| Hall Ticket Number : | | | | | | | | | | |
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**R-20**

**Code: 20AC41T**

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

# 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) | 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 )**

### 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

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

, find the probabilities that a random variable having 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 $^{o}$F and standard deviation 1.2 $^{o}$F. Find the probability that, on any given day, the high temperature will be
(i) between 68.3 and 70.3 $^{o}$F , (ii) greater than 71.5 $^{o}$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) 00.5 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

*** End ***

| Hall Ticket Number : | | | | | | | | | | |
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**R-20**

**Code: 20A541T**

II B.Tech. II Semester Supplementry 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)**

| | | CO | Blooms Level |
|---|---|---|---|
| 1. | **Answer ALL the following short answer questions** ( 5 X 2 = 10M ) | | |
| 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 |
|---|---|---|---|---|
| | **UNIT–I** | | | |
| 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 |
| | **OR** | | | |
| 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 |
| | **UNIT–II** | | | |
| 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 |
| | **OR** | | | |
| 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 (p1, p2, p3 ) = (1,2,5), weights are (w1,w2,w3)=(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, (p1,p2,…,p5) = (10,15,6,8,4), (w1,w2,..,w5) = (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 ***

| Hall Ticket Number : | | | | | | | | | | |
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**R-20**

**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)**

| | | | Blooms Level |
|---|---|---|---|
| 1. | **Answer ALL the following short answer questions** ( 5 X 2 = 10M ) | CO | |
| 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 |
|---|---|---|---|---|---|
| | | **UNIT–I** | | | |
| 2. | | Determine the significance of conditional and control flags in detail. | 12M | CO1 | L3 |
| | | **OR** | | | |
| 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 |
| | | **UNIT–II** | | | |
| 4. | a) | Differentiate SRAM and DRAM 8086 microprocessor. | 4M | CO2 | L2 |
| | b) | Draw and explain the basic structure of DRAM | 8M | CO2 | L2 |
| | | **OR** | | | |
| 5. | | Explain the Architecture of 8257 with neat diagram. | 12M | CO2 | L2 |
| | | **UNIT–III** | | | |
| 6. | | Analyze the purpose of different Operational Modes of 8255 PPI. | 12M | C03 | L4 |
| | | **OR** | | | |
| 7. | | Summarize the interrupt handling in 8086 microprocessor and give the roll of interrupt vector table and ISR in this process. | 12M | CO3 | L5 |
| | | **UNIT–IV** | | | |
| 8. | | Analyze 8253 mode of operations and it's interfacing with 8086. | 12M | CO4 | L4 |
| | | **OR** | | | |
| 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 |
| | | **UNIT–V** | | | |
| 10. | a) | Determine Real and protected mode of 80386 | 6M | CO5 | L3 |
| | b) | Describe Paging concept. | 6M | CO5 | L2 |
| | | **OR** | | | |
| 11. | | Discuss different features of Pentium and Pentium pro processors | 12M | CO5 | L2 |

*** End ***

| Hall Ticket Number : | | | | | | | | | | |
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**R-20**

**Code: 20A543T**

II B.Tech. II Semester Supplmentary 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)**

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

| | | | | |
|---|---|---|---|---|
| | **UNIT–II** | | | |
| 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

**UNIT–III**

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 | Sharpeners |
|---|---|---|---|---|
| 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 | Sharpeners |
|---|---|---|---|---|
| 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 L4, L5

**UNIT–IV**

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 L4, L5

**UNIT–V**

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

*** End ***