

Subject Code:100301AMB.Tech– 3rd Semester Class Test - II (13/12/2021)**Subject: Applied Mathematics-III****Time: 2 Hrs.****Maximum Marks: 60**

Note: Attempt all questions. Part (a) of each question is compulsory and carries 04 marks; attempt any two parts from (b), (c) and (d) carrying 08 marks.

CO3:To employ the concept of Laplace transform and inverse transform to solve ordinary differential equations

CO4:To employ the methods of discrete and continuous probability distribution for predicting the possibility of an event occurring in various practical problems

CO5:To apply the methodology of integration of complex functions in various techniques dealing with engineering problems.

Sl. No.	Question	Marks	CO	B L	PI
1 a)	I. Write the condition for existence of Laplace transform.	(2)	CO3	L1	1.2.1
	II. If $f(t)$ is a periodic function with period T, then write $L\{f(t)\}$	(2)		L2	1.2.1
b)	Find the Laplace transform of $\frac{1 - \cos t}{t^2}$	(8)	CO3	L4	1.2.1 2.5.3
c)	Find the inverse Laplace transform of $\frac{s^2 + s - 2}{s(s + 3)(s - 2)}$	(8)	CO3	L4	1.2.1 1.2.2
d)	Solve $(D^3 - 3D^2 + 3D - 1)y = t^2 e^t$, when $y(0) = 1$, $Dy(0) = 0$ and $D^2y(0) = -2$.	(8)	CO3	L5	1.2.1 2.5.3
2 a)	I. Define moment generating function of discrete and continuous probability distribution.	(2) (2)	CO4	L1 L1	1.2.1
	II. Define expectation and variance.				

- b) The probability density $p(x)$ of a continuous random variable is given by (8)

$$p(x) = y_0 e^{-|x|}, -\infty < x < \infty$$

Prove that $y_0 = 1/2$. Find the mean and variance of the distribution.

- c) Out of 800 families with 5 children each, how many would you expect to have (8)

(a) 3 boys (b) 5 girls (c)

Either 2 or 3 boy?

Assume equal probabilities for boys and girls.

- d) Fit a Poisson distribution to the set of observation: (8)

X	0	1	2	3	4
F	122	60	15	2	1

- 3 a) I.State Cauchy's Residue theorem (2)
II.Write the Taylor series for complex functions. (2)

- b) Obtain Laurent expansion for the function $f(z) = \frac{z^2-1}{z^2+5z+6}$, about $z=0$ in the region $2 < |z| < 3$. (8)

- c) Evaluate $\int_C \frac{z^2}{(z-1)^2(z+2)} dz$, where C is the circle $|z|=2.5$. (8)

- d) Apply calculus of residue to prove that

$$\int_0^{2\pi} \frac{\cos 2\theta d\theta}{1-2a \cos \theta + a^2} = \frac{2\pi a^2}{1-a^2}, (a^2 < 1). \quad (8)$$

CO4

L4

B.

Time:

CO4

L5

1.2.1

1.2.2

CO4

L5

1.2.1

2.5.3

CO5

L1

1.2.1

L1

CO5

L5

1.2.1

1.2.2

CO5

L5

1.2.1

1.2.2

CO5

L5

1.2.1

2.5.3

Subject Code:102302CS
B.Tech. – 3rd Semester CSE Class Test - II (14/12/2021)
Course:Digital Electronics

Time: 2 Hrs.

Maximum Marks: 60

Note: Attempt all questions. Part (a) of each question is compulsory and carries 04 marks; attempt any two parts from (b), (c) and (d) carrying 08 marks.

CO2: Analyze the operations of various logic families and different semiconductor memories.

CO4: Outline the concepts of latch circuits, flip flops and counters.

