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|  | <b>LATSEST MCQS FROM MIDTERM PAPERS</b> |  | <b>10 MAY 2011</b> |
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## MTH202 Discrete Mathematics

**Question No. 1:**

If  $p =$  It is raining  $q =$  She will go to college

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"It is raining and she will not go to college" will be denoted by

- $p \wedge \sim q$ 
  $p \wedge q$ 
  $\sim (p \wedge q)$ 
  $\sim p \wedge q$

**Question No. 2:**

The negation of "Today is Friday" is

- Today is Saturday
  **Today is not Friday**
 Today is Thursday
  None of given

**Question No. 3:**

The converse of the conditional statement  $p \rightarrow q$  is

- $q \rightarrow p$ 
  $\sim q \rightarrow \sim p$ 
  $\sim p \rightarrow \sim q$ 
 None of these

**Question No. 4:**

Contra-positive of given statement "If it is raining, I will take an umbrella" is

- I will not take an umbrella if it is not raining. (Pg 19)**
 I will take an umbrella if it is raining.
- It is not raining or I will take an umbrella.
  None of these.

**Question No. 5:**

A statement is also referred to as a

- Proposition (pg 4)**
 Conclusion
  Order
  None of these

**Question No. 6:**

The statement "It is not raining if and only if roads are dry" is logically equivalent to

- If roads are dry then it is not raining.
  None of these.
- Roads are dry if and only if it is not raining**
 If it is not raining then roads are dry.

**Question No. 7:**

The statement  $\sim(\sim p) = p$  Describes

- Commutative Law
  Implication Laws
  **Double negative law**
 Equivalence

**Question No. 8:**

An arrangement of rows and columns that specifies the truth value of a compound proposition for all possible truth values of its constituent propositions is called

- Truth Table**
 Venn diagram
  False Table
  None of these

**Question No. 9:**

An argument is \_\_\_\_\_ if the conclusion is true when all the premises are true.

- Valid (Pg 25)**
 Invalid
  False
  None of these

**Question No. 10:**

The row in the truth table of an argument where all premises are true is called

- Valid row
  Invalid row
  **Critical row (Pg 27)**
 None of these

**Question No. 11:**

The statement  $p \rightarrow q \equiv (p \wedge \sim q) \rightarrow c$  describes

- Commutative Law     Implication Laws     Exportation Law     **Reductio ad absurdum**

**Question No. 12:**

$p \leftrightarrow q$  is logically equivalent to  $(p \rightarrow q) \wedge (q \rightarrow p)$      TRUE     FALSE

**Question No. 13:**

According to biconditional  $1+1=3$  if and only if sky is yellow.     **TRUE (Pg 20)**     FALSE

**Question No. 14:**

A statement that is always true regardless of the truth values of the statement variables called Tautology.

- TRUE (Pg 10)**     FALSE

**Question No. 15:**

If p and q are statement variables, then the conjunction of p and q is "p and q" denoted as " $p \vee q$ ".

- TRUE     **FALSE**

**Question No: 3 ( Marks: 1 ) - Please choose one**

For two sets A,B

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$A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$  is called

- ▶ Distributivity of intersection over union
- ▶ Distributivity of union over intersection
- ▶ None of these
- ▶ **Distributivity Law**

**Question No: 6 ( Marks: 1 ) - Please choose one**

Check whether

$36 \equiv 1 \pmod{5}$                        $36 \text{ Modulus } 5 = 1 \text{ remainder}$

$33 \equiv 3 \pmod{10}$                        $33 \text{ Modulus } 10 = 3 \text{ remainder}$

- ▶ **Both are equivalent**
- ▶ Second one is equivalent but first one is not
- ▶ First one is equivalent but second one is not

**Question No: 7 ( Marks: 1 ) - Please choose one**

A binary relation R is called Partial order relation if

- ▶ It is Reflexive and transitive
- ▶ It is symmetric and transitive
- ▶ It is reflexive, symmetric and transitive
- ▶ **It is reflexive, anti-symmetric and transitive (Pg 92)**

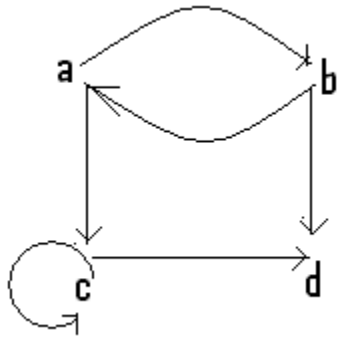
**Question No: 8 ( Marks: 1 ) - Please choose one**

