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<b>R-20</b>
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**Code: 20A543T**

II B.Tech. II Semester Supplementary Examinations Dec 2022 / Jan 2023

**Operating Systems**  
(Common to CSE and AI&DS )

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

**PART-A**

(Compulsory question)

1. <b>Answer ALL the following short answer questions</b> ( 5 X 2 = 10M )	CO	Blooms Level
a) What is kernel in operating system and what are the various types of kernel?	CO1	L1
b) What are Burst time, Arrival time, Exit time, Response time, Turnaround time, and Throughput of a process?	CO1	L1
c) What is a thread in OS? What are the differences between a process and a thread?	CO2	L1, L2
d) What is deadlock and what are its four necessary conditions?	CO3	L1, L2
e) What are the various file allocation methods?	CO4	L1, L2

**PART-B**

Answer *five* questions by choosing one question from each unit ( 5 x 12 = 60 Marks )

Marks    CO    BL

<b>UNIT-I</b>
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2. a) Describe some of the challenges of designing operating systems for mobile devices compared with designing operating systems for traditional PCs.	6M	CO1	L1
b) Discuss the services provided by the operating system for efficient system operation.	6M	CO1	L1

**OR**

3. a) Describe the actions taken by a kernel to context-switch between processes.	5M	CO1	L1
b) Suppose that the following processes arrive for execution at the times indicated. Each process will run for the amount of time listed. In answering the questions, use nonpreemptive scheduling, and base all decisions on the information you have at the time the decision must be made.			

Process	Arrival Time	Burst Time
P1	0	8
P2	3	4
P3	4	2

i) What is the average turnaround time and average waiting time for these processes with the FCFS scheduling algorithm?			
ii) What is the average turnaround time and average waiting time for these processes with the SJF scheduling algorithm?	7M	CO1	L6

<b>UNIT-II</b>
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4. a) What resources are used when a thread is created? How do they differ from those used when a process is created?	5M	CO2	L4
b) Imagine that there is rail bridge on the river for movement of trains from one side of the river to other side of the river. On the bridge only one train can move at a time. Train comes from both the sides. Assume that trains from two side of the river arrived at the bridge ends and waiting for the signal. Here only one train can be signalled at a time to avoid the collision on the bridge. Implement the above problem using Semaphores.	7M	CO2	L6

OR

5. a) Write about thread issues in-detail. 6M CO2 L1  
 b) Develop a pseudo code for a chess game using peterson's solution of process synchronization. 6M CO2 L6

<b>UNIT-III</b>
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6. a) What are the various possibilities to prevent the deadlock? Explain. 6M CO3 L4  
 b) Assume four persons (P1, P2, P3, P4) are sharing the following set of common resources.

i) 5 Pens ii) 3 Pencils iii) 4 Erasers iv) 2 Sharpeners

Allocation matrix and Need matrix are given as follows:

Allocation Matrix:

Person Name	Pens	Pencils	Erasers	Sharpener
P1	2	1	1	0
P2	0	0	0	1
P3	1	1	1	0
P4	1	1	0	1

Need Matrix:

Person Name	Pens	Pencils	Erasers	Sharpener
P1	1	0	0	1
P2	0	2	1	1
P3	2	0	0	1
P4	0	0	1	0

Find out a proper order for completing the four persons work using Banker's algorithm.

6M CO3 L4

OR

7. a) Explain about first fit, best fit, and worst fit memory allocation strategies with a suitable example. 6M CO3 L5  
 b) How memory is protected with the use of hardware support? Explain with a neat diagram. 6M CO3 L5

<b>UNIT-IV</b>
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8. a) Write a short note on directory structure. 6M CO4 L1  
 b) Consider a system that supports the strategies of contiguous, linked, and indexed allocation. What criteria should be used in deciding which strategy is best utilized for a particular file? 6M CO4 L1

OR

9. a) With a neat sketch explain the working of hard disk drive. 6M CO4 L5  
 b) With a suitable example explain the working of FCFS and SSTF disk scheduling algorithms. 6M CO4 L5

<b>UNIT-V</b>
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10. a) Write a short note on goals of protection. 5M CO5 L1  
 b) Explain about revocation of access rights. 7M CO5 L5

OR

11. a) Write about various forms of accidental and malicious security violations. 5M CO5 L1  
 b) Explain about system and network threats. 7M CO5 L5

