R-20

Code: 20A543T

II B.Tech. II Semester Regular Examinations August 2022

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)

			Blooms Level
1. Answer ALL the following short answer questions (5 X 2 = 10M)		CO	
a) What are the various types of system calls?		CO1	L1
b) What is process synchronization? What will be the result when processes are not synchronized?		CO2	L1
c) List out the differences between contiguous memory location and non-contiguous memory location.		CO3	L4
d) What is a file and what are its properties?		CO4	L1
e) What are the various ways for protecting the PC?		CO5	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. a)	Explain about storage structure of the PC.	6M	CO1	L5
b)	Write about various modes of operating system. With a neat diagram explain the transition from user mode to kernel mode and vice-versa.	6M	CO1	L1, L2

OR

3. a)	Explain above scheduling algorithms.	6M	CO1	L5
b)	With a neat diagram explain the life cycle of a process.	6M	CO1	L5

UNIT–II

4. a)	Assume your OS teacher is sharing a file in common amongst all students. If one student tries editing/writing the file, other students cannot read or write at the same time or the updations will not be visible to others. But then while reading others can read. Write pseudo code using Semaphores which gives priority over the readers; i.e., none of the readers should wait if the section is currently opened for reading.	6M	CO2	L4

b) The Singles-Badminton game is designed only for 2 players. If one player is playing, the other player has to wait for his turn and vice versa. Solve this problem with appropriate algorithm and justify the same.　　6M　CO2　L5

OR

5. a) Write a short note on models of multithreading in process management.　　5M　CO2　L2

b) Discuss the approaches to implement multiple processors scheduling in OS.　　7M　CO2　L6

UNIT–III

6. a) Explain about resource allocation graph. Give the examples for resource allocation graph with cycle and without cycle.　　6M　CO3　L5

b) Discuss Banker's algorithm with an example.　　6M　CO3　L6

OR

7. a) Illustrate the concept which helps to avoid external fragmentation with example.　　6M　CO3　L2

b) Consider a system with "Six" partitions in the memory in which "three" partitions consumes the processes inside to them and "three" partitions are holes. The memory structure is given below:

450 MB	860 MB	1350 MB	2360MB	4050MB	1350MB

The processes enter the system whose size is as given (in order): 240MB, 480MB, 1050MB, and 780MB. Implement "First Fit", "Best Fit" and "Worst Fit" algorithm and determine which algorithm can optimally satisfy this requirement. Justify your answer with a proper explanation.　　6M　CO3　L6

UNIT–IV

8. a) Discuss file mounting in-detail.　　6M　CO4　L6

b) Write about various file accessing methods.　　6M　CO4　L2

OR

9. a) Write short note on disk scheduling algorithms.　　6M　CO4　L2

b) Explain about various RAID levels　　6M　CO4　L5

UNIT–V

10. a) Illustrate the steps involved in DMA with a neat diagram.　　6M　CO5　L2

b) Explain the life cycle of an I/O request.　　6M　CO5　L5

OR

11. a) Write about computer security classifications.　　6M　CO5　L1, L2

b) Describe in-detail how firewalls protect systems and networks.　　6M　CO5　L4

*** End ***

Code: 20AC41T

II B.Tech. II Semester Regular Examinations August 2022
Probability and Statistics
(Common to CE, ME, 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) The aerokopter AK 1-3 is an ultra-lightweight manned kit helicopter with a high rotor tip speed. A sample of 8 measurements of speed, in meters per second yielded 204, 208, 205, 211, 207, 201, 201, 203. Find the mean and mode for this sample.   1   L1

b) State the addition theorem of probability. Explain it if the events are (i) mutually exclusive and (ii) Independent.   2   L1

c) Write the conditions for which binomial distribution can be approximated by Poisson distribution.   3   L1

d) Discuss about the errors that occur in sampling.   4   L1

e) Write the test statistic for the difference between two variances.   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.   Calculate the mean, median and mode for the frequency distribution given below:

Height (nm)	205-245	245-285	285-325	325-365	365-405	Total
Frequency	3	11	23	9	4	50

12M   1   L2

OR

3. a) Find Karl Pearson's coefficient of correlation between sales and expenses of the following 10 firms:

Firm	1	2	3	4	5	6	7	8	9	10
Sales	50	50	55	60	65	65	65	60	60	50
Expenses	11	13	14	16	16	15	15	14	13	13

6M   1   L3

b) Calculate Spearman's rank correlation coefficient between advertisement cost and sales from the following data:

Advertisement cost ('000 Rs)	39	65	62	90	82	75	25	98	36	78
Sales (Lakhs)	47	53	58	86	62	68	60	91	51	84

6M   1   L3

UNIT–II

4. a) Two cards are drawn at random from an ordinary deck of 52 cards. What is the probability of getting two aces if
(i) the first card is replaced before the second card is drawn;
(ii) the first card is not replaced before the second card is drawn?   6M   2   L3

b) State and prove Baye's theorem.   6M   2   L2

OR

5. A random variables X has the following probability function:

x	0	1	2	3	4	5	6	7
P(x)	0	K	2K	2K	3K	K^2	$2K^2$	$7K^2+K$

Determine: (i) K (ii) Evaluate P(X<6) (iii) Evaluate P(0<X<5) (iv) mean and variance | 12 | C02 | L5