CO5: Create IoT solutions using sensors, actuators and Devices

Sl. No.	Question	Marks	CO	BL	PI
1 a)	<p>I. TTL comes under the category of _____ (Bipolar / Unipolar logic families).</p> <p>II. Two characteristics of digital ICs are _____ and _____.</p> <p>III. TTL gates in all available series comes in three different types of output configuration. They are _____, _____ and _____.</p> <p>IV. Component used in CMOS is <u>Metal Oxide</u>.</p>	(4)	2	L3	1.4.1
b)	<p>Implement the following Boolean function using</p> <p>(i) PLA</p> <p>(ii) PAL</p> $F1(A, B, C, D) = \sum m(0, 2, 6, 8, 10, 14)$ $F2(A, B, C, D) = \sum m(0, 1, 6, 7, 8, 9, 14, 15)$	(8)	2	L3	3.1.1
c)	<p>With the help of a neat diagram, explain the working of</p> <p>(i) CMOS inverter.</p> <p>(ii) CMOS NAND gate</p>	(8)	2	L3	1.4.1

Note: A question may be split into sub-part further if required.

CO - Course Outcomes

BL- Bloom's Taxonomy Levels

(L1- Remembering, L2- Understanding, L3- Applying, L4- Analysis, L5- Evaluating, L6- Creating).

PI - Performance Indicator Code

(Please See: <https://www.aicte-india.org/sites/default/files/ExaminationReforms.pdf>)

L4 1.1.2

d)	Draw a TTL circuit with Totem pole output and explain its working	(8)	2	L6	1.4.1
2 a)	<p>I. Name of the circuit in which designer have more flexibility because output depends on both present input and past history of input is _____.</p> <p>II. Which one is easier to design? (synchronous / asynchronous sequential circuits)</p> <p>III. Number of NAND gates require to design SR latch using NAND gate is _____</p> <p>IV. Each of the counts of the counter is called _____ of the counter.</p>	(4)	4	L1	1.3.1
b)	What is Race around condition for J-k flip-flop. How it can be avoided in master slave flip-flop.	(8)	4	L2	1.3.1
c)	What is shift register? Give its types and explain nay one in brief.	(8)	4	L1	1.3.1
d)	Design and implement mod 5 synchronous counter using T flip flop.	(8)	4	L3	3.1.1
3 a)	<p>1. _____ sensor measure the amount of heat energy in a source, allowing them to detect temperature changes and convert these changes to data.</p> <p>2. _____ sensors measure the amount of water vapor in the atmosphere of air or other gases.</p> <p>3. When the pressure changes, the sensor detects changes in gas and liquid.</p>	(4)	5	L1	1.3.1

Subject Code: 102303CS
B.TECH– 3rd Semester Class Test – II (17-12-2021)
Course: Data Structures and Algorithms

Time: 2 Hrs.

Maximum Marks: 60

Note: Attempt all questions. Part (a) carries 4 marks and is compulsory. Attempt any two parts from parts (b), (c) and (c) carrying 8 marks each.

Q. No.	Questions	Marks	CO	BL	PI
1	a) Insert the following elements into an initially empty Binary Search Tree – 50 , 30, 90, 70, 80 , 20, 60, 100	(4)	CO3	L2	1.4.1
	b) Insert the following elements into an empty Max Heap - 60, 70, 30, 40, 20 , 60 , 40 , 10 Now perform 2 delete operations on the Heap that is formed after all insertions.	(8)	CO3	L2	2.1.2
	c) Explain the term Collision in Hashing. What are the different types of collision resolution techniques?	(8)	CO3	L3	2.1.3
	d) Using three nodes 60, 40 and 80. Demonstrate the concept of LL, LR, RL and RR rotation in an AVL tree. What is the maximum height possible for an AVL tree with 7 nodes?	(8)	CO3	L2	2.1.3
2	a) Draw all the Binary Trees can be created using all 3 nodes A, B and C whose Pre-order traversal is ABC.	(4)	CO4	L4	2.1.3
	b) Write the Warshal's Algorithm / C Code for finding All pairs of Shortest Path in a graph. Calculate All pairs of shortest path for a graph with the Adjacency matrix A = [[7,5,0,0] , [7,0,0,2] , [0,3,0,0], [4,0,1,0]] , each set of 4 elements represents one row of the matrix.	(8)	CO4	L2	2.1.2
	c) For the following graph perform a Breadth First Traversal and a Depth First Traversal from the source vertex A.	(8)	CO4	L2	1.4.1

