





All In One

MCS-013 Discrete Mathematics

**Prepared by** 





www.ignoustudymentor.com

@ism\_ignoustudymentor\_





# SM - IGNOU STUDY MENTOR Youtube Channel and

## Get a Complete Solution for IGNOU Students



www.ignoustudymentor.com





Visit us: www.ignoustudymentor.com 🕓 730-339-3555 🍞 f 🞯 🕢

### **Solved Assignment**

#### 2023-2024

### **MCS-013 DISCRETE MATHEMATICS** [SEM-2]



#### Ques.6. (a) How many ways are there to distribute 21 district items into 6 distinct boxes with:

#### i) At least two empty boxes. ii) No empty box.

#### Ans. (i) At Least Two Empty Boxes:

In this case, we will use the principle of inclusion-exclusion to count the ways to distribute the items while ensuring that at least two boxes are empty.

Let's consider the following cases:

Exactly 2 boxes are empty.

Exactly 3 boxes are empty.

Exactly 4 boxes are empty.

Exactly 5 boxes are empty.

DEREE

XAM

All 6 boxes are empty (which is not possible).

#### Case 1: Exactly 2 Boxes are Empty

There are 6 ways to choose which 2 boxes will be empty. The remaining 4 boxes will each receive some items.

So, for each choice of 2 empty boxes, we can distribute the items to the remaining 4 boxes using the stars and bars (balls and bins) technique. The number of ways to distribute 21 items into 4 distinct boxes is (21+4-14-1) = (243)

Therefore, the total number of ways for this case is 6x (24 3



Baaki बचे हुए Questions के Answers 🕟 YouTube पर Milege

## **IGNOU SOLVED GUESS PAPER**

Get IGNOU Important Questions with Answer, Video, PDF.

### **Solved Assignment**

### MCS-013 DISCRETE MATHEMATICS [SEM-2]



2023-2024

#### Case 2: Exactly 3 Boxes are Empty:

There are (6 ways to choose which 3 boxes will be empty. The remaining 3 boxes 3 ) will each receive some items.

So, for each choice of 3 empty boxes, we can distribute the items to the remaining 3 boxes using the stars and bars technique. The number of ways to distribute 21 items into 3 distinct boxes (232)

#### Case 3, 4, and 5: No Need to Consider

Case 6: All 6 Boxes are Empty

Total Number of Ways:

Add up the total ways from all cases: =  $6x(243) \times (63) \times (232)$ 

#### (ii) No Empty Box:

नर्भः

ASSESSMENT

To distribute 21 items into 6 distinct boxes with no empty box, we'll use the principle of "Stirling numbers of the second kind," which counts the number of ways to partition a set of items into non-empty subsets.

The Stirling number S(21,6) gives the number of ways to partition 21 items into 6 non-empty subsets (boxes).

Therefore, the total number of ways is S(21,6). You can compute this value using appropriate formulas or software/tools that can calculate combinatorial numbers.

Please note that calculating Stirling numbers can be complex for larger numbers, and you might need to use specialized tools or software to find the exact value.



🔁 Baaki बचे हुए Questions के Answers ▶ YouTube पर Milege

### **IGNOU SOLVED ASSIGNMENTS**

Get IGNOU Solved Assignments for all IGNOU courses

### Solved Assignment

### **MCS-013 DISCRETE MATHEMATICS** [SEM-2]



2023-2024

#### (b) Explain principle of multiplication with an example.

Explain principle of multiplication with an example. The principle of multiplication, also known as the multiplication rule, is a fundamental concept in combinatorics that explains how to count the total number of outcomes when multiple independent events are performed in sequence. It states that if there are n ways to perform the first event and m ways to perform the second event, then there are n×m ways to perform both events in sequence.

In other words, when events are performed independently, the total number of outcomes is the product of the number of outcomes for each individual event.

#### **Example: Arranging Outfits**

Consider a scenario where you have 3 shirts and 4 pairs of pants, and you want to calculate how many different outfits you can create by choosing one shirt and one pair of pants.

