Code No. 11005/BL/Non-CBCS

FACULTY OF INFORMATICS

M.C.A. I-Year I-Semester (Non-CBCS) (Backlog) Examination, August 2021

Subject : Discrete Mathematics

Time : 2 Hours **Max. Marks: 80**

Missing data, if any, may be suitably assumed

Note: Answer any Four questions : **(4 x 20 = 80 Marks)**

1. a) State and prove Demorgan's Law
   b) Show that $(\sim p \wedge (\sim q \wedge r)) \vee (q \vee r) \vee (p \wedge r) \Leftrightarrow r$

2. a) Define maximal and minimal elements of P, upper and lower bounds of P.
   b) Define lattice. Explain different types of lattices

3. a) Obtain principal conjunctive normal form (PCNF) of the formula $(\neg P \rightarrow R) \wedge (Q \Leftrightarrow P)$
   b) Find DNF of f(x, y, z) = x + yz

4. a) Let $F : R \rightarrow R$ and $g : R \rightarrow R$ where $f(x) = x^2-2$, $g(x) = x+4$, find fog and gof. State whether these functions are injective, surjective, bijective
   b) Prove that the function of f: $A \rightarrow B$ has an inverse if and only if b is bijective

5. a) Show that (G, *) is a group and (a, b) ∈G, then show that $(a*b)^{-1} = b^{-1}*a^{-1}$
   b) State and prove Lagrange's theorem

6. a) Solve $a_n + 5a_{n-1} + 6a_{n-2} = 42(4)^n$
   b) Solve recurrence relation $a_n - 8a_{n-1} + 21a_{n-2} - 18a_{n-3} = 0$

7. a) Find the number of integers between 1 and 1000 inclusive that are divisible by none of 5,6,8
   b) A chess player places Black and White chess pieces (2knights, 2 bishops, 2 rooks, 1 queen, 1king of each color) in first 2 rows of chess board. In how many ways can this be done.

8. a) Find the coeffieient of $x^5y^{10}z^5w^5$ in $(x-7y + 3z -w)^{25}$
   b) State and prove principle of inclusion and exclusion.

9. a) Prove that a graph is a tree iff G is connected and $|V| - 1 = |E|$
   b) Show that 2 simple graphs are isomorphic iff their complements are isomorphic

10. a) State and prove Euler's formula for planar graphs
    b) Define (i) Chromatic number (ii) Hamiltonian graph

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Code No. 11229/O/BL

FACULTY OF INFORMATICS

M.C.A. I-Semester (CBCS) (Main & Backlog) (Old) Examination, July 2021

Subject : Discrete Mathematics

Time : 2 Hours — Max. Marks: 70

Missing data, if any, may be suitably assumed

Note: Answer any Four questions : ($4 \times 17^{1/2} = 70$ Marks)

1. a) What is tautological implication and logical equivalence?
   b) Show that $P \to (Q \to R) \Rightarrow (P \to Q) \to (P \to R)$

2. a) Draw Hasse diagram for following sets under partial ordering relation "Divides" and indicate those which are totally ordered
   (i) {2,6,24} (ii) {3,5,15} (iii) {2,4,8,16}
   b) What is a lattice? Show that operations of meet and join on a lattice are commutative Associative and idempotent.

3. a) Let f : $R \to R$ be given by $f(x) = x^3+4$ Find f^{-1}
   b) If f,g, are two functions such that f: $P \to Q$ and g: $Q \to R$ then Prove that.
   i) If f and g are one-to-one gof is 1-1
   ii) If f,g are onto then gof is onto

4. a) Obtain PDNF of the formula $(\neg P \to R) \wedge (Q \Leftrightarrow P)$
   b) Find CNF of function f(w, x, y, z) = (w + x + y) (x + y' + z) (w + y')

5. a) Show that in a group (G, *) for every a, b∈G $(a*b)^2 = a^2*b^2$ iff (G,*) is an abelian.
   b) If G is a group such that $(ab)^n = a^n b^n$ for 3 consecutive integers, then ab = ba.

6. a) Solve the recurrence relation $a_n = a_{n-1} + n(n+1)/2$, $n \geq 1$
   b) Explain second order linear homogeneous recurrence relation.

7. a) State and prove principle of inclusion and exclusion
   b) How many 6 digit decimal number contain exactly 3 different digits

8. a) How many integers between 1 and 1000 inclusive have sum of digits equal to 10
   b) State and prove multinomial theorem

9. a) Show that a complete graph k_n is planar iff $n \leq 4$
   b) Explain depth first search algorithm.