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**Code: 20AC41T**

II B.Tech. II Semester Supplementary Examinations Dec 2022 / Jan 2023

**Probability and Statistics**

(Common to CE, ME, CSE and AI&amp;DS)

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

**PART-A**
**(Compulsory question)**

- |   |    |              |
|---|----|--------------|
| <b>1. Answer ALL the following short answer questions ( 5 X 2 = 10M )</b>   | CO | Blooms Level |
| a) An engineering group receives e-mail requests for technical information from sales and service. The daily numbers of e0mails for six days are 11, 9, 17, 19, 4, 5. Find the mean and median. | 1  | L1           |
| b) Write the axioms of probability.   | 2  | L1           |
| c) Define Poisson distribution and state its constants.   | 3  | L1           |
| d) Discuss about one tail and two tail tests.   | 4  | L1           |
| e) Write the test statistic of paired sample test.  | 5  | L1           |

**PART-B**
**Answer five questions by choosing one question from each unit ( 5 x 12 = 60 Marks )**

Marks CO Blooms Level

**UNIT-I**

2. Find the value of mean, mode and median from the data given below:

Weight (kg)	93-97	98-102	103-107	108-112	113-117	118-122	123-127	128-132
Number of students	3	5	12	17	14	6	3	1

12M 1 L2

**OR**

3. a) Calculate the Karl Person's coefficient of correlation for the following ages (in years) of husbands and wives at the time of their marriage:

Age of Husband	23	27	28	28	28	30	30	33	35	38
Age of wife	18	20	22	27	21	29	27	29	28	29

6M 1 L3

- b) A test in statistics was taken by 7 students. The teacher ranked his pupils according to their academic achievement. The order of achievement from high to low, together with family income for each pupil, is given as follows:

Name	Rama	Krishna	Siva	Lava	Achyuta	Para	Pragni
Income (Rs '000)	8.7	4.2	5.7	8.2	20	18	17.5

6M 1 L3

**UNIT-II**

4. a) Define a discrete random variable and its probability distribution function.
- 6M 2 L3
- 
- b) If the probability density of a random variable is given by

$$f(x) = \begin{cases} x & \text{for } 0 < x < 1 \\ 2-x & \text{for } 1 \leq x < 2 \\ 0 & \text{elsewhere} \end{cases}$$

this probability density will take on a value

- (i) between 0.45 and 0.75 (ii) less than 0.6 (iii) greater than 1.0

6M 2 L3

**OR**

5. a) Given
- $P(A) = 0.30, P(B) = 0.62, P(A \cap B) = 0.12$
- , find
- 
- (i)
- $P(A \cup B)$
- (ii)
- $P(\bar{A} \cap B)$
- (iii)
- $P(A \cap \bar{B})$
- (iv)
- $P(\bar{A} \cup \bar{B})$

4M 2 L2

- b) In a bolt factory, machines A, B, C manufacture respectively 25%, 35% and 40% of the total. Of their output 5%, 4%, 2% are known to be defective bolts. A bolt is drawn at random from the product and is found to be defective. What is the probability that it was manufactured by machine A? 8M 2 L3

**UNIT-III**

6. a) If a coin is tossed 12 times, find the probability of getting  
 (i) at least two heads, (ii) at most 3 heads,  
 (iii) between 5 to 8 heads and (iv) all heads. 6M 3 L3
- b) The daily high temperature in a computer server room at the university can modeled by a normal distribution with mean 68.7 °F and standard deviation 1.2 °F. Find the probability that, on any given day, the high temperature will be  
 (i) between 68.3 and 70.3 °F , (ii) greater than 71.5 °F. 6M 3 L3

**OR**

7. a) Fit a Poisson distribution to the following data:

Number of deaths	0	1	2	3	4
Frequencies	122	60	15	2	1

6M 3 L3

- b) Find the probabilities that a random variable having the standard normal distribution will take on a value  
 (i) Between 0.87 and 1.28, (ii) between - 0.34 and 0.62,  
 (iii) Greater than -0.65 and (iv) less than -0.43 and greater than 0.43. 6M 3 L3