The order pairs which are not present in a relation, must be present in

- ▶ Inverse of that relation
- ▶ Composition of relations
- ▶ **Complementary relation of that relation (pg 97)**

**Question No: 9 ( Marks: 1 ) - Please choose one**

The relation as a set of ordered pairs as shown in figure is



- ▶  $\{(a,b),(b,a),(b,d),(c,d)\}$
- ▶  $\{(a,b),(b,a),(a,c),(b,a),(c,c),(c,d)\}$
- ▶  **$\{(a,b), (a,c), (b,a),(b,d), (c,c),(c,d)\}$**
- ▶  $\{(a,b), (a,c), (b,a),(b,d),(c,d)\}$

**Question No: 10 ( Marks: 1 ) - Please choose one**

A circuit with two input signals and one output signal is called

- ▶ NOT-gate (or inverter)
- ▶ **AND- gate**
- ▶ None of these

**Question No: 11 ( Marks: 1 ) - Please choose one**

If  $f(x)=2x+1$  then its inverse =

- ▶  $x-1$
- ▶  **$\frac{1}{2}(x-1)$**
- ▶  $x^2 +2$

$$f(x) = 2x + 1$$

$$y = 2x + 1$$

$$x = \frac{y-1}{2}$$

$$f(x)^{-1} = \frac{y-1}{2}$$

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**Question No: 12 ( Marks: 1 ) - Please choose one**

Null set is denoted by

- ▶ **(phi) or { }. (pg 39)**
- ▶ A
- ▶ None of these

**Question No: 13 ( Marks: 1 ) - Please choose one**

The total number of elements in a set is called

- ▶ Strength
- ▶ **Cardinality (pg 141)**
- ▶ Finite

**Question No: 14 ( Marks: 1 ) - Please choose one**

If  $f(x) = x+1$  and  $g(x) = -2x^2 + 1$  then  $(2f - 1g)x =$

▶  $2x^2 - x$

▶  $3x+2$

▶  $2x^2 + 2x + 1$

$= (2f - 1g)x$

$= 2f(x) - g(x)$

$= 2(x+1) - (-2x^2 + 1)$

$= 2x + 2 + 2x^2 - 1$

$= 2x^2 + 2x + 1$

**Question No: 15 ( Marks: 1 ) - Please choose one**

Let

$a_0 = 1, a_1 = -2$  and  $a_2 = 3$

then  $\sum_{j=0}^2 a_j =$

▶ -6

▶ **2**

▶ 8

**Question No: 16 ( Marks: 1 ) - Please choose one**

Which of the given statement is incorrect?

▶ The process of defining an object in terms of smaller versions of itself is called recursion. (Pg 159)

▶ A recursive definition has two parts: Base and Recursion.

▶ **Functions cannot be defined recursively (Pg 159)**

▶ Sets can be defined recursively. (Pg 165)

**Question No: 17 ( Marks: 1 ) - Please choose one**

The operations of intersection and union on sets are commutative

▶ **True (Pg 42)**

▶ False

▶ Depends on the sets given

**Question No: 18 ( Marks: 1 ) - Please choose one**

The power set of a set A is the set of all subsets of A, denoted  $P(A)$ .

▶ False

▶ **True (Pg 68)**

**Question No: 19 ( Marks: 1 ) - Please choose one**

What is the output state of an OR gate if the inputs are 0 and 1?

▶ 0

▶ **1**

▶ 2

▶ 3

**Question No: 20 ( Marks: 1 ) - Please choose one**

The product of the positive integers from 1 to n is called

▶ Multiplication

▶ **n factorial**

▶ Geometric sequence

**Question No: 6 ( Marks: 1 ) - Please choose one**

Let  $A = \{1, 2, 3, 4\}$  and  $R = \{(1, 1), (2, 2), (3, 3), (4, 4)\}$  then

- ▶ R is symmetric.
- ▶ R is anti symmetric.
- ▶ R is transitive.
- ▶ R is reflexive.
- ▶ **All given options are true**

