

FINALTERM EXAMINATION
Fall 2009
MTH202- Discrete Mathematics

Time: 120 min
Marks: 80

Gray Highlighted are correct answers.....

Question No: 1 (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

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

Question No: 2 (Marks: 1) - Please choose one

Symmetric and antisymmetric are

- ▶ Negative of each other
- ▶ Both are same
- ▶ Not negative of each other

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

The statement $p \leftrightarrow q \equiv q \leftrightarrow p$ describes

► Commutative Law:

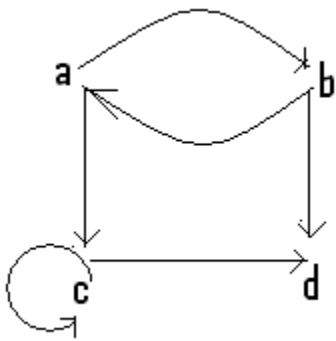
► Implication Laws:

► Exportation Law:

► Equivalence:

Question No: 4 (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: 5 (Marks: 1) - Please choose one

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

- ▶ Commutative Law:
- ▶ Implication Laws:
- ▶ Exportation Law:
- ▶ Reductio ad absurdum

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

A circuit with one input and one output signal is called.

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

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

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

▶ $x^2 -1$

▶ $2x^2 -1$

▶ $2x^3 -1$

ee bhai aap $f(x)$ main x ki jagah $g(x)$ put karen then simplify it

like this

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

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

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

▶ $9x^2 +4$

▶ $6x+4$

▶ $9x+8$

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

How many integers from 1 through 1000 are neither multiple of 3 nor multiple of 5?

▶ 333

▶ 467

▶ 533

▶ 497

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

$$\left[\frac{N}{6} \right] = 9$$

What is the smallest integer N such that

▶ 46

▶ 29

▶ 49

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

What is the probability of getting a number greater than 4 when a die is thrown?

▶ $\frac{1}{2}$

▶ $\frac{3}{2}$

▶ $\frac{1}{3}$

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

If A and B are two disjoint (mutually exclusive) events then

$$P(A \cup B) =$$

- ▶ $P(A) + P(B) + P(A \cap B)$
- ▶ $P(A) + P(B) + P(A \cup B)$
- ▶ $P(A) + P(B) - P(A \cap B)$
- ▶ $P(A) + P(B) - P(A \cap B)$
- ▶ $P(A) + P(B)$

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

If a die is thrown then the probability that the dots on the top are prime numbers or odd numbers is

- ▶ 1
- ▶ $\frac{1}{3}$
- ▶ $\frac{2}{3}$

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

The probability of getting 2 heads in two successive tosses of a balanced coin is

$\frac{1}{4}$



$\frac{1}{2}$



$\frac{2}{3}$



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

The probability of getting a 5 when a die is thrown?

$\frac{1}{6}$



$\frac{5}{6}$



$\frac{1}{3}$



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

If a coin is tossed then what is the probability that the number is 5

$\frac{1}{2}$



0

1

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

If A and B are two sets then The set of all elements that belong to both A and B , is

$A \cup B$

$A \cap B$

$A - B$

None of these

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

What is the expectation of the number of heads when three fair coins are tossed?

1

1.34

▶ 2

▶ 1.5

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

If A, B and C are any three events, then

$P(A \cup B \cup C)$ is equal to

▶ $P(A) + P(B) + P(C)$

▶ $P(A) + P(B) + P(C) - P(A \cap B) - P(A \cap C) - P(B \cap C) + P(A \cap B \cap C)$

▶ $P(A) + P(B) + P(C) - P(A \cap B) - P(A \cap C) - P(B \cap C)$

▶ $P(A) + P(B) + P(C) + P(A \cap B \cap C)$

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

A rule that assigns a numerical value to each outcome in a sample space is called

▶ One to one function

▶ Conditional probability

▶ Random variable

Question No: 21 (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

Question No: 22 (Marks: 1) - Please choose one

A walk that starts and ends at the same vertex is called

▶ Simple walk

▶ Circuit

▶ Closed walk

Question No: 23 (Marks: 1) - Please choose one

If a graph has any vertex of degree 3 then

▶ It must have Euler circuit

▶ It must have Hamiltonian circuit

▶ It does not have Euler circuit

Question No: 24 (Marks: 1) - Please choose one

The square root of every prime number is irrational

▶ True

- ▶ False

- ▶ Depends on the prime number given

Question No: 25 (Marks: 1) - Please choose one

A predicate is a sentence that contains a finite number of variables and becomes a statement when specific values are substituted for the variables

- ▶ True

- ▶ False

- ▶ None of these

Question No: 26 (Marks: 1) - Please choose one

If r is a positive integer then $\gcd(r,0)=$

- ▶ r
- ▶ 0
- ▶ 1

- ▶ None of these

Question No: 27 (Marks: 1) - Please choose one

Combinatorics is the mathematics of counting and arranging objects

- ▶ True
- ▶ False
- ▶ Cannot be determined

Question No: 28 (Marks: 1) - Please choose one

A circuit that consist of a single vertex is called

- ▶ Trivial
- ▶ Tree
- ▶ Empty

Question No: 29 (Marks: 1) - Please choose one

In the planar graph, the graph crossing number is

- ▶ 0
- ▶ 1
- ▶ 2

▶ 3

Question No: 30 (Marks: 1) - Please choose one

How many ways are there to select five players from a 10 member tennis team to make a trip to a match to another school?

