SYMBIOSIS INTERNATIONAL (DEEMED UNIVERSITY)

(Established under Section 3 of the UGC Act, 1956)
Re-accredited by NAAC with 'A' Grade (3.58/4) Awarded Category – I by UGC

Seat No. | | | | | | |

Institute: (0701)SYMBIOSIS INSTITUTE OF TECHNOLOGY, PUNE

Programme: (070122) BACHELOR OF TECHNOLOGY(COMPUTER SCIENCE AND ENGINEERING)
(070124) BACHELOR OF TECHNOLOGY(INFORMATION TECHNOLOGY)

Batch: 2019-23,2020-24
Semester: IV
Course: Engineering Mathematics - III
Course Code: 0701220401,0701240401

Date: 15/11/2022
Day: Tuesday

Maximum Marks: 45
Time: 09:30 am - 11:00 am

NOTE : DO NOT WRITE ANYTHING ON THE QUESTION PAPER

Instructions:

1. There are Nine questions in this paper and All questions are compulsory.
2. Write your seat number in word and figures in the answer sheet provided.
3. The use of non-programmable calculators is allowed.
4. Please note that the content of CO, BL is for administrative purpose.

		Marks	CO/BL
Q.1	Check the Analyticity of the function $f(z)=x^2+iy^2$ at the point $z=\frac{1}{2}+i\frac{1}{2}$.	5	1/3
Q.2	Evaluate the Complex Integral $\int_C \frac{e^z}{(z-1)(z-4)}dz;\ where\ c\ is\ \lvert z\rvert=3/2.$	5	1/3
Q.3	Find the Fixed points of the bilinear transformation $f(z)=\frac{3iz+1}{z+i}$.	5	1/2
Q.4	Find the Fourier sine Transform of $f(x)=xe^{-2x}$.	5	2/2
Q.5	Find the Z-Transform of $f(n)=2^n+1$.	5	3/2

Q.6 Find the Inverse Z-Transform for the function $U(Z) = \dfrac{3z}{(z^2 + 5z + 4)}$. **5** 3/3

Q.7 Classify the following Partial differential equation **4** 3/2

$$\left(\frac{\partial^2 u}{\partial x^2}\right) + y\left(\frac{\partial^2 u}{\partial x \partial y}\right) + x\left(\frac{\partial^2 u}{\partial y^2}\right) + 2\frac{\partial u}{\partial y} = 0$$

Q.8 Find the Partial differential equation corresponding to the curve **4** 3/2

$$z + xy = f(x - y).$$

Q.9 Solve the Heat equation **7** 3/3

$$\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$$

with $u(0,t) = u(\pi,t) = 0$ *and* $u(x,0) = x/2.$

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Programme: (070122) BACHELOR OF TECHNOLOGY(COMPUTER SCIENCE AND ENGINEERING)
(070124) BACHELOR OF TECHNOLOGY(INFORMATION TECHNOLOGY)

Batch: 2019-23,2020-24
Semester: IV
Course: Data Structures
Course Code: 0701220403,0701240403

Date: 19/11/2022
Day: Saturday

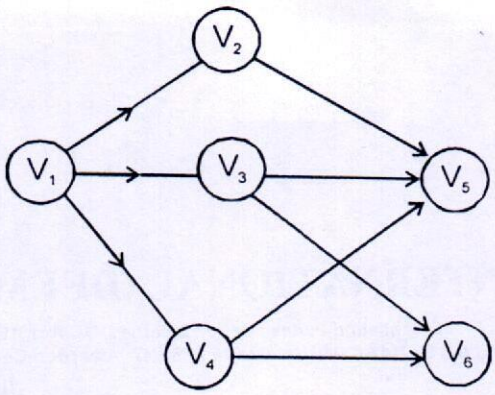
Maximum Marks: 45
Time: 09:30 am - 11:00 am

NOTE : DO NOT WRITE ANYTHING ON THE QUESTION PAPER

Instructions:

1. **All questions are compulsory.**
2. **Write your seat number in word and figures in the answer sheet provided.**
3. **The use of non-programmable calculators is allowed.**
4. **Please note that the content of CO & BL is for administrative purpose.**

			Marks	CO/ BL
Q.1	a)	Illustrate a circular linked list with a suitable example.	3	1/2
	b)	Write an algorithm to perform the following operations on a circular linked list i) insert at the start ii) Insert at the end	7	1/2
Q.2	a)	Explain the difference between Binary Tree and Binary Search Tree (BST)	3	2/2
	b)	Write an algorithm to create Binary Search Tree.	7	2/2
Q.3	a)	State different graph applications.	3	3/2
	b)	Illustrate the Breadth First Search (BFS) graph traversal algorithm and apply it to the following graph.	7	3/3



Q.4 **a)** Apply AVL tree to height balance input: **30, 80, 90, 20, 25, 40** — **5** — 4/3

Q.5 **a)** Write the advantages and disadvantages of sequential access file organization. — **3** — 5/2

b) Apply quadratic probing to insert the following identifiers in the hash table. **37, 90, 55, 22, 11, 17, 49, 87 in** hash table. What will be the final hash table after inserting the above identifiers? — **7** — 5/3

Consider:

N= number of buckets in hash table are 10 (Buckets are numbered from 0-9).

