FINALTERM EXAMINATION
Spring 2009
MTH202- Discrete Mathematics (Session - 2)

Time: 120 min
Marks: 80

Student Info	
StudentID:	Moona
Center:	OPKST
ExamDate:	7/11/2009 12:00:00 AM

For Teacher's Use Only									
Q No.	1	2	3	4	5	6	7	8	Total
Marks									
Q No.	9	10	11	12	13	14	15	16	
Marks									
Q No.	17	18	19	20	21	22	23	24	
Marks									
Q No.	25	26	27	28	29	30	31	32	
Marks									
Q No.	33	34	35	36	37	38	39	40	
Marks									
Q No.	41	42	43	44	45	46	47	48	
Marks									
Q No.	49	50							
Marks									

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

The negation of “Today is Friday” is

► Today is Saturday

► **Today is not Friday**
► Today is Thursday

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

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: 3 (Marks: 1) - Please choose one

The converse of the conditional statement **p ® q** is

► **q ®p**

► ~q ®~p

► ~p ®~q

► None of these

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

Contrapositive of given statement "***If it is raining, I will take an umbrella"*** is

► **I will not take an umbrella if it is not raining.**

► 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 (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: 6 (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, antisymmetric and transitive**

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

How many functions are there from a set with three elements to a set with two elements?

► 6
► **8**
► 12

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

$1,10,10^2,10^3,10^4,10^5,10^6,10^7,.....$ is

► **Arithmetic series**

Arithmetic series

► Geometric series

► Arithmetic sequence

► Geometric sequence

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

$\lceil x \rceil$ for x = -2.01 is

► -2.01
► -3
► **-2**
► -1.99

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

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

P(AÈB) =

► P(A) + P(B) + P(AÇB)
► P(A) + P(B) + P(AUB)
► P(A) + P(B) - P(AÇB)
► P(A) + P(B) - P(AÇB)
► **P(A) + P(B)**

Question No: 11 (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: 12 (Marks: 1) - Please choose one

If $P(A \cap B) \neq P(A)P(B)$ then the events A and B are called

- **Independent**
- Dependen
- Exhaustive

Question No: 13 (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**

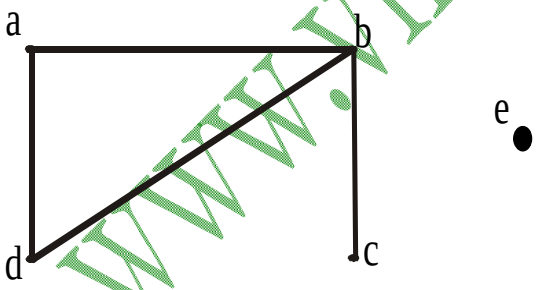
Question No: 14 (Marks: 1) - Please choose one

The expectation of x is equal to

- Sum of all terms
- Sum of all terms divided by number of terms
- $\sum xf(x)$

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

The degree sequence {a, b, c, d, e} of 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: 16 (Marks: 1) - Please choose one

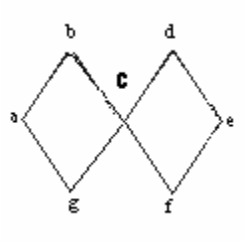
Which of the following graph is not possible?

- Graph with four vertices of degrees 1, 2, 3 and 4.
- **Graph with four vertices of degrees 1, 2, 3 and 5**.
- Graph with three vertices of degrees 1, 2 and 3.

► Graph with three vertices of degrees 1, 2 and 5.

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

The graph given below



► Has Euler circuit
► Has Hamiltonian circuit
► **Does not have Hamiltonian circuit**

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

Let n and d be integers and d ¹ 0. Then n is divisible by d or d divides n If and only if

► **n= k.d for some integer k**

► n=d

► n.d=1

► none of these

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

The contradiction proof of a statement pàq involves

► **Considering p and then try to reach q**

► Considering ~q and then try to reach ~p

► Considering p and ~q and try to reach contradiction

► None of these

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

An integer n is prime if, and only if, n > 1 and for all positive integers r and s, if n = r·s, then

► **r = 1 or s = 1.**

► r = 1 or s = 0.

► r = 2 or s = 3.

► None of these

Question No: 21 (Marks: 1) - Please choose one

The method of loop invariants is used to prove correctness of a loop with respect to certain pre and post-conditions.

