Hall Ticket Number :										

R-20

Code: 20A445T

II B.Tech. II Semester Regular & Supplementary Examinations July 2023

Microprocessor and Interfacing

(Common to CSE, AI&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 (5 X 2 = 10M)	CO	BL
a) Illustrate the following Arithmetic instructions of 8086 i) AAA ii) MUL	CO1	L2
b) Analyze the different types of command words used in 8259?	CO2	L6
c) What are the modes of operation supported by 8255?	CO3	L6
d) What is USART?	CO4	L6
e) What are the different registers in 80286?	CO5	L2

PART-B

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

		Marks	CO	BL
	UNIT–I			
2. a)	Explain the functions of different registers in 8086. Also discuss the flag register contents.	6M	CO1	L2
b)	How procedure CALL and RET take place in 8086. Explain CALL and RET instructions in 8086 instruction set.	6M	CO1	L2
	OR			
3.	Explain branch instructions of 8086 with examples.	12M	CO1	L2
	UNIT–II			
4. a)	With the help of basic cell explain SRAM and DRAM?	6M	CO2	L6
b)	With a neat pin diagram explain the minimum mode operation of 8086.	6M	CO2	L2
	OR			
5. a)	What is the purpose of ALE, BHE, DT/R and DEN pins of 8086? Show their timing in the system bus cycle of 8086?	6M	CO2	L2
b)	Draw and discuss the status registers of 8257?	6M	CO2	L6

UNIT–III

6.	a)	Draw and explain the interfacing of cascaded 8259s with 8086.	6M	CO3	L6
	b)	Write an ALP in 8086 to generate a symmetrical square wave form with 1KHz frequency? Give the necessary circuit setup with a DAC?	6M	CO3	L6
		OR			
7.	a)	Describe the interrupt structure in 8086.	4M	CO3	L6
	b)	Which interrupt type is associated with TF flag? What is its vector address?	4M	CO3	L6
	c)	What is meant by vector address? How the vector address is used to service the interrupts?	4M	CO3	L6

UNIT–IV

8.	a)	Give the specifications of RS232C?	4M	CO4	L6
	b)	Explain about line driver and line receiver used in serial communication?	4M	CO4	L6
	c)	Give the status register of 8251 and explain each bit.	4M	CO4	L6
		OR			
9.		Draw and explain the architecture of 8251.	12M	CO4	L6

UNIT–V

10.	a)	Draw and discuss the register organization of 80286.	6M	CO5	L2
	b)	What are the salient features of protected virtual address mode of 80386?	6M	CO5	L2
		OR			L2
11.	a)	Draw and discuss the flag register of 80386 in details.	6M	CO5	L2
	b)	Enumerate the salient features of Pentium and Pentium Pro.	6M	CO5	L2

*** End ***

Hall Ticket Number :										

R-20

Code: 20A543T

II B.Tech. II Semester Regular & Supplementary Examinations July 2023

Operating Systems

(Common to CSE, AI&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 (5 X 2 = 10M)	CO	BL
a) Define the term "Inter process Communication".	CO1	L1
b) List out the advantages of using multithreaded programming.	CO2	L1
c) What do you mean by Demand Paging?	CO3	L1
d) Explain the importance of disk scheduling.	CO4	L2
e) Discuss the principles of protection in a modern computer system	CO5	L2

PART-B

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

			Marks	CO	BL
		UNIT–I			
2.	a)	Explain the Dual-Mode operation of an operating system.	6M	CO1	L2
	b)	What are the three main purposes of an operating system?	6M	CO1	L2
		OR			
3.	a)	Consider Four jobs to be executed on a single processor system arrive at time 0 in the order A, B, C, D. Their burst CPU time requirements are 4, 1, 8, 1 time units respectively. Apply FCFS and SJF CPU scheduling algorithms to calculate average waiting time, average turnaround time.	8M	CO1	L3
	b)	Explain the criteria for evaluating the CPU scheduling algorithms? Why do we need it?	4M	CO1	L2
		UNIT–II			
4.	a)	Write in detail about the thread libraries.	4M	CO2	L2
	b)	Apply semaphores to provide synchronization for Producer Consumer problem.	8M	CO2	L3
		OR			
5.	a)	Discuss Mutual-exclusion implementation with Test And Set instruction.	6M	CO2	L2
	b)	What is a Semaphore? Explain various operations defined on it.	6M	CO2	L2
		UNIT–III			
6.	a)	Apply first-fit, best-fit, and worst-fit algorithms to place processes of size 115 KB, 500 KB, 358 KB, 200 KB, and 375 KB (in order) for the given six memory partitions of 300 KB, 600 KB, 350 KB, 200 KB, 750 KB, and 125 KB (in order).	6M	CO3	L3
	b)	Apply FIFO and LRU page replacement algorithms to calculate number of page faults would occur by consider the following page reference string with five page frames: 1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 6.	6M	CO3	L3