**Question No: 7 ( Marks: 1 ) - Please choose one**

The inverse of given relation

$$R = \{(1,1),(1,2),(1,4),(3,4),(4,1)\}$$

- ▶  $\{(1,1),(2,1),(4,1),(2,3)\}$
- ▶  $\{(1,1),(1,2),(4,1),(4,3),(1,4)\}$
- ▶  **$\{(1,1),(2,1),(4,1),(4,3),(1,4)\}$  (Pg 95)**

**Question No: 11 ( Marks: 1 ) - Please choose one**

$$(A \cap B)^c = (A^c \cap B^c)$$

- ▶ True
- ▶ **False**

**Question No: 13 ( Marks: 1 ) - Please choose one**

Let g be the functions defined by  
 $g(x) = 3x + 2$  then  $g \circ g(x) =$

- ▶  $9x^2 + 4$
- ▶  $6x + 4$
- ▶  **$9x + 8$**

$$\begin{aligned} g(g(x)) &= g(3x + 2) \\ &= 3(3x + 2) + 2 \\ &= 9x + 6 + 2 \\ &= 9x + 8 \end{aligned}$$

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**Question No: 16 ( Marks: 1 ) - Please choose one**

The Common fraction for the recurring decimal 0.81 is

- ▶  $\frac{81}{100}$
- ▶  $\frac{81}{98}$
- ▶  **$\frac{9}{11}$**

**(Pg 157)**

**Question No: 17 ( Marks: 1 ) - Please choose one**

A collection of rules indicating how to form new set objects from those already known to be in the set is called

- ▶ Base
- ▶ Restriction
- ▶ **Recursion (Pg159)**

**Question No: 19 ( Marks: 1 ) - Please choose one**

The statement of the form  $p \vee \sim p$  is:

- ▶ **Tautology (Pg 10)**
- ▶ Contradiction
- ▶ Fallacy

**Question No: 20 ( Marks: 1 ) - Please choose one**

Let A,B,C be the subsets of a universal set U.

Then  $(A \cup B) \cup C$  is equal to:

- ▶  $A \cap (B \cup C)$

▶  $A \cup (B \cap C)$

- ▶  $\emptyset$

▶  $A \cup (B \cup C)$

**Associative Law**

**Question: If  $R = \{ (a, a), (b, b), (c, c) \}$  is a relation on the set  $A = \{a, b, c\}$  Then  $R$  is**

- Symmetric only.
- Symmetric and reflexive only.
- Reflexive only.
- **Equivalence relation. (Pg 85)**

**Question: The negation of the implication “If  $P$  is a square then  $P$  is a rectangle” is**

- **If  $P$  is not a square then  $P$  is not a rectangle**
- $P$  is not a square and  $P$  is a rectangle
- $P$  is a square and  $P$  is not a rectangle.
- None of the above

**Question: Identify the false statement**

- **$0 \in \emptyset$**
- $\{\emptyset\} \subseteq \emptyset$
- If  $A$  and  $B$  are two sets  $A \cap B$  and  $B \cap A$  then  $A = B$ .
- Two sets are disjoint if their intersection is empty set.
- $A \cap A^c = U$

**Question: Let  $A$  be a set containing 3 elements then the total number of relations from  $A$  to  $A$  is**

- $2 \cdot 9$
- $2^9$
- **$n \cdot n$**
- $2n$

**Question: Let  $A = \{1,2,3\}$  and  $B = \{2,3,4,5\}$  then**

- $A = B$ .
- $A$  is a subset of  $B$ .
- $A$  is improper subset of  $B$ .
- **Both 2 and 3.**

**Question: Which of the following is not a Proposition?**

- **$x > 11$ .**
- Sun rounds about the Earth
- $11 + 7 = 18$
- None of above.