According to the principle of multiplication, the total number of outfits you can create is the product of the number of choices for each step:

Total outfits = Number of choices for a shirt × Number of choices for a pair of pants Total outfits =  $3 \times 4 = 12$  outfits

So, you can create 12 different outfits by choosing one shirt and one pair of pants







### **IGNOU STUDY MATERIAL**

Get IGNOU All Types of Study Materials and Books.

### **Solved Assignment**

#### MCS-013 DISCRETE MATHEMATICS [SEM-2]



2023-2024

## Ques.c) Three Sets A, B and C are: A = {1, 2,3,4,5, 8,9,12,15,17}, B ={1,2, 3,4,8,9, 10} and C ={1,2,7, 9, 10, 11, 13}. Find $A \cup B \cap C$ ; $A \cap A \cup C$ ; $A \cap B \cup C$ ; $A \cap B \cup C$ and $(A \cap C)$ .

**Ans.**  $A \cup B \cap C = A \cup B = \{1, 2, 3, 4, 5, 8, 9, 10, 12, 15, 17\} A \cup B \cap C = \{1, 2, 9, 10\}$ 

A∩~B∪C= ~B= {5,7,11, 12, 13, 15, 17} A∩~B={5,12,15,17} A∩~B∪C={1,2,5,7,9,10,11,12,13,15,17}

AnBuC= AnB={1,2,3,4,8,9} AnBuC={1,2,3,4,7,8,9,10,11,13}

(A∩~C)= ~C={3,4,5,8,9,10,12,15,17} (A∩~C)={3,4,5,8,9,12,15}

#### Ques.7(a) Explainadditiontheoreminprobability.

**Ans.** The addition theorem in probability, also known as the addition rule, is a fundamental concept that provides a way to calculate the probability of the union of two or more mutually exclusive events. Mutually exclusive events are events that cannot occur simultaneously. The addition theorem states that the probability of the union of mutually exclusive events is the sum of the probabilities of the individual events.

Mathematically,fortwomutually exclusive events A and B, the addition theorem can be expressed as:  $P(A \cup B) = P(A) + P(B)$ 

This formula holds when events A and B are mutually exclusive, meaning that they cannot both happen at the same time.



🔁 Baaki बचे हुए Questions के Answers 下 YouTube पर Milege



**IGNOU PROJECT & SYNOPSIS** 

Get IGNOU Project Report & Synopsis for all IGNOU Courses

### **Solved Assignment**

### MCS-013 DISCRETE MATHEMATICS [SEM-2]



2023-2024

#### (b) MakePascal'striangleupton=6.

**Ans.** Pascal's Triangle is a triangular arrangement of numbers where each numbers is the sum of the two numbers directly above it. Here's Pascal's Triangle to un=6.

(c) What is a function? Explain different types of functions with examples.

**Ans.** A function is a relation between a set of inputs (domain) and a set of possible outputs (codomain) such that each input is related to exactly one output. It's like a rule that assigns a unique value to every element in the domain. Functions are a fundamental concept in mathematics and have wide applications in various fields.

Different Types of Functions: One-to-One (Injective) Function:

A function is a one-to-one (or injective) if each distinct element in the domain maps to a distinct element in the codomain.



Baaki बचे हुए Questions के Answers 🕨 YouTube पर Milege

**IGNOU ADVISOR** 

Touch with Presonal ADVISOR to clear all types of doubt.

### **BCA**

### **Solved Assignment**

### **MCS-013 DISCRETE MATHEMATICS** [SEM-2]



2023-2024

Example: f(x)=2x is a one-to-one function, as different inputs map to different outputs.

#### **Onto (Surjective) Function:**

A function is onto (or surjective) if every element in the codomain has at least one pre-image in the domain.

Example: f(x) = x 2 is not onto, as not all positive numbers have square roots in the domain.

#### **Bijective Function:**

A function is bijective if it is both one-to-one and onto. This means each element in the domain is related to exactly one element in the codomain, and every element in the codomain has a unique pre-image in the domain.

Example: f(x)=3x+2 is a bijective function.

#### **Constant Function:**

A constant function always returns the same value for all inputs in the domain. Example: f(x) = 4 is a constant function.

#### **Identity Function:**

13.73

An identity function maps each element to itself.