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Programme: (070122) BACHELOR OF TECHNOLOGY (COMPUTER SCIENCE AND ENGINEERING)
(070124) BACHELOR OF TECHNOLOGY (INFORMATION TECHNOLOGY)

Batch: 2017-21,2018-22
Semester: IV
Course: Data Structures
Course Code: 0701220405,0701240405

Date: 19/11/2022 Maximum Marks: 60

Day: Saturday Time: 09:30 am - 12:00 pm

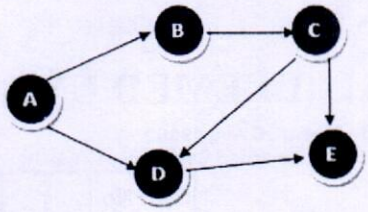
NOTE : DO NOT WRITE ANYTHING ON THE QUESTION PAPER

Instructions:

1. All questions are compulsory.
2. Write your seat number in words and figures in the answer sheet provided.
3. The use of non-programmable calculators is allowed.
4. Please note that the content of CO & BL is for administrative purposes.

			Marks	CO/ BL
Q.1	a)	Explain any application of the linked list.	5	1/2
	b)	Write an algorithm to perform the following operations on a singly linked list i) Insert at the start ii) Delete at the start iii) Display	10	1/2
Q.2	a)	Explain the concept threaded binary tree.	5	2/2
	b)	Write a function code to implement the BST operation the for following functions: i) Create BST ii) Display Inorder traversal iii) Display Preorder traversal	10	2/2

Q.3	**a)**	Explain the adjacency matrix representation of graph data structures.	**4**	3/2
	b)	Write and apply the topological sort algorithm on the following graph.	**8**	3/3



Q.4	**a)**	Explain different rotations of the AVL tree.	**4**	4/2
	b)	Build an AVL tree with the following values: **15, 30, 36, 25, 20, 24, 10, 13, 7**	**8**	4/3
Q.5	**a)**	What are the characteristics of good hash functions? Explain any one hashing technique.	**4**	5/2
	b)	Explain the advantages and disadvantages of sequential file organization.	**2**	5/2

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Programme: (070122) BACHELOR OF TECHNOLOGY(COMPUTER SCIENCE AND ENGINEERING)
(070124) BACHELOR OF TECHNOLOGY(INFORMATION TECHNOLOGY)

Batch: 2019-23,2020-24
Semester: IV
Course: Operating Systems
Course Code: 0701220405,0701240405

Date: 17/11/2022 **Maximum Marks:** 45

Day: Thursday **Time:** 09:30 am - 11:00 am

NOTE : DO NOT WRITE ANYTHING ON THE QUESTION PAPER

Instructions:

1. **All questions are compulsory.**
2. **Write your seat number in word and figures in the answer sheet provided.**
3. **The use of non-programmable calculators is allowed.**
4. **Please note that the content of CO & BL is for administrative purposes.**

			Marks	CO/ BL
Q.1	a)	Illustrate with a suitable example the difference between Multithreading and Multitasking	3	1/2
	b)	Explain in detail the logical view of OS and batch and timesharing OS	7	1/2
Q.2	a)	Summarize the roles & responsibilities of the scheduler and dispatcher for process execution. And solve the following : For the following processes calculate the avg waiting time using SJF (p) and round robin (quantum=3).	7	2/3

Process	Arrival Time	Total Burst Time
P1	0	12
P2	1	1
P3	2	5
P4	4	2
P5	5	7
P6	6	3

b) Explain in detail any one communication models for IPC. **3** 2/2

Q.3 a) Why condition variables are used in monitors? Support the answer with a proper example. **6** 3/2

b) A barber shop consists of a waiting room with n chairs and a barber room with one barber chair. If there are no customers to be served, the barber goes to sleep. If a customer enters the barbershop and all chairs are occupied, then the customer leaves the shop. If the barber is busy but chairs are available, then the customer sits in one of the free chairs. If the barber is asleep, the customer wakes up the barber. Write pseudo-code to coordinate the barber and the customers using semaphores. **4** 3/3

Q.4 a) Explain in detail Paging scheme. Why and How TLB is used in Paging? Solve following Paging example. **5** 4/3

Consider a system with 80% hit ratio, 50 nano-seconds time to search the associative registers, 750 nano-seconds time to access memory.

Find the time to access page

i) When the page number is in associative memory.
ii) When the time to access a page when not in associative memory.
iii) Find the effective memory access time.

b) Justify "Copy-On-Write is a clever way to share virtual pages" **5**

Q.5 a) Explain the following concepts w.r.t. file system **5** 5/2

i) File Mounting and Protection
ii) File Access Methods

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