OR

7.	a)	Explain in detail about deadlock detection Techniques.	6M	CO3	L2
	b)	Consider a system with five processes P0 through P4 and three resource types A, B, and C. Resource type A has ten instances, resource type B has five instances, and resource type C has seven instances. Suppose, at time T0, the following snapshot of the system has been taken:			

	Allocation			Max			Available		
	A	B	C	A	B	C	A	B	C
P0	0	1	0	7	5	3	3	3	2
P1	2	0	0	3	2	2			
P2	3	0	2	9	0	2			
P3	2	1	1	2	2	2			
P4	0	0	2	4	3	3			

		Apply safety algorithm to find out whether the system is in safe state or not?	6M	CO3	L3

UNIT–IV

8.	a)	Discuss the advantages and disadvantages of disk space allocation methods.	4M	CO4	L2
	b)	Apply FCFS, SSTF and SCAN disk-scheduling algorithms to calculate total distance (in cylinders) that the disk arm moves to satisfy all the pending requests. The queue of pending requests, in FIFO order is: 2,069, 1,212, 2,296, 2,800, 544, 1,618, 356, 1,523, 4,965, and 368. Let as assume that a disk drive has 5,000 cylinders, numbered 0 to 4,999. The drive is currently serving a request at cylinder 2,150, and the previous request was at cylinder 1,805.	8M	CO4	L3

OR

9.	a)	Write short notes on i. File Attributes ii. File System	4M	CO4	L2
	b)	Apply LOOK, C-SCAN and C-LOOK disk-scheduling algorithms to calculate total distance (in cylinders) that the disk arm moves to satisfy all the pending requests. The queue of pending requests, in FIFO order, is: 86, 147, 91, 177, 94, 150, 102, 175, and 130. Let as assume that a disk drive has 200 cylinders, numbered 0 to 199. The drive is currently serving a request at cylinder 143, and the previous request was at cylinder 125.	8M	CO4	L3

UNIT–V

10.	a)	What is access matrix? Explain the different implementations of access matrix	6M	CO5	L2
	b)	Describe in detail how firewalls protect systems & networks.	6M	CO5	L2

OR

11.	a)	Explain the following program threats. i) Trojan horse ii) Trap door iii) Stack and Buffer overflow	6M	CO5	L2
	b)	Explain the computer-security classifications.	6M	CO5	L2

*** End ***

Hall Ticket Number :										

R-20

Code: 20AC41T

II B.Tech. II Semester Regular & Supplementary Examinations July 2023

Probability and Statistics

(Common to CE, ME, CSE, AI&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** (5 X 2 = 10M)	CO	BL
a)	Write the formula for Rank correlation coefficient with repeated ranks.	CO1	L1
b)	Two cards are drawn from a well shuffled pack of cards .Find probability that they are both aces if the first card is (i) replaced (ii) not replaced	CO2	L2
c)	If the mean of a Poisson variable is 1.8, then find P(X>1)	CO3	L3
d)	Define Type-I and Type-II Errors.	CO4	L3
e)	Explain briefly the Variance Ratio test(F-Test)	CO5	L2

PART-B

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

			Marks	CO	BL

UNIT–I

2. Calculate Mean, Median and Mode from the following data.

Class interval	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90
Frequency	5	9	13	21	20	15	8	3

12M CO1 L3

OR

3. Find Karl Pearson's coefficient of correlation from the following data

Wages	100	101	102	102	100	99	97	98	96	95
Cost of living	98	99	99	97	95	92	95	94	90	91