10. a) State and prove Grinbeng's theorem
    b) Define (i) Complete bipartite graph (ii) Euler Graph

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Code No. 11335/BL

FACULTY OF INFORMATICS

M.C.A. I-Semester (CBCS) (Backlog) (2019 Batch) Examination, July 2021

Subject : Discrete Mathematics

Time : 2 Hours **Max. Marks: 70**

Missing data, if any, may be suitably assumed

Note: Answer any Four questions : **($4 \times 17^{1/2} = 70$ Marks)**

1. a) Show that $PV\ (q \wedge r)$ *and* $(p \vee q) \wedge (p \vee r)$ are logically equivalent.
   b) Prove or disprove the statement that x and y are real numbers $(x^2 = y^2) \Leftrightarrow (x = y)$

2. a) State and prove Demorgan laws
   b) i) Define well-ordering principle. Give an example
   ii) Define Division Algorithm

3. a) If $f : X \to Y$ is a bijective mapping and $I_x : X \to X$, $I_y : Y \to Y$ are identity functions, then show that $foI_x = f = I_y\ of$
   b) If $f : R \to R$ defined by $f(x) = 3x - 2$ then Verify whether f is one – one and onto (or) not?

4. a) Define Binary relation and Equivalence Relation and give on example to each
   b) How many positive integers not exceeding 1000 are divisible by 7 or 11?

5. a) Find the sequence with exponential generating function $f(x) = e^{3x} - 2.e^{2x}$
   b) Find the generating functions for $(1+x)^n$ and $(1-x)^{-n}$, where $n \in Z^+$

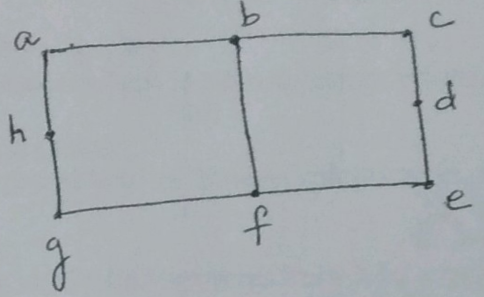
6. Explain linear homogeneous recurrence relations with constant coefficients. Find all solutions of the recurrence relation $a_n = 5.a_{n-1} - 6a_{n-2} + 7^n$

7. a) State and prove Lagrange's theorem
   b) Define Homomorphism and Isomorphism with an example to each

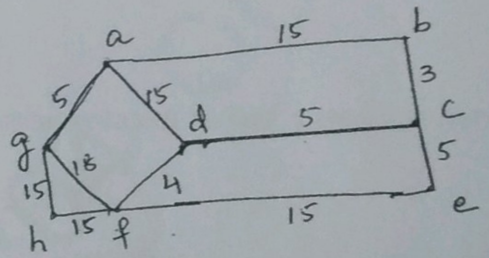
8. a) If $a \equiv b \pmod{m}$, $c \equiv d \pmod{m}$ then show that $a + c \equiv b + d \pmod{m}$ and $ac \equiv bd \pmod{m}$
   b) Find all the solutions to the system of congruence's $x \equiv 2 \pmod{3}, x \equiv 1 \pmod{4}, x \equiv 3 \pmod{5}$

....2

9. Find the Hamilton Cycle and Path for the following graph



10. a) State prime's Algomithm
    b) Find the minimal spanning tree of the given graph



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Code No. 3008

FACULTY OF INFORMATICS

MCA I – Year I – Semester (Backlog) Examination, February 2020

Subject: Discrete Mathematics

Time: 3 Hours Max.Marks: 80

Note: Answer one question from each unit. All questions carry equal marks.

Unit – I

1 a) Construct the truth tables for the following formulas.
i) $P \wedge (p \vee Q)$
ii) $(\neg p \wedge (\neg Q \wedge R) \vee (Q \wedge R) \vee (p \wedge R)$ 10
b) Give an example of a relation which is both symmetric and antisymmetric. 6

OR

2 a) Define binary relation and lattice. 4
b) What are the special properties of binary relations in a set? Explain with an example. 12

Unit – II

3 a) Let X = {1,2,3} and f,g,h, and s be functions from X to x given by
f = {(1,2), (2,3), (3,1)} g = {(1,2), (2,1), (3,3)}
h = {(1,1), (2,2), (3,1)} s = {(1,1), (2,2), (3,3)}
Find fog, gof, fohog, sog, and sos. 10
b) Obtain disjunctive normal forms of
i) $P \wedge (P \rightarrow \varphi)$
ii) $\neg (p \vee \varphi) \rightleftharpoons (p \wedge R)$ 6

