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R-17

Code: 7GC42

II B.Tech. II Semester Regular Examinations May 2019

Probability and Statistics
(Common to CE, ME and CSE)

Max. Marks: 70

Time: 3 Hours

PART-A

Answer the following units by choosing one question from each unit (3 x 14 = 42 Marks)

UNIT-I

1. a) A Problem in statistics is given to the three students A, B and C whose chances of solving it are $\frac{1}{2}$, $\frac{3}{4}$ and $\frac{1}{4}$ respectively. What is the probability that the problem will be solved if all of them try independently? 7M
- b) State and Prove Baye's theorem 7M

OR

2. a) A random variable X has the following probability distribution:

x:	0	1	2	3	4	5	6	7
p(x):	0	K	2k	2k	3k	k ²	2k ²	7k ² +k

Find $k, P(X < 6), P(X \geq 6), P(0 < X < 5)$ and find a value if $P(X \leq a) > \frac{1}{2}$ 7M

- b) A continuous random variable X has a probability density function

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

represents the density of a random variable X, then

find $P(X \leq 0)$, mean and variance. 7M

UNIT-II

3. a) The number of telephone lines busy at an instant of time is a binomial variate with probability 0.2. If at an instant 10 lines are chosen at random, what is the probability that (i) 5 lines are busy, (ii) at most 2 lines are busy (iii) all lines are busy 7M
- b) Fit a Poisson distribution to the frequency distribution.

x:	0	1	2	3	4
f:	122	60	15	2	1

7M

OR

4. In a normal distribution, 7% are under 35 and 89% are under 63. Find the mean and the standard deviation of the distribution. 14M

UNIT-III

5. A population consists of the four numbers 3, 7, 11, 15. Consider all possible samples of size 2 which can be drawn with replacement from this population. Find the population mean and standard deviation, and mean and standard deviation of the sampling distribution of means. 14M

OR

6. a) A random sample of 100 factory workers in a large city revealed a mean weekly earnings of Rs. 487 with a standard deviation of Rs. 48. With what level of confidence can we assert that the average weekly salary of all factory workers in in the cit is between Rs. 472 and Rs. 502? 7M
- b) The mean and standard deviation of marks scored by a sample of 100 students are 67.45 and 2.92. Find (i) 95% and (ii) 99% confidence intervals for estimating the mean marks of the student population. 7M

UNIT-IV

7. Random samples of 400 men and 600 women were asked whether they would like to have a flyover near their residence. 200 men and 325 women were in favour of the proposal. Test the hypothesis that proportions of men and women in favour of the proposal are same, at 5% level 14M

OR

8. a) In a sample of 1,000 people in Karnataka 540 are rice eaters and the rest are wheat eaters. Can we assume that both rice and wheat are equally popular in the state at 1% level of significance 7M
- b) The heights of 10 males of a given locality are found to be 70, 67, 62, 68, 61, 68, 70, 64, 64, 66 inches. Is it reasonable to believe that the average height is greater than 64 inches? Test at 5% significance level assuming that for 9 degrees of freedom 7M

UNIT-V

9. The measurements of the output of two units have given the following results. Assuming that both samples have been obtained from the normal populations at 10% significant level, Test whether the two populations have the same variance

Unit-A	14.1	10.1	14.7	13.7	14.0
Unit-B	14.0	14.5	13.7	12.7	14.1

14M

OR

10. A pair of dice are thrown 360 times and the frequency of each sum is indicated below:

Sum	2	3	4	5	6	7	8	9	10	11	12
Frequency	8	24	35	37	44	65	51	42	26	14	14

Would you say that the dice are fair on the basis of the chi-square test at 0.05 level of significance? 14M

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Code: 7G141

II B.Tech. II Semester Regular Examinations May 2019

Computer Organization

(Computer Science and Engineering)

Max. Marks: 70

Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

UNIT-I

1. a) Explain various components of Computers? 4M
- b) List various interconnection structures and explain its use in multiprocessors? 10M

OR

2. a) How to represent negative numbers In computer? 7M
- b) Explain about 2's complement approach for representing the fixed point numbers? 7M

UNIT-II

3. a) What is an arithmetic micro operation? Explain with examples 7M
- b) Write short notes on the following:
 - i) Register transfer language
 - ii) Reduced Instruction set computer 7M

OR

4. a) Explain in detail about different instruction types and instruction sequencing. 7M
- b) Discuss about different types of addressing modes? 7M

UNIT-III

5. a) What is meant by microprogramming? Explain the micro programmed control? 7M
- b) Explain about control memory in a micro programmed control organization 7M

OR

6. a) List the advantages and disadvantages of micro programmed control unit over hardware control unit 7M
- b) What are micro-subroutines? Explain. 7M