► **True**

► False

► None of these

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

The greatest common divisor of 27 and 72 is

► 27
► **9**
► 1
► None of these

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

If a tree has 8 vertices then it has

► 6 edges
► **7 edges**
► 9 edges

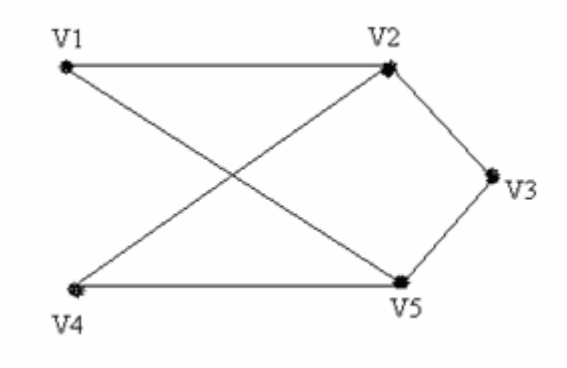
Question No: 24 (Marks: 1) - Please choose one

Complete graph is planar if

► **n = 4**
► n>4
► $n \leq 4$

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

The given graph is



- ► **Simple graph**
- ► Complete graph
- ► Bipartite graph
- ► Both (i) and (ii)
- ► Both (i) and (iii)

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

The value of 0! Is

- ► 0
- ► **1**
- ► Cannot be determined

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

Two matrices are said to confirmable for multiplication if

- ► Both have same order
- ► **Number of columns of 1st matrix is equal to number of rows in 2nd matrix**
- ► Number of rows of 1st matrix is equal to number of columns in 2nd matrix

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

The value of (-2)! Is

- 0
- 1
- **Cannot be determined**

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

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

The value of is

► 0
► n(n-1)
► $n^2 + n$
► Cannot be determined

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

The number of *k*-combinations that can be chosen from a set of *n* elements can be written as

► **$^{n}C_{k}$**

► $^{k}C_{n}$

► $^{n}P_{k}$

► $^{k}P_{k}$

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

If the order does not matter and repetition is allowed then total number of ways for selecting k sample from n. is

► n^k

► **C(n+k-1,k)**

► P(n,k)

► C(n,k)

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

If the order matters and repetition is not allowed then total number of ways for selecting k sample from n. is

► n^k

► **C(n+k-1,k)**

► P(n,k)

► C(n,k)

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

To find the number of unordered partitions, we have to count the ordered

partitions and then divide it by suitable number to erase the order in partitions

► True

► **False**

► None of these

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

A tree diagram is a useful tool to list all the logical possibilities of a sequence of events where each event can occur in a finite number of ways.

► **True**

► False

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

If A and B are finite (overlapping) sets, then which of the following **must be** true

► **n(AÈB) = n(A) + n(B)**

► n(AÈB) = n(A) + n(B) - n(AÇB)

► n(AÈB)= ø

► None of these

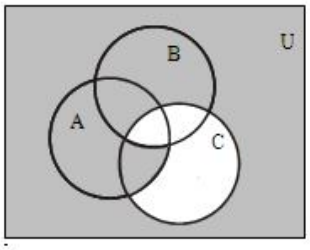
Question No: 36 (Marks: 1) - Please choose one

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

► 0
► **1**
► 2
► 3

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

In the given Venn diagram shaded area represents:



► (A Ç B) È C
► (A È B^c) È C
► (AÇ B^c) È C^c
► **(A Ç B) Ç C^c**

Question No: 38 (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:

≡ $A \cap (B \cup C)$

≡ $A \cup (B \cap C)$

≡ $\varnothing$

≡ $A \cup (B \cup C)$

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

n ! >2^n for all integers n ³4.

► True
► **False**

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

$+, -, \times, \div$ are

► Geometric expressions

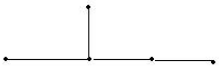
► **Arithmetic expressions**

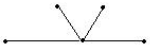
► Harmonic expressions

Question No: 41 (Marks: 2)

Find a non-isomorphic tree with five vertices.

There are three non-isomorphic trees with five vertices as shown (where every tree with five vertices has 5-1=4 edges).





Question No: 42 (Marks: 2)

Define a predicate.

Let the declarative statement:
"x is greater than 3".
We denote this declarative statement by P(x) where

x is the variable,

P is the predicate "is greater than 3".
The declarative statement P(x) is said to be the value of the propositional function P at x.

