Hall Ticket Number :

R-20

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

<div align="center">UNIT–III</div>

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

<div align="center">OR</div>

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

<div align="center">UNIT–IV</div>

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

<div align="center">OR</div>

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

<div align="center">UNIT–V</div>

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

<div align="center">OR</div>

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

<div align="center">*** End ***</div>

Hall Ticket Number : ☐☐☐☐☐☐☐☐☐☐

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)

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

		CO	Blooms Level
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: 20A542T

II B.Tech. II Semester Regular Examinations August 2022
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)	Distinguish between NFA and DFA	CO1	L1
b)	Define recursive definition of regular expression.	CO2	L1
c)	Define Right Linear and Left Linear Grammars formally and also provide examples.	CO3	L2
d)	Define Push Down Automata (PDA) mathematically with neat block diagram.	CO4	L2
e)	Explain about the Post's Correspondence Problem	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.   Construct Minimized Finite automation for FSM given below
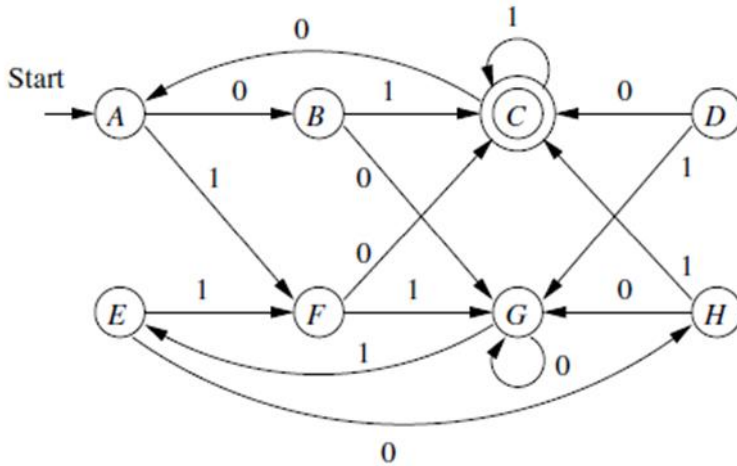
                                                12M CO1   L2

OR

3. a) Design a Moore machine to determine the residue mod
      5 for each binary string treated as integer?   6M CO1   L4

   b) Eliminate €-moves for the given NFA-€.
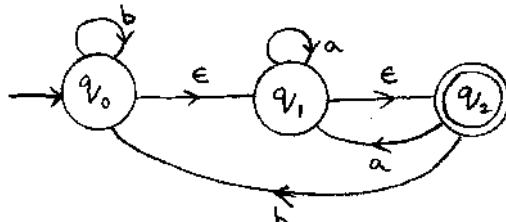
                                                6M CO1   L3

UNIT–II

4. Construct a DFA for the regular expression $(0+1)^*(00+11)(0+1)^*$ 12M   CO2   L2

OR

5. a) Describe a pumping lemma for regular languages. What are its applications?   6M   CO3   L3

   b) Show that $L = \{a^n b^n / n >= 1\}$ is not regular   6M   CO3   L3

UNIT–III

6. Construct regular grammar for the given DFA.
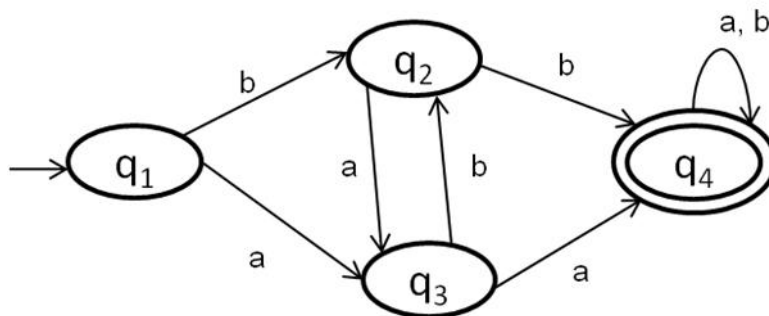
12M   CO3   L4

OR

7. Convert the following CFG into GNF.

S   AA/a

A   SS/b   12M   CO3   L4

UNIT–IV

8. Design a Pushdown Automata (PDA) for a given CFL

$$L = \{ a^n b^n : n \geq 0 \}$$

12M   CO4   L3

OR

9. Construct PDA for the given CFG.

S   0BB, B   0S | 1S| 0

Test whether 010000 is accepted or not?   12M   CO4   L3

UNIT–V

10. Construct Turing Machine to implement addition of two unary numbers $f(X,Y) = X+Y$ 12M   CO5   L3

OR

11. Describe the following with suitable examples.

   i.   Context Sensitive Language (4M)

   ii.   Decidability of Problems (4M)

   iii.   Universal Turing Machine (4M)   12M   CO5   L3

*** 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

UNIT–IV

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

OR

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

UNIT–V

10.	a)	Differentiate real and protection mode in 80386	4M	CO5	L2
	b)	Describe the features of 80386	8M	CO5	L1

OR

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

*** End ***

Code: 20A543T

R-20

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)

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