UNIT-IV

7. Show the step by step multiplication process using Booth algorithm when the following binary numbers are multiplied $(+15) * (-13)$. Assume 5-bit registers that hold signed numbers and draw the flow chart for the corresponding example 14M

OR

8. a) Draw the flow chart for division algorithm? 7M
- b) Explain the different mapping techniques used in the usage of Cache memory. 7M

UNIT-V

9. a) Describe in detail about Input Output Organization. 7M
- b) What is DMA? Describe how DMA is used to transfer data from peripherals. 7M

OR

10. a) Explain instruction pipelining. 7M
- b) What is branch hazard? Describe the method for dealing with the branch hazard? 7M

Code: 7G142

II B.Tech. II Semester Regular Examinations May 2019

Design and Analysis of Algorithms

(Computer Science and Engineering)

Max. Marks: 70

Time: 3 Hours

Answer all five units by choosing one question from each unit (5 x 14 = 70 Marks)

UNIT-I

1. a) Explain in brief about Asymptotic notations with examples. 7M
b) Explain the Performance Analysis of the algorithm. 7M

OR

2. a) Define Time and Space Complexity, and calculate the time space complexity for addition of two matrices. 7M
b) Explain how Time Complexity is calculated. Give an example. 7M

UNIT-II

3. a) Explain the general method of Divide and Conquer. 7M
b) Give the Quick Sort algorithm and analyze the efficiency. 7M

OR

4. a) Explain the merge sort algorithm with an example and also draw the tree structure of the recursive calls made. 7M
b) What is the solution generated by the function Job Sequence when $n=5$
(p_1, p_2, p_3, p_4, p_5)=(20,15,10,5,1), (d_1, d_2, d_3, d_4, d_5)=(2,2,1,3,3)? 7M

UNIT-III

5. a) Explain about Reliability Design. 7M
b) Find the optimal solution for the Knapsack instance
 $n=7, M=15$ ($p_1, p_2, p_3, p_4, p_5, p_6, p_7$)=(10,5,15,7,6,18,3) and
($w_1, w_2, w_3, w_4, w_5, w_6, w_7$)=(2,3,5,7,1,4,1) by using dynamic programming. 7M

OR

6. a) Solve the following instance of OBST problem
Identifier set = (a_1, a_2, a_3, a_4)
 $P = (1/20, 1/5, 1/10, 1/20)$ $Q = (1/5, 1/10, 1/5, 1/20, 1/20)$. 7M
b) Discuss all pairs shortest path problem with an example. 7M

UNIT-IV

7. a) Write an algorithm for 8 Queen's problem using backtracking and explain with an example. 7M
b) Draw the portion of state space tree generated by sum of subsets problem for a set of integers $N = (12, 1, 50, 3, 20, 8)$ whose sum is exactly equivalent to 44 by backtracking algorithm. 7M

OR

8. a) Consider the TSP instance by the cost matrix
$$\begin{matrix} \infty & 11 & 10 & 9 & 6 \\ 8 & \infty & 7 & 3 & 4 \\ 8 & 4 & \infty & 4 & 8 \\ 11 & 10 & 5 & \infty & 5 \\ 6 & 9 & 5 & 5 & \infty \end{matrix}$$

Solve the problem by applying LCBB. 7M
b) Describe the Branch and Bound technique. How the Branch and Bound technique can be used to solve 0/1 Knapsack problem? 7M

UNIT-V

9. a) Explain the relationship between P and NP. 7M
b) Show the job sequencing with deadlines problem is NP-hard. 7M

OR

10. Explain Cook's theorem in detail. 14M

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II B.Tech. II Semester Regular Examinations May 2019

Formal Languages and Automata Theory

(Computer Science and Engineering)

Max. Marks: 70

Time: 3 Hours

Answer all five units by choosing one question from each unit (5 x 14 = 70 Marks)

UNIT-I

1. a) Design a DFA that accepts the language $L(M)=\{WWW \in \{a, b\}^*\}$ and W does not contain 3 consecutive b's. 7M
- b) Construct a Moore machine to determine the residue mod 3 for each binary string treated as a binary integer. 7M

OR

2. a) Develop deterministic finite automata accepting the language given over the alphabet $\{0, 1\}$. $L = \{\text{the set of all strings such that every block of five consecutive contains at least two 0's}\}$. 7M
- b) Discuss about minimization of FSM and equivalence between two FSMs. 7M

UNIT-II

3. a) Construct NFA with ϵ moves for the regular expression $(0+1)^*$. 7M
- b) Prove or disprove that the language L given by $L = \{ a^m b^n / m \neq n, m \text{ and } n \text{ are positive integer} \}$ is regular. 7M