Question No: 43 (Marks: 2)

Write the following in the factorial form:

(n +2)(n+1) n

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

Question No: 44 (Marks: 3)

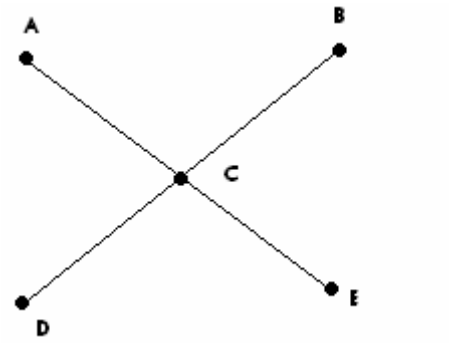
Determine the probability of the given event
"An odd number appears in the toss of a fair die"

Sample space will be..S={1,2.3,4,5,6}…there are 3 odd numbers so,
For odd numbers, probability will be

$\frac{3}{6}$ …Ans

Question No: 45 (Marks: 3)

Determine whether the following graph has Hamiltonian circuit.



This graph is not a Hamiltonian circuit, because it does not satisfy all conditions of it.
E.g. it has unequal number of vertices and edges. And its path cannot be formed without repeating vertices.

Question No: 46 (Marks: 3)

Prove that If the sum of any two integers is even, then so is their difference.

Theorem: □ integers m and n, if m + n is even, then so is m - n.

Proof:

Suppose m and n are integers so that m + n is even. By definition of even, m + n = 2k for some integer k. Subtracting n from both sides gives m = 2k - n. Thus,

m - n	= (2k - n) - n	by substitution
	= 2k - 2n	combining common terms
	= 2(k - n)	by factoring out a 2

But (k - n) is an integer because it is a difference of integers. Hence, (m - n) equals 2 times an integer, and so by definition of even number, (m - n) is even.

This completes the proof.

Question No: 47 (Marks: 5)

Show that if seven colors are used to paint 50 heavy bikes, at least 8 heavy bikes will be the same color.

N=50
K=7
C(7+50-1,7)

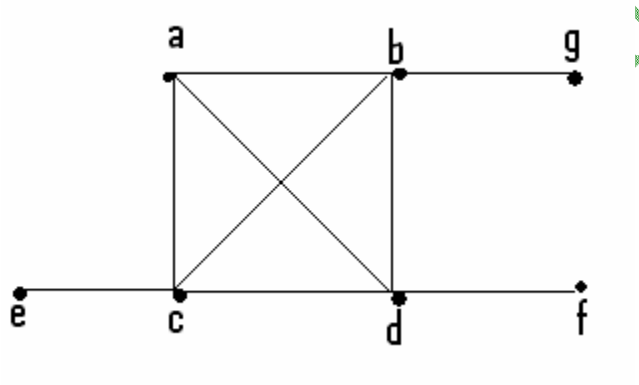
C(56,7)

56!/(56-7)!7!
56!/49!.7!

Question No: 48 (Marks: 5)

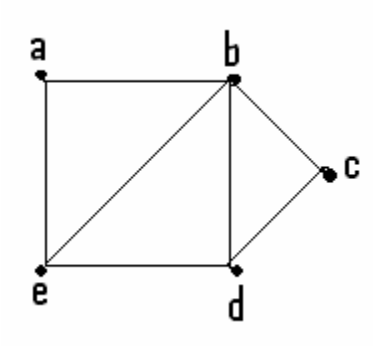
Determine whether the given graph has a Hamilton circuit? If it does, find such a circuit, if it does not , given an argument to show why no such circuit exists.

(a)



This graph does not have Hamiltonian circuit, because it does not satisfy the conditions. Circuit may not be completed without repeating edges. It has also unequal values of edges and vertices.

(b)



This graph is a Hamiltonian circuit ..Its path is a b c d e a

Question No: 49 (Marks: 5)

Find the GCD of **11425 , 450** using Division Algorithm.

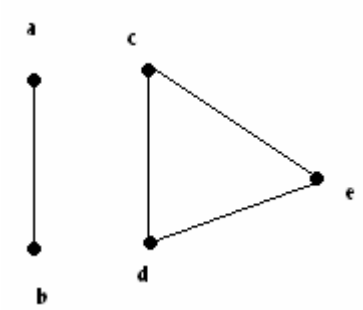
LCM = 205650

11425 = 450x25 + 175
450 = 175x2 + 100
175 = 100x1 + 75
100 = 75x1 + 25
75 = 25x3 + 0

Linear combination= 25 = 127x450 + -5x11425
GCD= 25…Ans

Question No: 50 (Marks: 10)

Write the adjacency matrix of the given graph also find transpose and product of adjacency matrix and its transpose (if not possible then give reason)



Adjacency matrix= 0 1 0 0 0

1 0 0 0 0
0 0 0 1 1
0 0 1 0 1
0 0 1 1 0

Transpose = 0 1 0 0 0
1 0 0 0 0
0 0 0 1 1
0 0 1 0 1
0 0 1 1 0

Its transpose is not possible…it's same. Because there is no loop. It is not directed graph.