UNIT–III

6. a) Fit a binomial distribution to the following data:

x:	0	1	2	3	4	5
f:	10	10	30	25	15	10

6M | 3 | L3

b) Given a random variable having the normal distribution with mean 16.2 and variance 1.5625, find the probabilities that it will take on a value (i) greater than 16.8, (ii) between 13.6 and 18.8. | 6M | 3 | L3

OR

7. a) If a random variable X follows Poisson distribution such that $P(X = 1) = P(X = 2)$, find (i) the mean and variance of the distribution (ii) $P(X = 0)$. | 6M | 3 | L3

b) An automatic machine fills distilled water in 500 ml bottles. Actual volumes are normally distributed about a mean of 500 ml, and standard deviation 20ml.
(i) What proportion of the bottles are filled with water outside the tolerance limit of 475 ml to 525 ml?
(ii) To what value does the standard deviation need to be adjusted if 99% of the bottles must be within tolerance limits? | 6M | 3 | L3

UNIT–IV

8. a) A random sample of size 100 is taken from a population with standard deviation 5.1. Given that the sample mean is 21.3, construct a (i) 95% (ii) 98% confidence interval for the population mean. | 8M | 4 | L3

b) Write the procedure in testing the hypothesis. | 4M | 4 | L1

OR

9. a) Suppose that we want to estimate the true proportion of defectives in a very large shipment of adobe bricks, and that we want to be at least 95% confidence that the error is at most 0.04. How large a sample will we need if
(i) we have no idea what the true proportion might be;
(ii) we know that the true proportion doesn't exceed 0.12? | 6M | 4 | L3

b) To test the claim that the resistance of electric wire can be reduced by more than 0.050 ohm by alloying, 32 values obtained for standard wire yielded mean of 0.136 ohm and standard deviation 0.004 ohm, and another 32 values obtained for alloyed wire yielded mean 0.083 ohm and standard deviation 0.005 ohm. At 0.05 level of significance, does this support the claim? | 6M | 4 | L3

UNIT–V

10. Two horses A and B were tested according to the time (in seconds) to run a particular track with the following results. Test whether the two horses have the same running capacity?

Horse A	28	30	32	33	33	29	34
Horse B	29	30	30	24	27	29	--

12M | 5 | L3

OR

11. From the following data find whether there is any significant liking in the habit of taking soft drinks among the categories of the employees.

Soft drinks	Clerks	Teachers	Officers
Pepsi	10	25	65
Thumsup	15	30	65
Fanta	50	60	30

12 | 5 | L1

*** End ***

R-20

Code: 20A541T

II B.Tech. II Semester Regular Examinations August 2022
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)

		CO	Blooms Level
1. **Answer ALL the following short answer questions** (5 X 2 = 10M)			
a) Define time complexity and space complexity.		CO1	L1
b) What is meant by Divide – and – Conquer approach?		CO2	L1
c) Define the Dynamic 0/1 Knapsack Problem		CO3	L1
d) Write the Control Abstraction of iterative Backtracking method.		CO4	L1
e) State Cook's theorem.		CO5	L1

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

	Marks	CO	Blooms Level

UNIT–I

		Marks	CO	Blooms Level
2. a)	Using step count find the time complexity of sum of 'n' natural numbers	6M	CO1	L3
b)	Describe find and union operation on sets	6M	CO1	L1
	OR		CO1	
3. a)	What is pseudo-code? Explain with an example.	3M	CO1	L1,2
b)	Describe best case, average case and worst case efficiency of an algorithm?	9M	CO1	L1,2

UNIT–II

		Marks	CO	Blooms Level
4. a)	Show the result of running Quick sorting technique on the sequence 38,27,43,3,9,82,10	6M	CO2	L4
b)	Derive the Average case time complexity of Quick sorting technique.	6M	CO2	L3

OR

5. a) State the Job – Sequencing with deadlines problem. Find an optimal sequence to the n=5 Jobs where profits (P1,P2,P3,P4,P5) = (20,15,10,5,1)and deadlines (d1,d2,d3,d4,d5) =(2,2,1,3,3).   6M CO2   L4

b) Write the Binary search algorithm and analyze for its best, worst and average case time complexity.   6M CO2   L3

UNIT–III

6. Draw an Optimal Binary Search Tree for n=4 identifiers (a1,a2,a3,a4) = (do, if, read, while) P(1:4)=(3,3,1,1) and Q(0:4)=(2,3,1,1,1).   12M CO3   L4