**Question:  $F = \{x \in \mathbb{R} \mid x^2 + 29x + 12 = 0\}$**

- **finite**
- infinite
- (c) none of above

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**Question: Let  $A$  has the same cardinality as  $B$  if and only if ,there is a----- correspondence between sets  $A$  and  $B$**

- one-one
- onto
- **(c) Both (a) and (b) (Pg 141)**

**Question: Let  $A = \{0,1,2,3,4,5\}$  and we define functions  $f: A \rightarrow A$  and then  $g: A \rightarrow A$**

$f(3)=3, f(4)=2, f(5)=2, f(2)=5, f(1)=2$

$g(1)=4, g(3)=3, g(5)=3, g(2)=1$

**then  $f \circ g(5)$  and  $g \circ f(2)$**

- **(a)  $f \circ g(5) = g \circ f(2)$**
- (b)  $f \circ g(5) \neq g \circ f(2)$
- (c)  $f \circ g(3) = g \circ f(1)$
- (d) None of the above

$$f \circ g(5) = fg(5)$$

$$= f(3) = 3$$

$$g \circ f(2) = gf(2)$$

$$= g(5) = 3$$

**Question: Choose the correct answer:**

If  $f$  and  $g$  are two one-to-one functions, then their composition of  $g \circ f$  is

- onto
- **one-to-one (Pg 134)**
- (c) bijective

**Question: If  $1=1$  then  $2=2$ , the conditional statement is**

- **True**
- False
- None of other.

$$\text{If } 1^3 + 2^3 + 3^3 + \dots + n^3 =$$

Then,

$$\left[ \frac{n(n+1)}{2} \right]^2 \quad (\text{Pg 157})$$

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$$\frac{n(n+1)(2n+1)}{6}$$

$$\frac{n(n+1)}{2}$$

None of these

**Question: A set  $Z$  has  $n$  elements. How many functions are from  $Z$  to  $Z$ ?**

- $2^n$
- **$n \times n$**
- $n^n$
- None of the other

**Question: Compute the summation**

$$\sum_{i=0}^2 (i^2 + 2)$$

- 5
- 3
- 0
- **None of these.**

**Question: Let  $S = \{n \in \mathbb{Z} / n = (-1)^k, \text{ for some integer } k\}$**

- $S = \{1\}$
- $S = \{-1\}$
- $S = \{-1, 1\}$
- None of the other

**Question: If  $p=T, q=T, r=F$**

Then

$$((\sim p) \wedge r) \rightarrow (q \wedge r)$$

Must be

- F
- **T**
- $q \vee r$
- None of these.

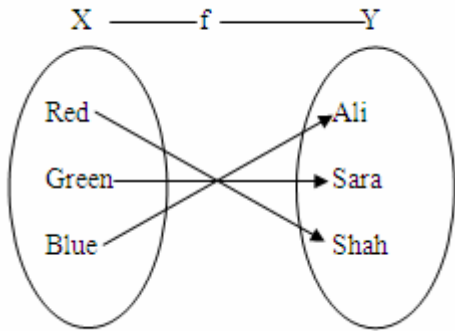
**Question: If  $A = \{a, b, c, d\}$  then the number of elements of power set  $P(A)$  are**

- $2^4$
- $2^5$
- $2^6$
- $2^7$

**Question:** Consider the relation  $R=\{(1,1),(1,2),(1,4),(2,1),(2,2),(3,3),(4,4)\}$  on  $A=\{ 1,2,3,4 \}$  is

- ▶ Symmetric
- ▶ Transitive
- ▶ **Reflexive**
- ▶ All of these

**Question:** The function defined by the following diagram is  $f: X \rightarrow Y$



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- ▶ One-to-one
- ▶ Onto
- ▶ **Both one-to-one and onto**
- ▶ None of these

**Question:**  $1, 10, 10^2, 10^3, 10^4, 10^5, 10^6, 10^7, \dots$

is

- ▶ **Arithmetic series (Pg 145)**
- ▶ Geometric series
- ▶ Arithmetic sequence
- ▶ Geometric sequence

**Question:**

Negations for the given statement “The train is late or my watch is fast” is

- ▶ **The train is not late or my watch is not fast.**
- ▶ The train is not late and my watch is not fast.
- ▶ The train is not late or my watch is fast
- ▶ None of these.

**Question:**

Let  $R$  be the relation from  $A=\{a_1, a_2, a_3\}$  (Elements of  $A$  are ordered by their subscript) to itself given by the matrix representation . Then  $R$  is

$$\begin{pmatrix} 0 & 1 & 0 \\ 1 & 0 & 1 \\ 0 & 1 & 0 \end{pmatrix}$$

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- ▶ Reflexive and Symmetric.
- ▶ Symmetric and Transitive.
- ▶ **Irreflexive and Symmetric.**
- ▶ Irreflexive and Anti- Symmetric.