FINALTERM EXAMINATION
Fall 2009
MTH202- Discrete Mathematics

Time: 120 min
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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

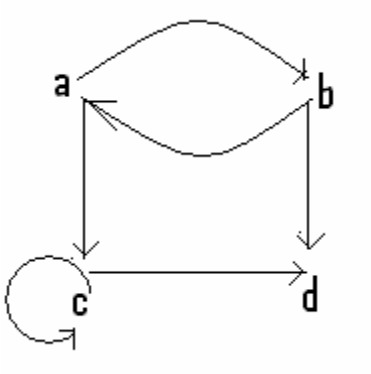
Question No: 3 (Marks: 1) - Please choose one

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 $p \rightarrow q \equiv (p \wedge \neg q) \rightarrow c$ 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

$$\left\lceil \frac{N}{6} \right\rceil = 9$$

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

► Hermition 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.q+ r
- ► n=d.r+ q

► n=q.r+ d

► None of these

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

Euler formula for graphs is

► f = e-v

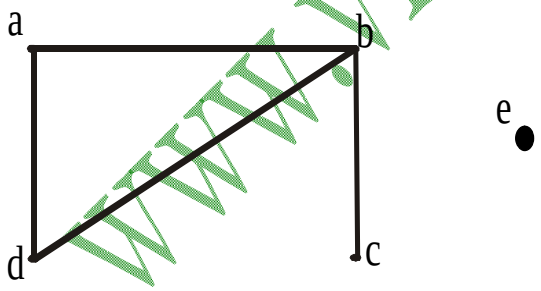
► f = e+v +2

► 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 then find A^t

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.

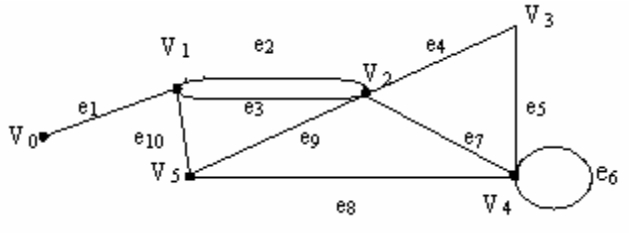
Question No: 49 (Marks: 5)

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) $V_5\ V_2\ V_3\ V_4\ V_4V_5$

v) $V_2\ V_3\ V_4\ V_5\ V_2V_4\ V_3\ V_2$

FINALTERM EXAMINATION
Fall 2008
MTH202- Discrete Mathematics (Session - 3)

Ref No: 402317
Time: 120 min
Marks: 70

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

When 5^k is even, then $5^k+5^k+5^k$ is odd.

- ► True
- ► False

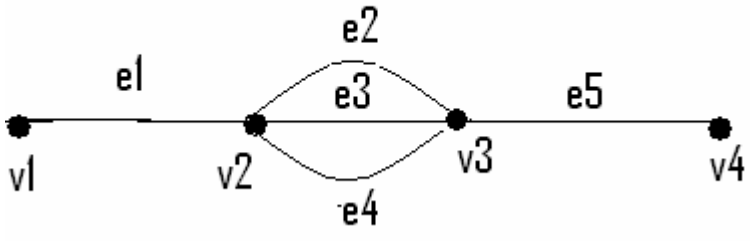
Question No: 2 (Marks: 1) - Please choose one

An arrangement of objects without the consideration of order is called

- ► Combination
- ► Selection
- ► None of these
- ► Permutation

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

In the following graph



How many simple paths are there from v_1 to v_4

- ► 2
- ► 3
- ► 4

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

Changing rows of matrix into columns is called

- ► Symmetric Matrix
- ► Transpose of Matrix
- ► Adjoint of Matrix

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

The list of the degrees of the vertices of graph in non increasing order is called

- ► Isomorphic Invariant
- ► Degree Sequence
- ► Order of Graph

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

A vertex of degree greater than 1 in a tree is called a

- ► Branch vertex
- ► Terminal vertex
- ► Ancestor

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

The word "algorithm" refers to a step-by-step method for performing some action

- ► True
- ► False
- ► None of these

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

The sum of two irrational number must be an irrational number

- ► True

► False

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

An integer n is prime if, and only if, n > 1 and for all positive integers r and s, if n = r·s, then

► r = 1 or s = 1.

► r = 1 or s = 0.

► r = 2 or s = 3.

► None of these

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

An integer n is even if, and only if, n = 2k for some integer k.

