

POSSESSION OF MOBILES IN EXAM IS UFM PRACTICE

Name Himanshu

Enrollment No. 21103262

Jaypee Institute of Information Technology, Noida T-1 Examination, Even 2023 B.Tech IV Semester

Course Title: Probability and Random Processes
Course Code: ISBI1MA301

Maximum Time: 1 Hour
Maximum Marks: 20

After pursuing the course, students will be able to

- CO1: explain the basic concepts of probability, conditional probability and Bayes' theorem.
CO2: identify and explain one and two dimensional random variables along with their distributions and statistical averages.
CO3: apply some probability distributions to various discrete and continuous problems.
CO4: solve the problems related to the component and system reliabilities.
CO5: identify the random processes and compute their averages.
CO6: solve the problems on Ergodic process, Poisson process and Markov chain.

All questions are compulsory.

1. (i) If A and B are any two events such that $P(A \cup B) = \frac{2}{3}$, $P(\bar{A} \cup \bar{B}) = \frac{5}{6}$ and $P(\bar{A}) = 2P(B)$. Find $P(A)$, $P(B)$ and $P(B/A)$. Are A and B independent? Justify your answer. [CO1, 4 Marks]
(ii) A pair of fair dice is thrown. Find the probability that the sum is 10 or greater if a 5 appears on at least one of the dice. [CO1, 2 Marks]
2. A certain blood test declares that 83% of the time it is positive for patients having a certain disease and 21% of the time it is also positive in healthy people. In a certain location, 40% of the people have the disease, and anybody with a positive blood test is given a drug that cures the disease. If 17% of the time the drug produces a scar, what is the probability that a person from this location who has the scar had the disease in the first place? [CO1, 3 Marks]
3. (a) The revenue generated by selling newspaper in a week is a random variable X with the moment generating function as $M_X(t) = \frac{1}{(1-25e^{0.01t})^4}$. Find the standard deviation of X . [CO2, 2 Marks]
(b) The probability density function of a continuous random variable X is given by
$$f(x) = \begin{cases} k(1-x^2); & 0 < x < 1 \\ 0 & \text{elsewhere.} \end{cases}$$
Find (i) the value of k , (ii) variance of X and (iii) $P(0.4 < X < 0.6)$. [CO2, 3 Marks]
4. The joint probability mass function of two random variables X and Y is given by
$$f_{XY}(x, y) = \begin{cases} \frac{1}{55} (2x + y^2); & x = 1, 2, 3 \quad y = 0, 1, 2 \\ 0 & \text{otherwise.} \end{cases}$$
Find (i) $P(X \leq 2, Y > 1)$, (ii) $P(X = 2/Y = 1)$. [CO2, 3 Marks]
5. Suppose that continuous random variables X and Y have the following joint probability density function $f(x, y) = \begin{cases} c, & x^2 \leq y \leq 1, \quad 0 < x < 1 \\ 0 & \text{otherwise.} \end{cases}$ Find value of c , $f_X(x)$ and conditional distribution of Y given $X = \frac{1}{2}$. [CO2, 3 Marks]

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TI Examination, Even 2023

B. Tech IV Semester

Course Name: Algorithms and Problem Solving

Maximum Time: 1 Hr.

Course Code: 15B11C1411

Maximum Marks: 20 Marks

CO1	Analyse the complexity of different algorithms using asymptotic analysis
CO2	Select appropriate sorting and searching technique for problem solving
CO3	Apply various algorithm design principles for solving a given problem
CO4	Identify, formulate and design an efficient solution to a given problem using appropriate data structure and algorithm design technique

Q1. [CO2] [5 Marks] You have been given a two-dimensional array, $A[0 \dots m-1, 0 \dots n-1]$ in which every row and every column are sorted, and an integer k . Propose an efficient algorithm to find the k^{th} biggest element in the given two-dimensional array, A .

Q2. [CO1] [2 Marks] In context of Quick Sort, formulate the recurrence for following scenarios:

- (a) Pivot always lands in the beginning of the array
- (b) Pivot always lands in the middle of the array
- (c) Pivot always lands in the middle third (i.e. pivot is at one third position) of the array