**UNIT-IV**

8. a) Define the following;  
 (I) Point estimation (ii) Interval estimation  
 (iii) Unbiased estimator (iv) More efficient unbiased estimator  
 (v) Null hypothesis and (vi) Alternative Hypothesis. 6M 4 L1
- b) The breaking strength of ropes produced by a manufacturer have mean 1800N and variance 1000N. By a new technique in the manufacturing process, it is claimed that the breaking strength can be increased. To test this claim a sample of 50 ropes is tested and found that the mean breaking strength is 1850N. Can we support the claim at (i) 0.05 and (ii) 0.01, level of significance? 6M 4 L3

**OR**

9. a) Discuss about the possible errors that are being occurred in sampling. 4M 4 L3
- b) A cigarette manufacturing firm claims that its brand A line of cigarettes outsells its brand B by 8%. If it is found that 42 out of a sample of 200 smokers prefer brand A and 18 out of another sample of 100 smokers prefer brand B, test whether the 8% difference is a valid claim. 8M 4 L3

**UNIT-V**

10. To reduce the amount of recycled construction materials entering land fill, it is crushed for use in the base of roadways. Green engineering practices require that their strength, resiliency modulus, be accessed. Measurements on 6 specimens of recycled materials from two different locations produced the data:

Location-I	707	632	604	652	669	674
Location-II	552	554	484	630	648	610

Use the 0.05 level of significance to establish a difference in mean strength for the materials from two locations. Also construct a 99% confidence interval for the difference between means. 12M 5 L3

**OR**

11. Fit a Poisson distribution to the following data and test for goodness of fit at 0.05 level of significance.

x:	0	1	2	3	4
f:	419	352	154	56	19

12M 5 L3

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<b>R-20</b>
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**Code: 20A541T**

II B.Tech. II Semester Supplementary Examinations Dec 2022 / Jan 2023

**Design and Analysis of Algorithms**

(Common to CSE and AI&DS)

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

**PART-A**

(Compulsory question)

1. Answer ALL the following short answer questions ( 5 X 2 = 10M )	CO	Blooms Level
a) Write the pseudo code for finding the factorial of given number.	CO1	L3
b) Write the differences between divide and conquer and greedy method.	CO2	L2
c) State the principle of optimality	CO3	L1
d) Differentiate between Backtracking and Branch & Bound techniques.	CO4	L2
e) Define class P and class NP.	CO5	L1

**PART-B**

Answer *five* questions by choosing one question from each unit ( 5 x 12 = 60 Marks )

	Marks	CO	Blooms Level
<b>UNIT-I</b>			
2. a) What is Amortized analysis of algorithms and how is it different from Asymptotic analysis?	6M	CO1	L2
b) Describe the characteristics of algorithm with an example.	6M	CO1	L2
<b>OR</b>			
3. a) What is space complexity? Illustrate with an example for fixed and variable part in space complexity?	6M	CO1	L1,2
b) Describe find and union operation on sets	6M	CO1	L2
<b>UNIT-II</b>			
4. a) Write Divide – And – Conquer recursive Merge sort algorithm and derive the time complexity of this algorithm	8M	CO2	L2
b) Explain the general principle of Greedy method and also list the applications of Greedy method	4M	CO2	L1
<b>OR</b>			
5. a) Describe the Algorithm Analysis of Binary Search	4M	CO2	L2
b) What is a Spanning tree? Explain Prim’s Minimum cost spanning tree algorithm with suitable example.	8M	CO2	L3

**UNIT-III**

6. a) Describe the algorithm to find minimum-cost binary search tree. Show that the computing time of function OBST is  $O(n^2)$ . 6M CO3 L2
- b) Explain how travelling sales person problem uses the dynamic programming technique with example. 6M CO3 L3

**OR**

7. a) Describe the Dynamic 0/1 Knapsack Problem. Find an optimal solution for the dynamic programming 0/1 knapsack instance for  $n=3$ ,  $m=6$ , profits are  $(p_1, p_2, p_3) = (1, 2, 5)$ , weights are  $(w_1, w_2, w_3) = (2, 3, 4)$ . 6M CO3 L4
- b) Describe All-pairs shortest path algorithm with example. Give the time complexity of the algorithm. 6M CO3 L3

**UNIT-IV**

8. a) Write a backtracking algorithm to solve sum of subsets problem with  $m=35$ ,  $w = \{20, 18, 15, 12, 10, 7, 5\}$  to the variable tuple size formulation. 12M CO4 L4