► True

► False

► Depends on the value of k

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

For any two sets A and B, A – (A – B) =

► A Ç B

► A È B

► A – B

► None of these

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

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

- ▶ Simple walk
- ▶ Circuit
- ▶ Closed walk

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

Associative law of union for three sets is

- ▶ A È (B È C) = (A È B) È C
- ▶ A Ç (B Ç C) = (A Ç B) Ç C
- ▶ A È (B Ç C) = (A È B) Ç (A È B)
- ▶ None of these

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

Two distinct edges with the same set of end points are called

- ▶ Isolated
- ▶ Incident
- ▶ Parallel

Question No: 15 (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: 16 (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: 17 (Marks: 1) - Please choose one

If two relations are reflexive then their composition is

≡ **Antisymmetric**
≡ **Reflexive**
≡ **Irreflexive**
≡ **Symmetric**

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

If p and q are statement variables, the biconditional of p and q is

denoted by

► p«q

► ~q ®~p

► ~p ®~q

► None of these

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

Select the correct one

► A proof by contradiction is based on the fact that a statement can be true and false at the
same time.

► A proof by contraposition is based on the logical equivalence between a statement and its contradiction.

► The method of loop invariants is used to prove correctness of a loop without any conditions.

► None of the given choices

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

According to Demorgan's law

$\sim (p \vee q) = ?$

► $\sim p \vee \sim q$

► $\sim p \wedge \sim q$

► $\sim p \wedge q$

► $\sim p \vee q$

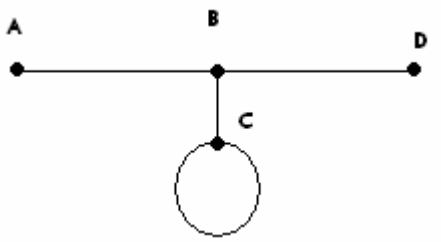
Question No: 21 (Marks: 2)

Find integers q and r so that a=bq+r , with 0≤r<b.
a=45 , b=6.

Ans:
If a =45 and b = 6 are two integers with $b \neq 0$ such that the q and r are non negitive integers.
a=bq+r
divides 45 by 6
this gives= 6.7 +3
divides 6 by 3
this gives = 3.2 +0
hence gcd of the (45,6) will be 3

Question No: 22 (Marks: 2)

Give the degree of each vertex in the figure (given below)



Ans: degree of A vertex = 1
Degree of B vertex = 3
Degree of C vertex = 3

Degree of D vertex = 1
Total degree of vertices = 8
Can be prove by formula
Degree of vertices = 2. no. of edges
= 2 . 4
= 8

Question No: 23 (Marks: 2)

What is the probability of getting a number greater than 2 when a dice is tossed?

As dice has 6 sides so possible event will be 36.
No. greater than 2 will be
3 ,4 ,5 ,6 = 18

P(E) =n(E)/(n(S))

= 18/36

= ½ will be the possibility to get no greater than 2

Question No: 24 (Marks: 3)

How many distinguishable ways can the letters of the word HULLABALOO be arranged if words are to begin with U and end with L

Question No: 25 (Marks: 3)

Write the Pre and Post Conditions of the

"Algorithm to compute a product of two negative integers".

Ans:
Pre condition: The input variables m and n are nonnegative integers.
Post condition: the out put variables p equals m.n.
Example:

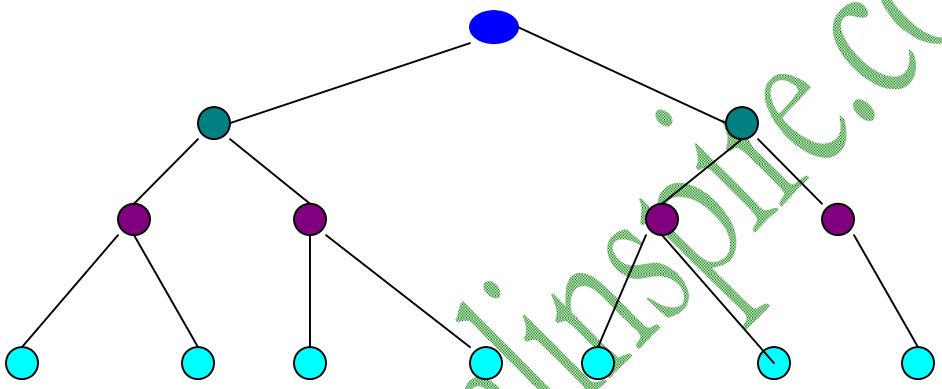
If $k \geq 0$, then $\binom{n}{k} = \frac{n(n-1)\dots(n-k+1)}{1 \cdot 2 \cdots k} = (-1)^k \binom{-n+k-1}{k}$ extends to all *n*.

extends to $k < 0$ via

$$\binom{n}{k} = \begin{cases} (-1)^{n-k}\binom{-k-1}{n-k} & \text{if } n \geq k, \\ (-1)^{n-k}\binom{-k-1}{-n-1} & \text{if } n \leq -1. \end{cases}$$

Question No: 26 (Marks: 3)

Draw a full binary tree with seven vertices.