OR

4. a) Construct FA for regular expression $0^*1 + 10$. 7M
- b) Discuss about closure properties of regular sets. 7M

UNIT-III

5. a) Construct a regular grammar for the regular expression $a^*b(a+b)^*$. 7M
- b) Convert the given CFG to CNF
 $S \rightarrow aAs / a$
 $A \rightarrow SbA / SS / ba$ 7M

OR

6. Convert the given CFG to GNF
 $S \rightarrow ABA$
 $A \rightarrow Aa / \epsilon$ 14M

UNIT-IV

7. a) Design a PDA for accepting a language $L = \{ a^n b^n / n \geq 1 \}$ 7M
- b) Discuss the procedure for conversion of CFG to PDA 7M

OR

8. a) Design PDA for the following grammar
 $S \rightarrow 0A$
 $A \rightarrow 0AB / 1$
 $B \rightarrow 1$ 7M
- b) Construct PDA for the language $L = \{ a^n b^{2n} / n \geq 1 \}$ 7M

UNIT-V

9. a) Write short notes on decidability of problems in detail? 7M
- b) Construct Turing Machine for language consisting of strings having any number of 0's and only even number of 1's over the input set $\{0, 1\}$. 7M

OR

10. a) Discuss the procedure for constructing items in LR(0) grammar with illustration. 7M
- b) Analyze Universal Turing Machine and Linear Bounded Automata. 7M

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II B.Tech. II Semester Regular Examinations May 2019

Object Oriented Programming using Java

(Computer Science and Engineering)

Max. Marks: 70

Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

UNIT-I

1. a) List and explain the Principles of OOP paradigm. 7M
b) Differentiate Procedure Oriented Programming (POP) with Object Oriented Programming (OOP). 7M

OR

2. Explain different types of control statements available in Java with examples. 14M

UNIT-II

3. Define inheritance. Write a java program to implement multi level inheritance. 14M

OR

4. Write a sample program to illustrate packages. 14M

UNIT-III

5. Explain the following exceptions with the help of examples:
(i) ArithmeticException (ii) NullPointerException (iii) NumberFormatException. 14M

OR

6. a) With the help of an example, explain multithreading by extending Thread class. 7M
b) Give the list of different unchecked exceptions in java and their meaning. 7M

UNIT-IV

7. a) What is a Generic Method? Illustrate Generic Method with an example program. 7M
b) How to add a bridge method in Generic class? Explain with an example. 7M

OR

8. a) What are the three parts of a Lambda Expression? What is the type of Lambda Expression? 7M
b) Write about Method reference feature in Lambda expressions with example. 7M

UNIT-V

9. a) What is a List interface in Java? Explain the operations on List. 7M
b) Define TreeSet class. Illustrate any five methods of TreeSet class. 7M

OR

10. a) Explain about LinkedList class in java with example. 7M
b) What is Scanner class? Describe the details of Scanner class. 7M

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II B.Tech. II Semester Regular Examinations May 2019

Operating Systems

(Computer Science and Engineering)

Max. Marks: 70

Time: 3 Hours

Answer all five units by choosing one question from each unit (5 x 14 = 70 Marks)

UNIT-I

1. a) List types of system calls and explain 7M
- b) Distinguish Between the Computer Organization and Computer Architecture? 7M

OR

2. a) Consider the following set of processes arrival with time

Process	Burst time	Arrival Time
P1	10	0
P2	1	0
P3	2	1
P4	4	2
P5	3	2

i) Draw Gantt Chart Using FCFS, SJF primitive and Non Primitive Scheduling?

ii) Calculate the Average waiting time for each of the Scheduling Algorithm? 7M

- b) What the essential properties of batch, real time and distributed operating system? 7M

UNIT-II

3. a) Differentiate between the thread and process? 6M
- b) Write about Critical section. Briefly discuss about Peterson solution. 8M

OR

4. a) What are the principles of concurrency in operating system? 7M
- b) What are semaphores? Explain Binary and counting semaphores with example 7M

UNIT-III

5. a) Explain the different methods to recover from the dead lock? 7M
- b) Dead lock exists if cycle exists. Yes or No. Justify your answer with a suitable example? 7M

OR

6. a) Define demand paging. Explain any one page replacement algorithm. 7M
- b) Explain the segmentation with example 7M

UNIT-IV

7. a) Explain briefly various operations performed on files? 7M
- b) Explain various allocation methods in implementing file system 7M

OR

8. a) Explain the various Disk Scheduling algorithms with example? 7M
- b) How to transform I/O request to hardware operations? Explain. 7M

UNIT-V

9. What are security problems? Explain program threats. 14M

OR

10. a) Explain the difference between protection and security? Describe the scheme of capability list to implement protection? 10M
- b) Revocation of Access rights 4M