**OR**

9. a) Draw the portion of state space tree generated by LCBB for the 0/1 Knapsack instance:  $n = 5$ ,  $(p_1, p_2, \dots, p_5) = (10, 15, 6, 8, 4)$ ,  $(w_1, w_2, \dots, w_5) = (4, 6, 3, 4, 2)$  and  $m=12$ . Find an optimal solution using fixed – tuple sized approach. 12M CO4 L4

**UNIT-V**

10. a) Distinguish between deterministic and non deterministic algorithm. 6M CO5 L2
- b) Explain the non-deterministic sorting problem. 6M CO5 L2

**OR**

11. a) Explain the classes of NP-hard and NP-complete. 6M CO5 L2
- b) State the cook's theorem. What is the significance of the theorem? 6M CO5 L2

\*\*\* End \*\*\*

**Code: 20A542T**

II B.Tech. II Semester Supplementary Examinations Dec 2022 / Jan 2023

**Formal Languages and Automata Theory**  
(Computer Science and Engineering)

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

**PART-A**

(Compulsory question)

**1. Answer ALL the following short answer questions** ( 5 X 2 = 10M )

- |   | CO  | Blooms Level |
|---|-----|--------------|
| a) Write the Applications of Finite Automata                                    | CO1 | L1           |
| b) State the closure properties of regular sets                                 | CO2 | L1           |
| c) State the Pumping lemma for Context Free Languages                           | CO3 | L3           |
| d) Define DCFL and DPDA   | CO4 | L2           |
| e) Write short notes on Context Sensitive Language and Linear Bounded Automata. | CO5 | L3           |

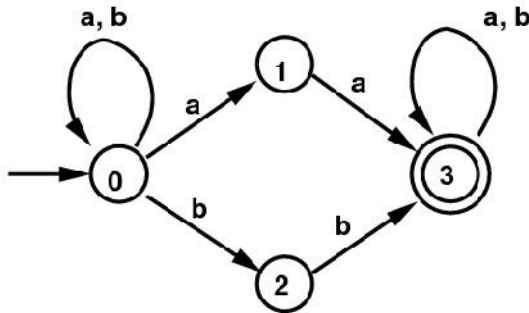
**PART-B**

Answer *five* questions by choosing one question from each unit ( 5 x 12 = 60 Marks )

Marks    CO    Blooms Level

**UNIT-I**

2. a) Explain the procedure to convert NFA to DFA 5M    CO1    L2  
 b) Let M be the NFA shown in Figure.



Construct Equivalent DFA for the above NFA 7M    CO1    L2

**OR**

3. Let M1 be the Mealy machine shown in Fig., Construct Moore machine M2 for the given Mealy machine M1.

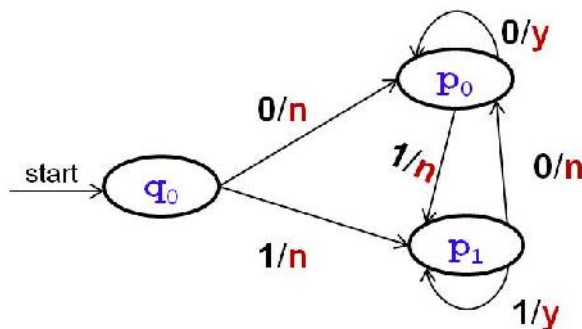


Fig. M<sub>1</sub> - A Mealy machine

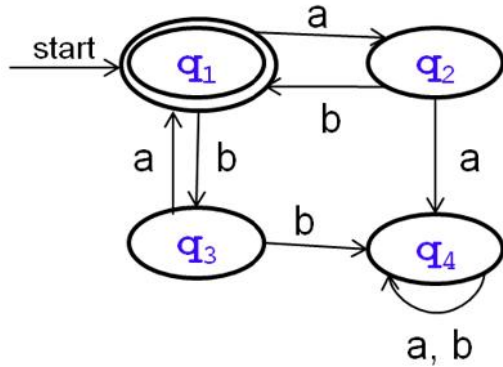
12M    CO5    L3

UNIT-II
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4. a) List the Identity rules of regular expression. 4M CO2 L2  
 b) Convert the following regular expression to NFA's with  $\epsilon$ -transitions:  $a^*(a+b)ab$  8M CO2 L3