Question No: 27 (Marks: 5)

Find n if
P(n,2) = 72

Given
P(n,2) = 72
n.(n-1)=72 by using the definition of permutation
n^2-1=72
n^2-n-72=0
n=9,-8 since n must be positive so only the acceptable value for n is 9

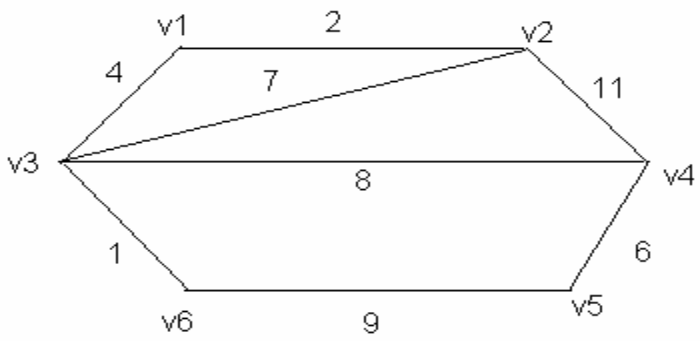
Question No: 28 (Marks: 5)

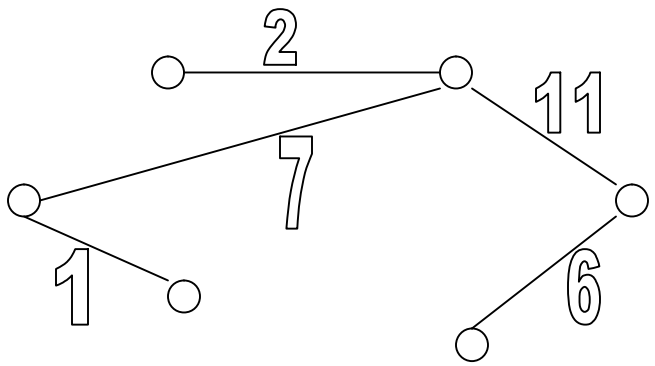
Five people are to be seated around a circular table. Two seating plans are

considered as same if one is the rotation of other. How many different seating plans are possible?

Question No: 29 (Marks: 5)

Use Kruskal's Algorithm to draw the minimal spanning tree for the graph below. Indicate the order in which edges are added to form a tree.





Order of adding the edges:
{v3,v6},{v1,v2},{v4,v5},{v2,v3},{v2,v4},.

Question No: 30 (Marks: 10)

Show the sample space for tossing one penny and rolling one die.
(H = heads, T = tails) using tree diagram

Question No: 31 (Marks: 10)

,$10^{3n} + 13^{n+1}$ is divisible by 7 for all n>=1

Let $10^{3n} + 13^{n+1}$ is divisible by 7

Basis step:
P(1) is true.now
P(1):

(0.1)

$10_{3n} + 13_{n+1}$ is divisible by 7

Since $10_{3.1} + 13_{1+1} = 10_{(3)} + 13_2$
Which is divisible by 7

Hence P(1) is true.now

Inductive step:
Suppose p(k is true)
$10^{3k}+13^{k+1}$ = 7.q
To prove p(k+1) $10^{3n}+13^{n+1}$ is true is divdsible by 7

$10^{3k+1}+13^{k+1+1}$ = 23^{4k+3}
= 23^{4k+3} +2 -2
=21^{4k+3} +2
=7.3^{4k+3} +2
= 7(3^{4k+3} +2)

=7. q where q is ant positive integer equal to 3^{4k+3} +2
So its proved that $10^{3n}+13^{n+1}$ divisible by 7 for all n>=1

FINALTERM EXAMINATION
Spring 2010
MTH202- Discrete Mathematics (Session - 1)

Time: 90 min
Marks: 60

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

Whether the relation R on the set of all integers is reflexive, symmetric, antisymmetric, or transitive, where $(x, y) \in R$ if and only if $xy \geq 1$

- ► Antisymmetric
- ► Transitive
- *► Symmetric
- ► Both Symmetric and transitive