▶ C(10,5)

▶ C(5,10)

▶ P(10,5)

▶ None of these

Solution: The answer is given by the number of 5-combinations of a set with ten elements. By Theorem 2, the number of such combinations is

$$C(10, 5) = \frac{10!}{5!5!} = 252.$$

Question No: 31 (Marks: 1) - Please choose one

The value of $0!$ is

▶ 0

▶ 1

▶ Cannot be determined

Question No: 32 (Marks: 1) - Please choose one

If the transpose of any square matrix and that matrix are same then matrix is

called

- ▶ Additive Inverse
- ▶ Hermitian Matrix
- ▶ Symmetric Matrix

Question No: 33 (Marks: 1) - Please choose one

$$\frac{(n-1)!}{(n+1)!}$$

The value of _____ is

- ▶ 0
- ▶ $n(n-1)$
- ▶ $\frac{1}{(n^2+n)}$
- ▶ _____
- ▶ Cannot be determined

Question No: 34 (Marks: 1) - Please choose one

If A and B are two disjoint sets then which of the following **must be** true

- ▶ $n(A \cup B) = n(A) + n(B)$
- ▶ $n(A \cup B) = n(A) + n(B) - n(A \cap B)$
- ▶ $n(A \cup B) = \emptyset$

- ▶ None of these

Question No: 35 (Marks: 1) - Please choose one

Any two spanning trees for a graph

- ▶ Does not contain same number of edges
- ▶ Have the same degree of corresponding edges
- ▶ contain same number of edges
- ▶ May or may not contain same number of edges

Question No: 36 (Marks: 1) - Please choose one

When $P(k)$ and $P(k+1)$ are true for any positive integer k , then $P(n)$ is not true for all +ve Integers.

- ▶ True
- ▶ False

Question No: 37 (Marks: 1) - Please choose one

$n^2 > n+3$ for all integers $n \geq 3$.

- ▶ True
- ▶ False

Question No: 38 (Marks: 1) - Please choose one

Quotient –Remainder Theorem states that for any positive integer d , there exist unique integer q and r such that _____ and $0 \leq r < d$.

- ▶ $n = d \cdot q + r$
- ▶ $n = d \cdot r + q$
- ▶ $n = q \cdot r + d$
- ▶ None of these

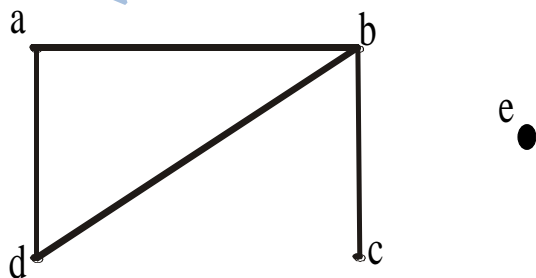
Question No: 39 (Marks: 1) - Please choose one

Euler formula for graphs is

- ▶ $f = e - v$
- ▶ $f = e + v + 2$
- ▶ $f = e - v - 2$
- ▶ $f = e - v + 2$

Question No: 40 (Marks: 1) - Please choose one

The degrees of $\{a, b, c, d, e\}$ in the given graph is



▶ 2, 2, 3, 1, 1

▶ 2, 3, 1, 0, 1

▶ 0, 1, 2, 2, 0

▶ 2,3,1,2,0

Question No: 41 (Marks: 2)

$$A = \begin{bmatrix} 1 & 3 & 7 \\ 5 & 2 & 9 \end{bmatrix}$$

Let $A = \begin{bmatrix} 1 & 3 & 7 \\ 5 & 2 & 9 \end{bmatrix}$ then find A'

Question No: 42 (Marks: 2)

Write the contra positive of the following statements:

1. For all integers n , if n^2 is odd then n is odd.
2. If m and n are odd integers, then $m+n$ is even integer.

Question No: 43 (Marks: 2)

How many distinguishable ways can the letter of the word HULLABALOO be arranged.

Question No: 44 (Marks: 3)

Find the variance σ^2 of the distribution given in the following table.

x_i	1	3	4	5
$f(x_i)$	0.4	0.1	0.2	0.3

Question No: 45 (Marks: 3)

Prove that every integer is a rational number.

Question No: 46 (Marks: 3)

- a. Evaluate $P(5,2)$
- b. How many 5-permutations are there of a set of five objects?

Question No: 47 (Marks: 5)

Is it possible to have a simple graph with four vertices of degree 1, 1, 3, and 3. If no then give reason? (Justify your answer)

Question No: 48 (Marks: 5)

Find the GCD of **500008, 78** using Division Algorithm.

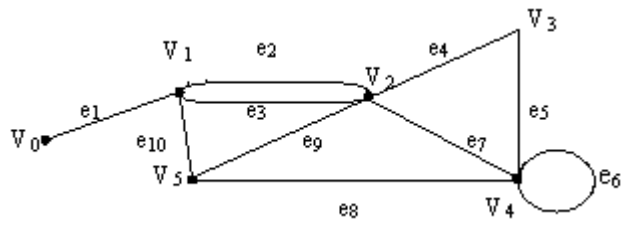
Question No: 49 (Marks: 5)

Find the M number of ways that ten chocolates can be divided among three children if the youngest child is to receive four chocolates and each of the others three chocolates.

Question No: 50 (Marks: 10)

In the graph below, determine whether the following walks are paths, simple paths, closed walks, circuits,

simple circuits, or are just walk?



- i) $V_0 e_1 V_1 e_{10} V_5 e_9 V_2 e_2 V_1$
- ii) $V_4 e_7 V_2 e_9 V_5 e_{10} V_1 e_3 V_2 e_9 V_5$
- iii) V_2
- iv) $V_5 V_2 V_3 V_4 V_4 V_5$
- v) $V_2 V_3 V_4 V_5 V_2 V_4 V_3 V_2$