Q3. [CO3] [6 Marks] Your friend, ABC has a collection of N lock-boxes (labelled as B_1, B_2, \dots, B_N) and labelled keys (K_1, K_2, \dots, K_N) to unlock or lock the respective boxes (key, K_i to lock/unlock the box B_i). However, quantity of some keys is more than one (i.e. duplicate keys are also there), viz., as observed from Table 1, quantity of the key, K_1 (which will lock/unlock the box, B_1) is 3. In all, there are M keys, where, $M > N$. For personal reasons, ABC keeps the keys inside these N boxes and keeps the record, R of the keys kept in different boxes, i.e. which key is kept in which box (an example of record, R is given in Table 1). One box may contain one or more than one keys, however, the key, K_i which is used to lock/unlock the box, B_i cannot be kept in B_i , viz. key, K_1 cannot be kept in box, B_1 . Your friend gave you the record R , all the N boxes (which are initially locked) and a duplicate key K_1 , which will be used to unlock the box, B_1 . Starting with B_1 , your task is to unlock all the boxes and return back the keys of all boxes to ABC. Out of several keys kept in B_1 , you are allowed to pick only one key, say K_i which will be used to open the box B_i . Further, from box, B_i you are allowed to pick only one key, say K_j which will be used to open the box B_j , and so on, i.e. you keep on collecting exactly one key from each box after opening them. When you have collected all the keys (total $N+1$ keys, remember that the key for box, B_1 was initially given to you, so you will have two keys (K_1) at the end), you need to handover $N+1$ keys to ABC.

Propose an efficient scheme to find out the sequence of boxes to be opened so that you can handover $N+1$ keys to your friend. Further, you have to apply the proposed scheme to the record, R (detailing the boxes and the keys stored in these boxes) given in Table 1 to find out the sequence (starting with B_1) of boxes to be opened so that you can handover all the keys (one key each for B_2 to B_{10} and 2 keys for B_1) to your friend.

Table 1: Record, R – List of Boxes and the Keys stored in these boxes

Box Number	Keys kept in the Box (key, K_i to be used to open box B_i)	Box Number	Keys kept in the Box (key, K_i to be used to open box B_i)
B_1	K_2, K_5, K_9	B_6	K_5, K_7, K_{10}
B_2	K_1, K_3, K_9	B_7	K_6, K_8, K_9, K_{10}
B_3	K_2, K_4, K_9, K_{10}	B_8	K_1, K_7, K_9
B_4	K_3, K_5, K_{10}	B_9	$K_1, K_2, K_3, K_7, K_8, K_{10}$
B_5	K_4, K_6, K_{10}	B_{10}	$K_3, K_4, K_5, K_6, K_7, K_9$

Q4. [CO1] [3 Marks] While computing the Big Oh (O) for following functions, what will be the $g(n)$ and constants, C and n_0 for respective functions:

- (i) $f(n) = 3n^4 + 2n + 6$
- (ii) $f(n) = 2n^3 + 4n^2 + n + 8$

Q5. [CO1] [4 Marks] A function, $f1()$ is given in Fig. 1. Answer following related to $f1()$.

- (a) Obtain the recurrence for the function, $f1()$, and solve it using appropriate recurrence solving scheme
- (b) Considering the array, arr as sorted array, mention the purpose/utility of the function $f1()$. Further, for arr (sorted array) as $\{2, 5, 8, 9, 12, 15, 19, 23, 32, 36\}$, $v1$ as 0, $v2$ as 9, and $v3$ as 4, compute the output of the function $f1()$

```
int f1(int *arr, int v1, int v2, int v3)
{
    int v4 = v1 + (v2 - v1) / 3;
    int v5 = v2 - (v2 - v1) / 3;
    if (arr[v4] == v3)
        return v4;
    else if (arr[v5] == v3)
        return v5;
    if (v1 < v2)
    {
        if (arr[v4] > v3)
            f1(arr, v1, v4 - 1, v3);
        else if (arr[v5] < v3)
            f1(arr, v5 + 1, v2, v3);
        else
            f1(arr, v4 + 1, v5 - 1, v3);
    }
    else
        return -1;
}
```

Fig. 1: The function, $f1()$

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Jaypee Institute of Information Technology, Noida

T1 Examination, 2023

B. Tech IV Semester

Course Title: Digital Systems

Maximum Time: 1 Hr

Course Code: 18B11EC213

Maximum Marks: 20

CO1: Familiarize with the fundamentals of number system, Boolean algebra and Boolean function minimization techniques.

CO2: Analyze and design combinational circuits using logic gates.

CO3: Analyze state diagram and design sequential logic circuits using flip flops.

CO4: Understand the classification of signals & systems and learn basic signal operations & Fourier analysis.

CO5: Understand various steps involved in digitization and transmission of a signal.

Note: Attempt all questions. All questions are compulsory.

Q. 1 (a) Subtract using 10's Complement method: $20 - 100$. [CO1, 1+1+2]

(b) Subtract using 2's Complement method: $(11010)_2 - (1101)_2$.