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

For a binary relation R defined on a set A , if for all $t \in A, (t,t) \notin R$ then R is

- * ► Antisymmetric
- ► Symmetric
- ► Irreflexive

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

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

- ► True
- * ► False
- ► Cannot be determined

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

The part of definition which can be expressed in terms of smaller versions of itself is called

► Base
► Restriction
*► Recursion
► Conclusion

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

$\left\lceil \frac{N}{6} \right\rceil = 9$

What is the smallest integer N such that

* ► 46
► 29
► 49

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

In probability distribution random variable f satisfies the conditions

$f(x_i) \leq 0 \quad and \quad \sum_{i=1}^{n} f(x_i) \neq 1$

►

$f(x_i) \geq 0 \quad and \quad \sum_{i=1}^{n} f(x_i) = 1$

* ►

$f(x_i) \geq 0 \quad and \quad \sum_{i=1}^{n} f(x_i) \neq 1$

►

$f(x_i) \prec 0 \quad and \quad \sum_{i=1}^{n} f(x_i) = 1$

►

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

What is the probability that a hand of five cards contains four cards of one kind?

► 0.0018

► $\frac{1}{2}$

*► 0.0024

Question No: 9 (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: 10 (Marks: 1) - Please choose one

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

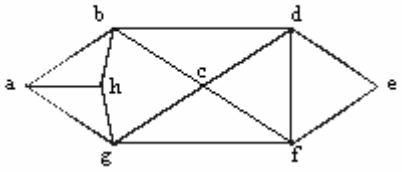
► Simple walk

► Circuit

*► Closed walk

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

The Hamiltonian circuit for the following graph is



► abcdefgh

► abefgha

*► abcdefgha

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

Distributive law of union over intersection for three sets

► A È (B È C) = (A È B) È C

► A Ç (B Ç C) = (A Ç B) Ç C

*► A È (B Ç C) = (A È B) Ç (A È B)

► None of these

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

The indirect proof of a statement pàq involves

► Considering ~q and then try to reach ~p

► Considering p and ~q and try to reach contradiction

*► Both 2 and 3 above

► Considering p and then try to reach q

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

The square root of every prime number is irrational

► True

*► False

► Depends on the prime number given

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

If a and b are any positive integers with b≠0 and q and r are non negative integers such that a= b.q+r then

*► gcd(a,b)=gcd(b,r)

► gcd(a,r)=gcd(b,r)

► gcd(a,q)=gcd(q,r)

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

The greatest common divisor of 27 and 72 is

► 27
► 9
*► 1
► None of these

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

In how many ways can a set of five letters be selected from the English Alphabets?

*► C(26,5)

► C(5,26)

► C(12,3)

► None of these

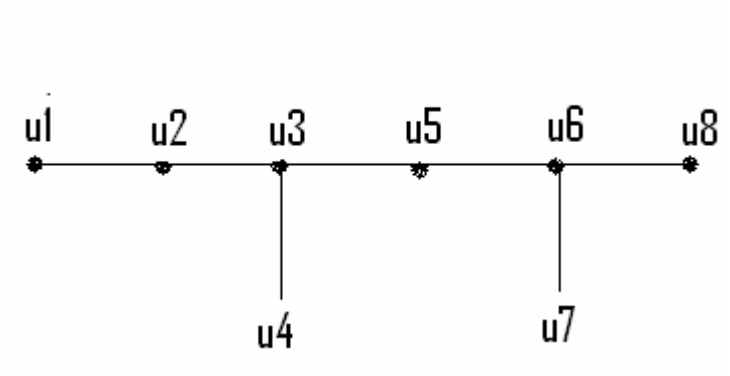
Question No: 18 (Marks: 1) - Please choose one

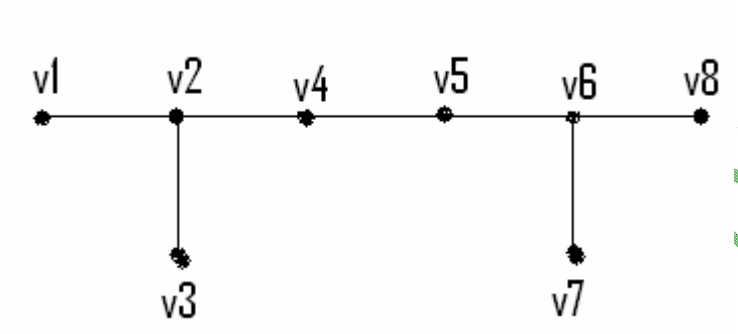
A vertex of degree greater than 1 in a tree is called a

