, Size, and Cost.	10	CO4	2	1.1.2
b)	What do you mean by Virtual memory? Discuss how Paging helps in implementing Virtual memory.	10	CO4	2	1.1.2
	Section-B	**Total Marks : 20**			
4	**Attempt ANY ONE part from the following**	***Same K Levels Questions***			
a)	What do you mean by asynchronous data transfer? Explain strobe control and hand-shaking mechanism.	5	CO5	2	1.4.1
b)	Explain the Input Output processor. How does IOP work under the supervision of the CPU?	5	CO5	2	1.4.1
5	**Attempt ANY ONE part from the following**	***Same K Levels Questions***			
a)	Define interrupt. Also, discuss different types of interrupts.	5	CO5	2	2.2.1

b)	Explain the difference between vectored and Non-vectored Interrupt. Explain stating an example of each.	5	CO5	2	2.2.1
6	**Attempt ANY ONE part from the following**	***Same K Levels Questions***			
a)	Write down the difference between isolated I/O and memory-mapped I/O. Also, discuss the advantages and disadvantages of isolated I/O and memory-mapped I/O.	**10**	CO5	2	1.3.1
b)	With a neat schematic diagram, explain about DMA controller and its mode of data transfer.	**10**	CO5	2	1.4.1

) Course Outcomes mapped with respective question
Bloom's knowledge Level (K1, K2, K3, K4, K5, K6)
K1-Remember, K2-Understand, K3-Apply, K4-Analyze, K5: Evaluate, K6-Create