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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									

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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

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

- ► **Arithmetic series**

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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
► $\frac{1}{3}$

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$\frac{2}{3}$

▶

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**

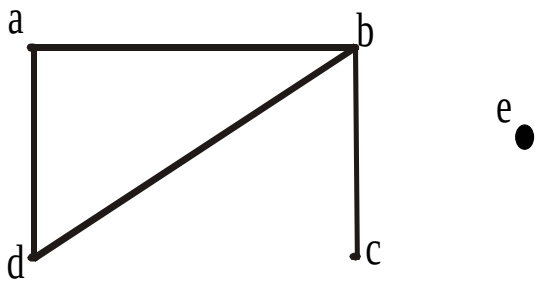
Question No: 14 (Marks: 1) - Please choose one

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

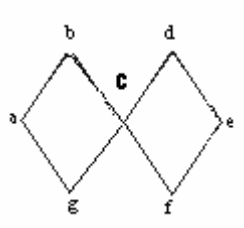
Question No: 16 (Marks: 1) - Please choose one

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

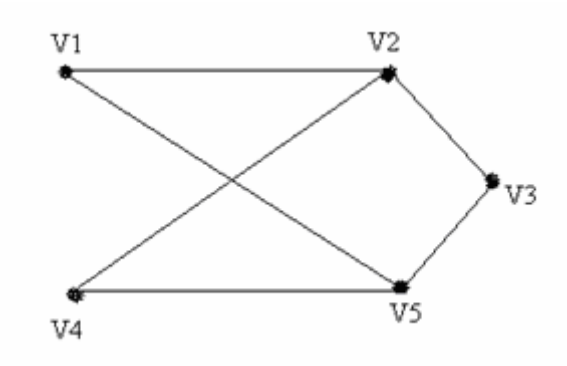
Question No: 24 (Marks: 1) - Please choose one

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

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

- **^nC_k**
- ^kC_n
- ^nP_k
- ^kP_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

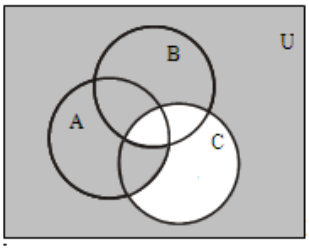
Question No: 36 (Marks: 1) - Please choose one

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

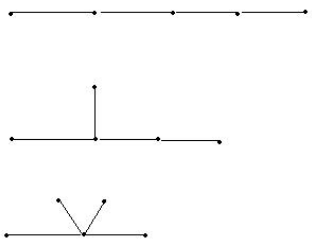
► **Arithmetic expressions**

► 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

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

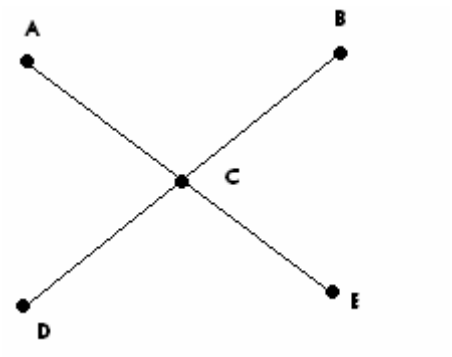
Question No: 44 (Marks: 3)

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

= 2(k - n) terms 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)

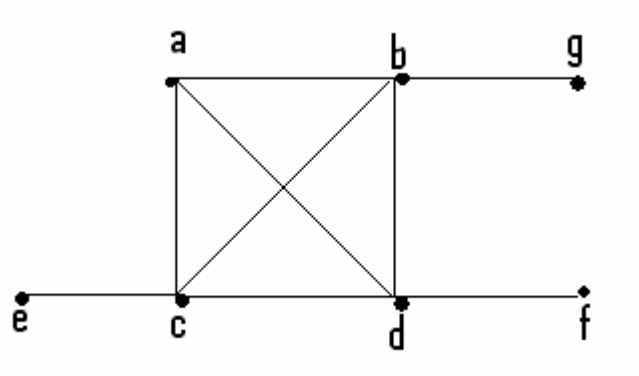
C(56,7)

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

Question No: 48 (Marks: 5)

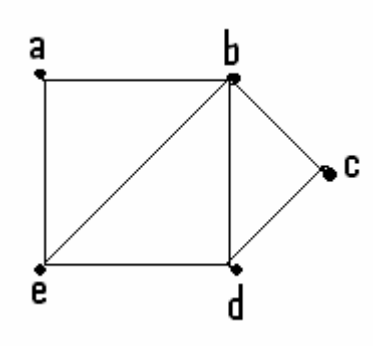
Determine whether the given graph has a Hamilton circuit? If it does, find such a circuit, if it does not , given an argument to show why no such circuit exists.

(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)

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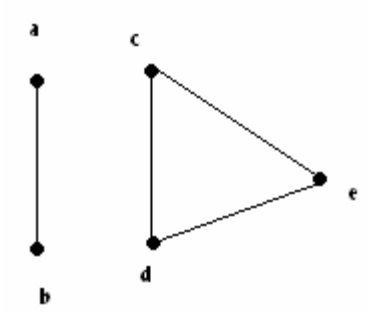

Adjacency matrix=

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

Transpose =

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

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

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