► Branch vertex
*► Terminal vertex
► Ancestor

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

For the given pair of graphs whether it is





► Isomorphic

*► Not isomorphic

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

The value of (-2)! Is

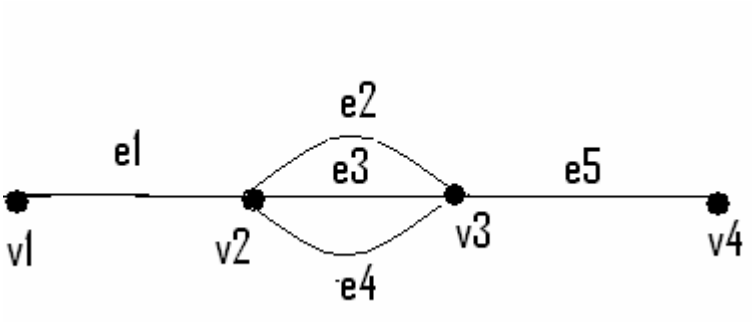
► 0

► 1

* ► Cannot be determined

Question No: 21 (Marks: 1) - Please choose one

In the following graph



How many simple paths are there from v_1 to v_4

► 2

*► 3

► 4

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

The value of $\frac{(n+1)!}{(n-1)!}$ is

► 0

*► n(n-1)

► $n^2 + n$

► Cannot be determined

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

If A and B are finite (overlapping) sets, then which of the following **must be** true

► n(AÈB) = n(A) + n(B)

* ► n(AÈB) = n(A) + n(B) - n(AÇB)

► n(AÈB)= ø

► None of these

Question No: 24 (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: 25 (Marks: 1) - Please choose one

When 3^k is even, then $3^k+3^k+3^k$ is an odd.

► True

*► False

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

Quotient –Remainder Theorem states that for any positive integer d, there exist unique integer q and r such that n=d.q+ r and _____.

* ► 0≤r<d

► 0<r<d

► 0≤d<r

► None of these

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

The value of $\lceil x \rceil$ for x = -3.01 is

*► -3.01

► -3

► -2

► -1.99

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

If p= A Pentium 4 computer,

q= attached with ups.

Then "no Pentium 4 computer is attached with ups" is denoted by

► ~ (pÙq)

► ~ pÚq

► ~ pÙq

*► None of these

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

An integer n is prime if and only if n > 1 and for all positive integers r and s, if n = r·s, then

► r = 1 or s = 2.

► r = 1 or s = 0.

▶ r = 2 or s = 3.

▶ None of these

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

If $P(A \cap B) \neq P(A)P(B)$ then the events A and B are called

*▶ Independent

▶ Dependent

▶ Exhaustive

Question No: 31 (Marks: 2)

Let A and B be the events. Rewrite the following event using set notation
"Only A occurs"

Question No: 32 (Marks: 2)

Suppose that a connected planar simple graph has 15 edges. If a plane drawing of this graph has 7 faces, how many vertices does this graph have?

Answer:

Given,
Edges = v =15
Faces = f = 7
Vertices = v =?
According toEuler Formula, we know that,

f= e – v +2
Putting values, we get
7 = 15 – v + 2
7 = 17 – v
Simplifying
v =1 7-7 =10

Question No: 33 (Marks: 2)

How many ordered selections of two elements can be made from the set {0,1,2,3}?

Answer

The order selection of two elements from 4 is as

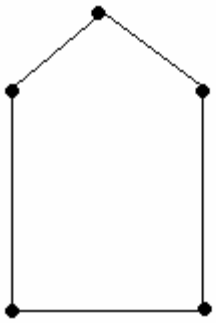
P(4,2) = 4!/(4-2)!
= (4.3.2.1)/2!
= 12

Question No: 34 (Marks: 3)

Consider the following events for a family with children:
A={children of both sexes}, B={at most one boy}.Show that A and B are dependent events if a family has only two children.

Question No: 35 (Marks: 3)

Determine the chromatic number of the given graph by inspection.



Question No: 36 (Marks: 3)

A cafeteria offers a choice of two soups, five sandwiches, three desserts and three drinks. How many different lunches, each consisting of a soup, a sandwiche, a dessert and a drink are possible?

Question No: 37 (Marks: 5)

A box contains 15 items,4 of which are defective and 11 are good. Two items are selected. What is probability that the first is good and the second defective?
Answer

Question No: 38 (Marks: 5)

Draw a binary tree with height 3 and having seven terminal vertices.

Question No: 39 (Marks: 5)

Find n if
P(n,2) = 72