	A	B	C	D	E	F	G	H	I
A	0	1	1	1	0	0	0	0	0
B	1	0	0	0	1	1	0	0	0
C	1	0	0	1	0	0	1	0	0
D	1	0	1	0	0	0	1	1	0
E	0	1	0	0	0	0	0	0	1
F	0	1	0	0	0	0	0	0	0
G	0	0	1	1	0	0	0	0	0
H	0	0	0	1	0	0	0	0	0
I	0	0	0	0	1	0	0	0	0

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|---|----|---|-----|-----|----|-------|
| | d) | Write and explain the working of an algorithm with an example for finding a Topological ordering of the vertices of a directed acyclic graph (DAG). | (8) | CO4 | L2 | 2.1.2 |
| 3 | a) | Derive the number of steps taken by Bubble sort algorithm over an array of N elements in the best case and worst case. $\frac{n(n-1)}{2}$ | (4) | CO5 | L2 | 2.1.3 |
| | b) | Show the working of Quick Sort (using left most element as Pivot) for the following array by drawing a recursion tree that clearly depicts which partition is being considered for a particular recursive call.
[4, 1, 6, 3, 8, 2, 9, 0, 5, 7] | (8) | CO5 | L3 | 2.1.2 |
| | c) | Write an algorithm / C program for Insertion Sort over an array of N numbers. Discuss the complexity of Insertion Sort by considering the number of comparisons needed in worst and best cases. | (8) | CO5 | L2 | 1.4.1 |
| | d) | Write an algorithm/ C program for Binary Search over an array of N numbers. Discuss the complexity of Binary Search algorithm using a recursion tree diagram. | (8) | CO5 | L2 | 2.1.2 |

Course Outcomes for Course - Data Structures and Algorithms (102303CS)

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|-----|---|
| CO1 | Analyze the structure, usage and complexities of different linear data structures like arrays and lists. |
| CO2 | Apply linear data structures like Stacks and Queues for data processing in various applications |
| CO3 | Employ non-linear data structures like Trees for different application scenarios that handle hierarchical data |
| CO4 | Realize of the utility of graph structures and understanding of standard graph based algorithms |
| CO5 | Select the most appropriate sorting / searching algorithm and Indexing structures like Hash/higher order trees. |

BL- Bloom's Taxonomy Levels (1- Remembering, 2- Understanding, 3- Applying, 4-Analysing, 5- Evaluating, 6- Creating) L1, L2 Etc.

CO- Course Outcomes

PO-Program Outcomes; PI Code- Performance Indicator Code

Note: Attempt all questions. Part (a) of each question is compulsory and carries 04 marks; attempt any two parts from (b), (c) and (d) carrying 08 marks.

CO3: To analyzes, and interprets the concept of Exception, Data-Bases & Advanced Python Concepts

CO4: To understand basic MVC architecture using Django-python web structures.

CO5: To use Django for full stack web development

Sl. No.	Question	Marks	CO	BL	PI
1	a) What is Python Package installer and how to install, explain with steps.	(4)	3	2	1.4.1
	b) Explain Exception handling using try-catch block.	(8)	3	1	1.1.2
	c) List out advantages of python along with the real-life examples	(8)	3	3	2.1.3
	d) Write short notes on any 2 modules of python along with its function	(8)	3	3	2.1.3
2	a) Write Django code for URL Mapping	(4)	4	2	1.4.1
	b) Draw and explain file structure in Django	(8)	4	1	2.1.2
	c) Illustrate difference between MVC and Django MVT Architecture	(8)	4	3	2.1.3
	d) Create a Django webpage demonstrating the process of template generation and rendering	(8)	4	4	1.4.1
3	a) Explain about following files: 1. Manage.py 2. Settings.py	(4)	5	2	1.4.1
	b) Explain CRUD operations.	(8)	5	1	2.1.2
	c) Explain about get and post method in HTML	(8)	5	2	2.1.3
	d) Write short notes on any 4 tags in DTL	(8)	5	1	2.1.3

Note: A question may be split into sub-part further if required.