12M CO1 L3

UNIT–II

4. a) State Baye's Theorem 2M CO2 L-1

b) In a bolt factory machines A, B, C manufacture 20%, 30% and 50% of the total of their output and 6%, 3% and 2% are defective. A bolt is drawn at random and found to be defective. Find the probabilities that is manufactured from (i) Machine A (ii) Machine B (iii) Machine C 10M CO2 L-3

OR

5. a) A random variable X is defined as the sum of the numbers on the faces when two dice are thrown. Construct Probability distribution table. 3M CO2 L-3

b) For the continuous probability function $f(x) = kx^{-e^{-x}}$ n x≥0,find (i) k (ii) Mean (iii) Variance 9M CO2 L-2

UNIT–III

6. a) Out of 800 families with 5 children each, how many would you expect to have (i) 3 boys (ii) either 2 or 3 boys (iii) atleast one boy? Assume equal probabilities for boys and girls 6M CO3 L-3

b) In a Normal distribution 7% of the items are under 35 and 89% are under 63. Determine the mean and variance of the distribution — 6M CO3 L-3

OR

7. a) Average number of accidents on one day on a national highway is 1.6. Determine the probability that the number of accidents are (i) at least one (ii) Atmost one — 6M CO3 L-3

b) In a sample of 1000 cases the mean of a certain test is 14 and standard deviation is 2.5.Assuming the distribution to be normal, find (i) how many score between 12 and 15? (ii) how many score above 18? (iii) how many score below 18? — 6M CO3 L-3

UNIT–IV

8. a) The mean life of a sample of 10 electric bulbs was found to be 1456 hours with standard deviation of 423 hours. The second sample of 17 bulbs chosen from a different batch shoed a mean life of 1280 hours with standard deviation of 398 hours. Is there a significant difference between the means of two batches at 5% level of significance? — 8M CO4 L-4

b) A random sample of 400 items is found to have mean 82 and Standard deviation of 18. Determine maximum error of estimation at 95% confidence interval. Also construct 95% confidence interval. — 4M CO4 L-4

OR

9. a) An oceanographer wants to whether the depth of the ocean in a certain region is 57.4 fathoms, as had previously been recorded. What can he conclude at the 0.05 level of significance, if readings taken at 40 random locations in the given region yielded a mean of 59.1 fathoms with standard deviation of 5.2 fathoms? — 4M CO4

b) In a random sample of 1000 persons from town A, 400 are found to be consumers of wheat. In a sample of 800 from town B, 400 are found to be consumers of wheat. Do these data reveal a significant difference between town A and town B, so far as the proportion of wheat consumers is concerned? Consider level of significance as 1%. — 8M CO4 L-4

UNIT–V

10. To compare two kinds of bumper guards, 6 of each kind were mounted on a car and then the car was run into a concrete wall. The following are the costs of repairs.

Guard I	107	148	123	165	102	119
Guard II	134	115	112	151	133	129

Use 0.01 level of significance to test whether the difference between two sample means is significant. — 12M CO5 L-4

OR

11. Mechanical engineers, testing a new welding technique, classified welds both with respect to appearance and an X-ray inspection. Test for performance with respect to appearance and X ray inspection are independent (consider level of significance as 5%)

Quality

X-Ray	Bad	Normal	Good
Bad	20	7	3
Normal	13	51	16
Good	7	12	21

12M CO5 L-4

*** End ***

Hall Ticket Number :										

R-20

Code: 20A541T

II B.Tech. II Semester Regular & Supplementary Examinations July 2023

Design and Analysis of Algorithms

(Common to CSE, AI&DS and AI&ML)

Max. Marks: 70 Time: 3 Hours

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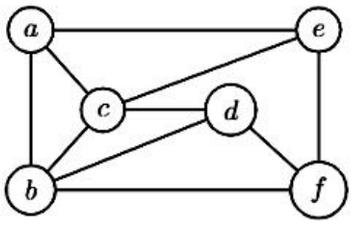
Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. In Part-A, each question carries **Two marks.**
3. Answer **ALL** the questions in **Part-A** and **Part-B**