If out of 35 people each person like Discrete Mathematics or Data Structures, 25 like Discrete Mathematics, and 20 like Data structures then the number of people who like



both Discrete and Data Structures is.....

- ▶ 5
- ▶ 15
- ▶ 10
- ▶ None of these.

**Question: Inverse of a function may not be a function**

- ▶ True (Pg 124)
- ▶ False

**Question No: 1 ( Marks: 1 ) - Please choose one**

The inverse of given relation  $R = \{(1,1),(1,2),(1,4),(3,4),(4,1)\}$  is

- ▶  $\{(1,1),(2,1),(4,1),(2,3)\}$
- ▶  $\{(1,1),(1,2),(4,1),(4,3),(1,4)\}$
- ▶  $\{(1,1),(2,1),(4,1),(4,3),(1,4)\}$

**Question No: 2 ( Marks: 1 ) - Please choose one**  
**Symmetric and antisymmetric are**

- ▶ Negative of each other
- ▶ Both are same
- ▶ Not negative of each other (Pg 90)

**Question No: 3 ( Marks: 1 ) - Please choose one**  
**Let  $A = \{a, b, c\}$  and**

**$R = \{(a, c), (b, b), (c, a)\}$  be a relation on A. Is R**

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- ▶ Transitive
- ▶ Reflexive
- ▶ Symmetric
- ▶ Transitive and Reflexive

**Question: In Boolean addition  $1+1=$**

- ▶ 2
- ▶ 1 (Pg 99)
- ▶ 0

**Question No: 8 ( Marks: 1 ) - Please choose one**  
The same element can never appear twice in a set

- ▶ True
- ▶ False

**Question No: 9 ( Marks: 1 ) - Please choose one**

If  $f(x)=2x+1$ ,  $g(x)=x^2 -1$  then  $fg(x)=$

- ▶  $x^2 -1$
- ▶  $2x^2 -1$
- ▶  $2x^3 -1$

$$fg(x) = f(x^2 - 1)$$

$$f(x^2 - 1) = 2(x^2 - 1) + 1$$

$$= 2x^2 - 2 + 1$$

$$= 2x^2 - 1$$

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**Question No: 13 ( Marks: 1 ) - Please choose one**

If a set contains exactly  $m$  distinct elements where  $m$  denotes some non negative integer then the set is .

- ▶ **Finite**
- ▶ Infinite
- ▶ None of these

**Question No: 14 ( Marks: 1 ) - Please choose one**

If  $f(4) = 1$  and  $g(1) = 4$  then  $fog(1) =$

- ▶ 3
- ▶ **1**
- ▶ 4

$$fog(1) = fg(1)$$

$$= f(4) = 1$$

**Question No: 15 ( Marks: 1 ) - Please choose one**

If  $(A \cup B) = A$ , then  $(A \cap B) = B$

- ▶ **True**
- ▶ False
- ▶ Cannot be determined

**Question No: 16 ( Marks: 1 ) - Please choose one**

The total number of elements in a set is called

- ▶ Strength
- ▶ **Cardinality**
- ▶ Finite

**Question No: 17 ( Marks: 1 ) - Please choose one**

If  $f(x) = x$  and  $g(x) = -2x$  then  $(f+g)x =$

- ▶  $3x$
- ▶  $2x^2$
- ▶  **$-x$**

**Question No: 19 ( Marks: 1 ) - Please choose one**

Which term of the sequence  $4, 1, -2, \dots$  is  $-77$

- ▶ **26**
- ▶ 27
- ▶ 28

**Question No: 20 ( Marks: 1 ) - Please choose one**

If a set  $A$  has 5 elements then power set of  $A$ ,  $P(S)$  contains elements. Which are?

- ▶  $5^5$
- ▶  $2^n$
- ▶  $4^5$
- ▶  **$2^5$**

**Question No: 13 ( Marks: 1 ) - Please choose one**

Let  $g$  be the functions defined by

$$g(x) = 3x + 2 \text{ then } g \circ g(x) =$$

▶  $9x^2 + 4$

▶  $6x + 4$

▶  **$9x + 8$**

$$\begin{aligned} g \circ g(x) &= 3(3x + 2) + 2 \\ &= 9x + 6 + 2 \\ &= 9x + 8 \end{aligned}$$