OR

7. a) Explain how Matrix – chain Multiplication problem can be solved using dynamic programming with suitable example.   6M CO3   L3

b) Explain Reliability Design Problem with suitable example.   6M CO3   L2

UNIT–IV

8. a) What is a Hamiltonian Cycle? Explain how to find Hamiltonian path and cycle using backtracking algorithm.   6M CO4   L2

b) Give the statement of sum –of subsets problem. Find all sum of subsets for n=4, (w1, w2, w3, w4) = (11, 13, 24, 7) and M=31.Draw the portion of the state space tree using fixed – tuple sized approach.   6M CO4   L4

OR

9. a) Discuss the 4 – queen's problem. Draw the portion of the state space tree for n = 4 queens using backtracking algorithm.   6M CO4   L3

b) Write Control Abstraction of Least – Cost(LC) Search.   6M CO4   L2

UNIT–V

10. a) Define P, NP, NP-Complete and NP-Hard   6M CO5   L1

b) Write nondeterministic algorithm for sorting of an array.   6M CO5   L3

OR

11. a) Explain the satisfiability problem.   6M CO5   L2

b) Distinguish between deterministic and non deterministic algorithm.   6M CO5   L2

*** End ***

Code: 20A3041T

R-20

II B.Tech. II Semester Regular Examinations August 2022

Foundations of Artificial Intelligence and Data Science
(Artificial Intelligence and Data Science)

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)

		CO	Blooms Level
1.	**Answer ALL the following short answer questions** (5 X 2 = 10M)		
a)	Define AI	CO1	L1
b)	A* algorithm is based on which search method?	CO2	L1
c)	What is Data Science process?	CO3	L3
d)	How is data exploration done?	CO4	L1
e)	Write any two advantages of Data Presentation	CO5	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.	a)	Explain about the foundations of AI.	6M	CO1	L2
	b)	Explain the structure of agents.	6M	CO1	L2
		OR			
3.	a)	Discuss the heuristic function. Explain how the heuristic function helps during search procedure. Explain with a suitable example.	6M	CO1	L2
	b)	Explain about the Uninformed Search Algorithm.	6M	CO1	L3
		UNIT–II			
4.	a)	Explain about A* algorithm in detail	6M	CO2	L3
	b)	Explain about Local search Algorithm.	6M	CO2	L3
		OR			
5.	a)	Explain how a constraint satisfaction problem (CSP) may be solved.	6M	CO2	L4
	b)	Discuss the importance of CSP backtracking.	6M	CO2	L3

UNIT–III

6. a) Explain about roles and stages in data science project. 6M CO3 L4
    b) Describe Statistical modeling in Data Science 6M CO3 L4

OR

7. Write about Discrete and Continuous Distributions 12M CO3 L4

UNIT–IV

8. a) Explain the k-Means Algorithm with an example. 6M CO4 L4
    b) Give the outline of Naïve Bayesian classification. 6M CO4 L2

OR

9. a) Why SVM is an example of a large margin classifier? 6M CO4 L2
    b) Write in detail about Logistic regression. 6M CO4 L2

UNIT–V

10. a) Explain the ideas and tools used for data visualization. 6M CO5 L4
    b) Give examples of inspiring (industry) projects. 6M CO5 L2

OR

11. Write the applications of data science in Geospatial 12M CO5 L4
    analytics and modeling

*** End ***

R-20

Code: 20A445T

II B.Tech. II Semester Regular Examinations August 2022

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)

			CO	Blooms Level
1.	**Answer ALL the following short answer questions**	(5 X 2 = 10M)		
a)	List the control flags in 8086 microprocessor		CO1	L1
b)	Discuss the significance of ALE pin in 8086		CO2	L2
c)	Describe CWR format of BSR mode of 8255?		CO3	L2
d)	List different modes of 8253?		CO4	L1
e)	Name any two features of 80286?		CO5	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.	Draw the internal block diagram of 8086 microprocessor and explain.	12M	CO1	L2

OR

3.	a)	Develop an alp to sort the N byte numbers in ascending order.	6M	CO1	L6
	b)	Develop an alp to reverse the string of 10 Words using string instructions.	6M	CO1	L6

UNIT–II

4.	Analyze the minimum mode memory read operation with relevant time cycle diagram	12M	CO2	L4

OR

5.	Justify is the significance of DMA and explain interfacing diagram with 8086 processor to transfer the data.	12M	CO2	L5

UNIT–III

6.	a)	Explain the function of ports in 8255 PPI	6M	CO3	L2
	b)	Develop interfacing circuit to rotate stepper motor in clock wise direction continuously	6M	CO3	L6

OR

7. With neat sketch explain the architecture of 8259 PIC   12M   CO3   L2

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UNIT–IV

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8. Explain the architecture of 8253 with neat diagram.   12M   CO4   L2

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OR

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9. a) Show the format of data transfer in asynchronous data   4M   CO4   L3

   b) Justify the necessity of TTL to RS232 conversion discuss how it is converted.   8M   CO4   L5

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UNIT–V

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10. a) Differentiate real and protection mode in 80386   4M   CO5   L2

   b) Describe the features of 80386   8M   CO5   L1

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OR

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11. Summarize the architectural features of Pentium and Pentium pro processors   12M   CO5   L5

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*** End ***

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