PART-A

(Compulsory question)

1.	**Answer ALL the following short answer questions** (5 X 2 = 10M)		CO	BL
a)	Show that 5n+6 = O(n).		CO1	L3
b)	Give a recurrence for running time of merge sort.		CO2	L2
c)	What is the principle of optimality?		CO3	L1
d)	Determine the minimum number of colors required to properly color the vertices of the following graph.		CO4	L2



e)	State the Cook's theorem.		CO5	L1

PART-B

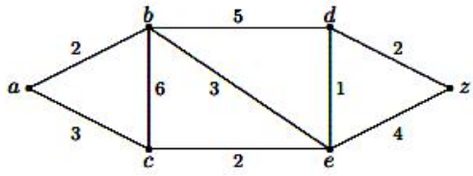
Answer *five* questions by choosing one question from each unit (5 x 12 = 60 Marks)

			Marks	CO	BL
		UNIT–I			
2.	a)	Formally define the asymptotic notations big-oh, big-omega and theta. Give an example for each of the notations.	9M	CO1	L2

	b)	Let T(n) be the number of times "AITS Rajampet" is printed in the following algorithm segment. Determine T(n) and represent it using theta notation.
		for (i =1; i ≤ n; i= i++) do
		for (j=1; j ≤ n; j= j+2) do
		print" AITS Rajampet ";
			3M	CO1	L4

		OR			
3.	a)	How would you find connected components of a graph using disjoint set data structure? Explain with an example.	4M	CO1	L3
	b)	Explain with pseudo code and a suitable example disjoint set *union* and *find* operations. What is weighting rule for union operation?	8M	CO1	L2
		UNIT–II			
4.	a)	Sort the keys 50, 50, 80, 30, 40, 30, 20 in non-decreasing order by applying quick sort. Give a recurrence for the worst-case running time of quick sort and represent its running time using theta notation.	7M	CO2	L3
	b)	Explain binary search algorithm with an example.	5M	CO2	L2
		OR			
5.	a)	State fractional knapsack problem. Find an optimal solution to the fractional knapsack instance n=7, m=15, (p1, p2, …,p7) = (1, 3, 5, 4, 1, 3 ,2) and (w1, w2, …, w7) = (5,10,15,7,8,9,4) by applying greedy algorithm.	7M	CO2	L3

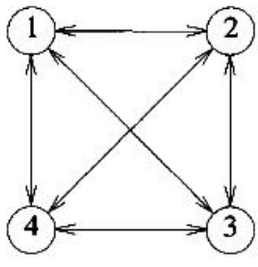
b) Define Minimum Spanning Tree (MST). Find a MST of the following graph by applying Prim's algorithm. CO2 L3



5M

UNIT–III

6. a) Define travelling salesperson problem. Consider the directed graph and the edge cost matrices given below. Solve the given instance of travelling salesperson problem by applying a dynamic programming algorithm. Assume vertex 1 as the source. CO3 L3



(a)

$$\begin{bmatrix} 0 & 10 & 15 & 20 \\ 5 & 0 & 9 & 10 \\ 6 & 13 & 0 & 12 \\ 8 & 8 & 9 & 0 \end{bmatrix}$$

(b)

9M

b) Define matrix chain multiplication problem. 3M CO3 L1

OR

7. a) Give a dynamic programming-based algorithm to solve 0/1 knapsack problem and analyze its running time. Solve the following instance of 0/1 knapsack problem by applying your algorithm. CO3 L3

Item No	Weight (Kg)	Profit (Rs)
1	2	3
2	3	4
3	4	5
4	5	6

Knapsack capacity (W) = 5 Kg 9M

b) Define binary search tree. Draw all different binary search trees possible with keys 25, 15 and 35. CO3 L2 3M

UNIT–IV

8. a) Explain the general method of backtracking. 4M CO4 L2

b) Give a backtracking solution to 8-queens problem. 8M CO4 L3

OR

9. a) Differentiate between FIFO and LC branch and bound techniques. 4M CO4 L2

b) Explain briefly the main steps in an LC branch-and-bound solution to 0/1 knapsack problem. CO4 L3 8M