OR

5. For the given Finite Automata (FA) write an equivalent Regular Expression.



12M CO2 L3

UNIT-III
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6. Construct DFA equivalent to the regular grammar given below:  
 $S \rightarrow aS \mid bS \mid aA$      $A \rightarrow bB \mid b$      $B \rightarrow aC$      $C \rightarrow \epsilon$  12M CO3 L3

OR

7. a) Test whether the following grammar is ambiguous or not. 4M CO3 L2  
 $S \rightarrow A/B$      $A \rightarrow aAb/ab$      $B \rightarrow abB/\epsilon$   
 b) Convert the following CFG into CNF  
 $S \rightarrow aS_1b$   
 $S_1 \rightarrow aS_1b/\epsilon$  8M CO3 L3

UNIT-IV
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8. Design a Pushdown Automata (PDA) for accepting palindrome strings over  $\{0, 1\}$  12M CO4 L3

OR

9. Obtain a CFG for the PDA shown below:  
 $M = (\{q_0, q_1\}, \{a, b\}, \{Z_0, Z\}, q_0, Z_0, \delta)$  and  $\delta$  is given below.  
 $(q_0, b, Z_0) = (q_0, ZZ_0)$   
 $(q_0, \epsilon, Z_0) = (q_0, \epsilon)$   
 $(q_0, b, Z) = (q_0, ZZ)$   
 $(q_0, a, Z) = (q_1, Z)$   
 $(q_1, b, Z) = (q_1, \epsilon)$   
 $(q_1, a, Z_0) = (q_0, Z_0)$  12M CO4 L3

UNIT-V
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10. Construct TM for the language  $L = \{a^n b^n / n \geq 1\}$  12M CO5 L3

OR

11. Describe the following with suitable examples.  
 i. Types of Turing machines (4M)  
 ii. Post Correspondence Problem (4M)  
 iii. Turing Reducibility (4M) 12M CO5 L3

\*\*\* End \*\*\*



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<b>R-20</b>
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**Code: 20A445T**

II B.Tech. II Semester Supplementary Examinations Dec 2022 / Jan 2023

**Microprocessor and Interfacing**

(Common to CSE and AI&DS)

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

**PART-A**

(Compulsory question)

1. Answer ALL the following short answer questions	( 5 X 2 = 10M )	CO	Blooms Level
a) Identify the function of BIU in 8086 microprocessor		CO1	L1
b) Differentiate I/O mapped and Memory Mapped I/O.		CO2	L2
c) Discuss interrupt driven I/O.		CO3	L2
d) Describe asynchronous communication.		CO4	L2
e) Define segmentation in 80386.		CO5	L1

**PART-B**

Answer five questions by choosing one question from each unit ( 5 x 12 = 60 Marks )

		Marks	CO	Blooms Level
<b>UNIT-I</b>				
2.	Determine the significance of conditional and control flags in detail.	12M	CO1	L3
<b>OR</b>				
3. a)	List the classification of instructions	2M	CO1	L1
b)	Discuss the instructions i) ADC ii) IDIV iii)JC iv) LOOP v) SAL	10M	CO1	L2
<b>UNIT-II</b>				
4. a)	Differentiate SRAM and DRAM 8086 microprocessor.	4M	CO2	L2
b)	Draw and explain the basic structure of DRAM	8M	CO2	L2
<b>OR</b>				
5.	Explain the Architecture of 8257 with neat diagram.	12M	CO2	L2
<b>UNIT-III</b>				
6.	Analyze the purpose of different Operational Modes of 8255 PPI.	12M	CO3	L4
<b>OR</b>				
7.	Summarize the interrupt handling in 8086 microprocessor and give the roll of interrupt vector table and ISR in this process.	12M	CO3	L5
<b>UNIT-IV</b>				
8.	Analyze 8253 mode of operations and it's interfacing with 8086.	12M	CO4	L4
<b>OR</b>				
9.	Develop assembly language programs to transmit serially 100 bytes of each 7bit , even parity and 2 stop bits with baud rate factor 16	12M	CO4	L6
<b>UNIT-V</b>				
10. a)	Determine Real and protected mode of 80386	6M	CO5	L3
b)	Describe Paging concept.	6M	CO5	L2
<b>OR</b>				
11.	Discuss different features of Pentium and Pentium pro processors	12M	CO5	L2

\*\*\* End \*\*\*