(c) Simplify the Boolean expression using Boolean laws: $Y = AB + \overline{A}C + A\overline{B}C(AB + C)$

Q.2. Find out minimized POS form of the following function: $Y = AB + \overline{A}C + A\overline{B}C$ [CO1, 4]

$F(A, B, C, D) = \sum m(0, 2, 8, 10, 14) + \sum d(5, 15)$ using k-map and also find out EPI's and PI's.

Q.3. Implement the function $F(A, B, C, D) = \sum m(0, 1, 3, 4, 8, 9, 15)$ using 8:1 Mux. [CO2, 4]

Q. 4 Simplify the function $F(A, B, C) = \sum m(0, 1, 4, 5)$ using QM Techniques [CO1, 4]

Q.5. How many decoders are required to construct 6: 64 decoder using 3:8 decoders. Implement the full subtractor using 3: 8 decoders. [CO2, 4]

$$AB + AC + \overline{A} + \overline{C}$$

$$\overline{A} + B +$$

$$AB + \overline{A}C + A\overline{B}C$$

$$AB + \overline{A}C + A\overline{B}C$$

$$A(B + \overline{B}C) + \overline{A}C$$

$$\overline{A}B -$$

$$A(B + C) + \overline{A}C$$

$$AB + AC + \overline{A}C$$

$$AB + 1$$

$$= 1$$

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Test 1 Examination, Even Semester 2022-23

B.Tech IV Semester

Course Title: Financial Accounting

Maximum Time: 1 Hr

Course Code: 15B1NHS435

Maximum Marks: 20

After pursuing this course, the students will be able to:

- CO1 Understand the basic concepts of Accounting
- CO2 Apply accounting concepts of recording of business transactions
- CO3 Compare and reconcile the accounting records with other sources of information
- CO4 Evaluate the accounting records to identify and rectify the errors made during accounting process
- CO5 Construct the final accounts and cash flow statement of a business

Note: Answer all questions

- Q.1 Name which user of accounting information would be interested in getting the following information: (CO1,2 marks)
- a. VAT and other tax liabilities.....
 - b. The potential of company to pay awards and Bonus.....
 - c. Profitability and share price.....
 - d. Creditworthiness of the company.....
- Q.2 If the accounting information is not clearly presented, which objective of accounting will not be fulfilled. Also explain any two other objectives of accounting. (CO1,3 marks)
- Q.3 Identify the accounting principle that will be violated in the following circumstances. Also, explain the principle briefly. (CO1,5 marks)
- a. The management wants to show higher revenues by treating orders received from customers as sales although no goods have been supplied to them.
 - b. To show higher profitability in the current year, the management wants you to adopt a depreciation method that would lead to a lower depreciation charge.
 - c. A businessman purchased goods for Rs 25,000 and sold 50% of goods for Rs 20,000. He counted the loss of Rs 5000.
 - d. Manisha Malhotra, the fashion designer took a designer saree of Rs 15,000 from her boutique to present the same to her friend on birthday. She recorded Rs 15,000 as her business expense.
 - e. Abdul Agra Ltd bought a grinding machine for Rs 50,000 which had a market value of Rs 65,000. The accountant recorded the machine at Rs 65,000 in accounting books.
- Q.4 Classify the following transactions into Financing, Investing, and Operating activities and show the effect of these transactions on accounting equation. (CO1,4 marks)
- a. Owner invested Rs 60,000 to business.
 - b. Purchased machine of Rs 20,000 for cash.
 - c. Purchased goods of Rs 5,000 on credit from Arora Pvt Ltd.
 - d. Borrowed Rs 50,000 from KTL Bank.
- Q.5 On 1 January 2022, Mr. Akash Advani started his business Advani Pvt Ltd with Cash Rs 80,000, Machinery Rs 40,000 and provided a loan to this business Rs 50,000. (CO2, 6 marks)
- | | |
|-------------------|---|
| January 2, 2022 | Purchased furniture on credit from Evok furniture for Rs 28,000 & purchased goods from Ambani Pvt Ltd for Rs 5,000 in cash. |
| February 10, 2022 | Sold goods for cash at Rs 15,000. |
| March 29, 2022 | Paid interest at 10% p.a on loan of Rs 50,000 for 3 months. |
| March 30, 2022 | Paid Rs 25,000 to Evok furniture in full settlement |
| March 31, 2022 | Salaries outstanding Rs 20,000 |
- Journalize the above mentioned transactions in the books of Advani Pvt Ltd