Example:f(x)=x is the identityfunction.



Baaki बचे हुए Questions के Answers ▶ YouTube पर Milege

### **IGNOU PREVIOUS QUES. PAPER**

Get IGNOU Exam Questions with Answer, Video, PDF.



#### **MCS-013** DISCRETE MATHEMATICS [SEM-2]



2023-2024

#### (d) Write the following statements in symbolic form: (i) Mr. X is poor but happy.

Ans. Let: P: Mr. X is poor. H: Mr. X is happy.

The symbolic form of the statement "Mr.X is poor but happy" is: PAH This means that both P (Mr. X is poor) and H (Mr. X is happy) are true simultaneously.

(ii)Either eat healthy food or be ready for poor health.

Let:

**BCA** 

0

0

0 0 0

0

0 0 0

0

Э

0

0 0 0

0 Э 0

0

0

0 0

0

0 0 0

0

0 0 E: Eat healthy food.

R: Be ready for poor health.

XAM

The symbolic form of the statement "Either eat healthy food or be ready for poor health" is: E∨R

This means that either E (Eat healthy food) or R (Be ready for poor health) is true, or both can be true.

**IGNOU SOLVED GUESS PAPER** 

Get IGNOU Important Questions with Answer, Video, PDF.

ARE Baaki बचे हुए Questions के Answers 📂 YouTube पर Milege



### **Solved Assignment**

### MCS-013 DISCRETE MATHEMATICS [SEM-2]



2023-2024

#### Ques.Q8. (a) Find inverse of the following functions

 $f(x) = \frac{x^3 + 2}{x - 3} \qquad x \neq 3$ 

**Ans.** To find the inverse of a function f(x), we need to switch the roles of x and y in the equation f(x) and then solve for y. The inverse function will be denoted as f - 1(x).



#### **Solved Assignment**

#### 2023-2024

#### MCS-013 DISCRETE MATHEMATICS [SEM-2]



(b) Find dual of Boolean Expression for the output ( Y) of the following logic circuit.



## (c) What is a proper subset ? Write the number of proper subsets of the Set {a, b, c, d, e, f}

**Ans.** A proper subset of a set is a subset that contains fewer elements than the original set and is not equal to the original set. In other words, if every element of set A is also an element of set B, but set B has at least one addition element that is not in set A, then set A is a proper subset of set B.

For example, if set  $A = \{a, b\}$  and set  $B = \{a, b, c\}$ , then A is a proper subset of B because every element of A is in B, but B has an additional element (c) that is not in A.



**BCA** 

### **Solved Assignment**

### MCS-013 DISCRETE MATHEMATICS [SEM-2]



2023-2024

A proper subset of a set is a subset that contains fewer elements than the original set and is not equal to the original set. In other words, if every element of set A is also an element of set B, but set B has at least one additional element that is not in set A, then set A is a proper subset of set B.

For example, if set  $A = \{a, b\}$  and set  $B = \{a, b, c\}$ , then A is a proper subset of B because every element of A is in B, but B has an additional element (c) that is not in A.

## (d) "If it rains, then you will play". Write inverse and contrapositive for this sentence

Ans. The given sentence is: "Ifit rains, then you will play."

#### Inverse:

The inverse of a conditional statement switches the hypothesis (if-part) and the conclusion (thenpart) and negates both.

Original statement: If it rains, then you will play. Inverse statement: If you do not play, then it did not rain.

#### **Contrapositive:**

The contrapositive of a conditional statement also switches the hypothesis and the conclusion, but it negates both and takes the logical complement of each.

Original statement: If it rains, then you will play. Contrapositive statement: If you do not play, then it does not rain.



🔁 Baaki बचे हुए Questions के Answers 下 YouTube पर Milege



**IGNOU PROJECT & SYNOPSIS** 

Get IGNOU Project Report & Synopsis for all IGNOU Courses



## **Follow :** ism\_ignoustudymentor\_

# Join Telegram Group :

ism\_ignoustudymentor

## Youtube Channel

### **ISM - IGNOU Study MENTOR**

### Website

www.ignoustudymentor.com

**S** 730-339-3555