CO - Course Outcomes

BL- Bloom's Taxonomy Levels

(L1- Remembering, L2- Understanding, L3- Applying, L4- Analysis, L5- Evaluating, L6- Creating).

PI - Performance Indicator Code

Subject Code: 102305CSB.Tech – 3rd Semester Class Test - II (21/12/2021)**Subject: Operating System****Time: 2 Hrs.****Maximum Marks: 60**

Note: Attempt all questions. Part (a) of each question is compulsory and carries 04 marks; attempt any two parts from (b), (c) and (d) carrying 08 marks.

CO4: Understand disk organization, file system structure, Secondary Storage Management functions of OS.

CO5: Understand various system calls and the concept of the Inode.

Sl. No.	Question	Marks	CO	BL	PI
1	a) I. True or False? A program does not need to be stored in memory in its entirety to be executed. II. True or False? With pure demand paging, the page fault rate is initially very high. III. What is thrashing? IV. How do we calculate the Effective Access Time?	(4)	CO3	L1	2.2.2
	b) How many page faults occur for the following reference string, with three & four page frames in memory respectively? 1,2,3,4,5,3,4,1,6,7,8,7,8,9,7,8,9,5,4,5,4,2. a) LRU algorithm b) FIFO algorithm c) Optimal page replacement algorithm Which is the most efficient among them?	(8)	CO3	L4	2.1.3
	c) Differentiate between Paging and Segmentation. Explain Paging with hardware architecture. 1) Consider a logical address space of eight pages of 1024 words each, mapped onto a physical memory of 32 frames. (a) How many bits are in logical address? How many bits are in physical address?	(8)	CO3	L5	1.4.1
	d) Discuss the concept of demand paging. Write and explain the steps of handling a page fault.	(8)	CO3	L5	1.4.1
2	a) I. What are the various File Access Methods used in the operating system? II. List all the attributes of files maintained by the operating system	(4)	CO4	L1	2.2.2
	b) Discuss the Various file allocation methods in the disk.	(8)	CO4	L3	2.2.2
	c) What are I/O subsystems? Discuss all the I/O buffering mechanisms.	(8)	CO4	L3	2.2.2

d)	A disk consists of 100 tracks, numbered 0 to 99. The head has just moved from track 51 to track 50. It reads data from both of those tracks. Five requests are pending to read data from, or write data to the following tracks; they are listed in the order in which the requests arrived: 16, 32, 64, 40, 72 For the sake of simplicity, assume that no other read or write requests will arrive until all of these requests have been serviced. In the table below, various disk scheduling algorithms are listed. In each case indicate (in the table provided) in which order the requests will be serviced (by listing the tracks to be accessed in the correct order). Also, calculate the number of tracks traversed to reach each track. Finally, calculate the average seek length for each case (Complete the Table for all the given algorithms)						(8)	CO4	L4	2.1.3																																																															
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3	a)	What is File System? What does UNIX file system Layout Consists of?	(4)	CO5	L1	2.2.2
	b)	Explain the architecture of Unix in detail with its feature?	(8)	CO5	L3	1.4.1
	c)	Draw and Explain the Inode Data structure with 8 Direct Blocks, 1 Single Indirect, 1 Double Indirect, 1 Triple Indirect. Calculate the Maximum File size possible with 128 Bytes block size and 8 Bytes is the size of each block address.	(8)	CO5	L4	2.2.2
	d)	What is Command in UNIX? What are the rules for writing Commands in UNIX? Explain any 5 Unix commands in detail.	(8)	CO5	L3	2.1.3