UNIT–V

10. a) Define complexity classes NP-hard and NP-complete. How to show that a problem is NP-hard? CO5 L2 7M

b) What is halting problem of the Turing machine? Determine the complexity class of halting problem. CO5 L1 5M

OR

11. a) Define decision problem. Give three examples for decision problems which are in class NP but not in class P. CO5 L2 4M

b) Define satisfiability problem. Design a nondeterministic algorithm to solve satisfiability problem. CO5 L2 8M

*** End ***

Hall Ticket Number :										

R-20

Code: 20A542T

II B.Tech. II Semester Regular & Supplementary Examinations July 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 marks.**
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 BL

a) Write a note on applications of formal languages and automata CO1 L1

b) Give English description of the language : b(a+b)*a CO2 L2

c) How do we show the acceptance of CFL? CO3 L2

d) Differentiate PDA and non-deterministic PDA. CO4 L2

e) Define Turing Machine. CO5 L1

PART-B

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

Marks CO BL

UNIT–I

2. Construct a DFA equivalent to the NFA given by M= ({p,q,r,s}, {0,1}, δ, p, {s}), where δ is defined in the following table.

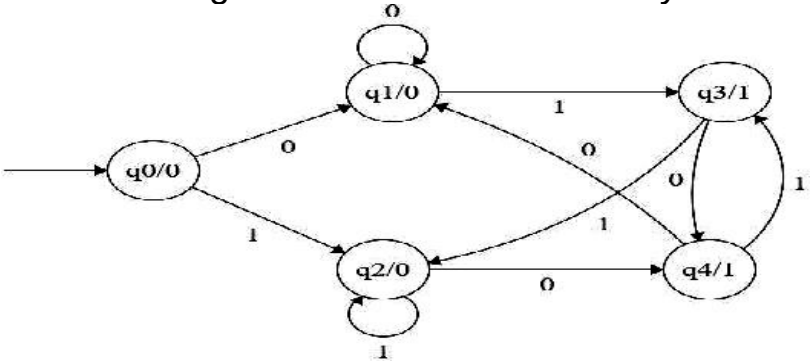
	0	1
p	{p,q}	{p}
q	{r }	{r}
r	{s }	-
s	{s }	{s}

12M CO1 L2

OR

3. a) Difference between Moore and Mealy Machines with their State transition diagram. 4M CO1 L1

b) Convert the following Moore machine into Mealy Machine



8M CO1 L2

UNIT–II

4.	a)	State and explain Arden's theorem	4M	CO2	L1
	b)	Construct a NFA- ϵ equivalent to the regular expression 10 + (0 + 11)0* 1	8M	CO2	L2
		OR			
5.	a)	Explain about pumping lemma of regular sets.	6M	CO2	L2
	b)	Show that the language L={$a^n b^n$/n>=1} is not regular.	6M	CO2	L2

UNIT–III

6.		Construct CFG, G=({S,A,B}, {a,b},P,S) with production set P as S→aAbB; A→Ab/b; B→Ba/a to CNF	12M	CO3	L2
		OR			
7.	a)	What is meant by ambiguous grammar? Test whether the grammar is ambiguous or not. S →A | B A →aAb | ab B→ abB | ϵ	6M	CO3	L2
	b)	Simplify the following CFG S→A/0C1 A→B/01/10 C→CD/ ε	6M	CO3	L3

UNIT–IV

8.	a)	Design PDA for the language L={$a^n b^n$/n>=1}	6M	CO4	L2
	b)	Construct PDA for the CFG S→aSb S→ab	6M	CO4	L2
		OR			
9.	a)	Write short notes on DPDA.	4M	CO4	L1
	b)	Design PDA for the language L= {WcW^r / W ε (0+1)*}	8M	CO4	L3

UNIT–V

10.	a)	Design Turing machine to find 2's complement of a binary number	6M	CO5	L2
	b)	Write a short note on Universal Turing Machine.	6M	CO5	L1
		OR			
11.	a)	Explain types of Turing machine	6M	CO5	L1
	b)	Write short notes on: i) Halting Problem of Turing Machine ii) Post-Correspondence Problem	6M	CO5	L1

*** End ***