OR

4 Use the Karnaugh map representation to find a minimal sum-of-products expression of the following function.
$f(a,b,c,d) = \Sigma(0,5,7,8,12,14)$. 16

Unit – III

5 i) Explain the term "homomorphism". 6
ii) What is second order linear homogeneous recurrence relation? Explain with an example. 10

OR

6 i) what is a "Semi-group"? Give an example for the same. 6
ii) Solve the following recurrence relation using generating functions. 10
$a_n - 5a_{n-1} + 6a_{n-2} = y^n$; $a_o = 1$, $a_1 = 5$, $n \geq 2$.

Unit – IV

7 i) State and prove "Binomial theorem". 12
ii) A palindrome is a word tht reads the same forward or backward. How many a letter palindromes are possible using the English alphabet. 4

OR

8 i) How many integral solutions are there to $x_1+x_2+x_3+x_4+x_5 = 20$ where each $x_1 \geq 2$? 6
ii) State and prove Newtons and Pascals identities. 10

Unit – V

9 i) With reference to graphs explain the term "isomorphism". 8
ii) What is spanning tree? Explain with an example. 8

OR

10 Explain the following terms: 4x4 = 16
i) Complete graph ii) Hamiltonian graph
iii) Binary tree iv) Chromatic numbers

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...mapur, Hyderabad

Code No. 3362/CBCS/N/S

FACULTY OF INFORMATICS

M.C.A. I-Semester (CBCS) (New) (Suppl.) Examination, November 2020

Subject : Discrete Mathematics

Time : 2 Hours Max. Ma

(4x17½=70 Ma

Note: *Answer any four question.*

1. a) State and prove Demorgane law?
   b) S.T if $p \Leftrightarrow q$ them P* ⇔ q* where P* is dual of A.

2. a) S.T $P \rightarrow (q \rightarrow p) \Leftrightarrow \sim P \rightarrow (p \rightarrow q)$
   b) $(p \rightarrow q) \wedge (r \rightarrow q) \Leftrightarrow (p \vee r) \rightarrow q$

3. How many function exists from X to Y for the given set? List the functions, also find whether there functions are surjective, injective or bij ective $X = \{1,2,3\}, Y = \{a, b, c\}$

4. a) State and explain principle of Inclusion and exclusion
   b) What are the properties of Binary relation set? Explain with an example

5. a) Explain summation operator?
   b) Prove that, $D_n - n D_{n-1} = (-1)^n$ for n^3

6. a) Solve the recurrence Relation $a_n - 7a_{n-1} + 10a_{n-2} = 0$, where $a_0 = 4$ $a_1 = 17$
   b) Differentiate Between Homogeneous and non Homogeneous recurrence relctions

7. a) State and Prove Lagranges theorem
   b) What is Semigroup? give an example for the same.

8. a) S.T in a group (G,*) for every $a, b \in G, (a * b)^2 = a^2 * b^2$ iff $(G,*)$ is an abelian grou
   b) If G is a group such that $(ab)^n = a^n b^n$ for there consecutive integer, then ab = ba

9. a) State and Prove Euler's formula
   b) Define spenning tree. Give an example

10. Explain in detail about DFS and BFS algorithm.

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Code No. 3256/CBCS/O/BL

FACULTY OF INFORMATICS

M.C.A. I-Semester (Old) (Backlog) Examination, November 2020

Subject : Discrete Mathematics

Time : 2 Hours **Max. Marks: 70**

Note: Answer any Four Question. **(4 x 17 ½ =70 Marks)**

1. a) Give an example of a relation which is neither reflexive nor irreflexive.
   b) Define Binary relation? What are the properties of Binary Relations in a set.

2. a) What is an equivalence relation? Give an example.
   b) Let X = {2, 3, 6, 12, 24, 36} and the relation $\leq$ be such that $x \leq y$ if x divides y. Draw the Hasse diagram of $(X, \leq)$

3. a) Use the Karnaugh map (K-map) representation to find a minimal sum-of products expression of the following function F (A, B, C, D) = $\sum(0, 1, 2, 3, 13, 15)$
   b) Explain Disjunctive normal forms (DNF) with example.

4. a) $f : R \rightarrow R$ and $g : R \rightarrow R$, R is the set of Real numbers find fog, gof, if f (x) x^2-2 and g (x) = x + 4
   b) What is Principal conjunctive Normal forms (PCNF)? Give an example.

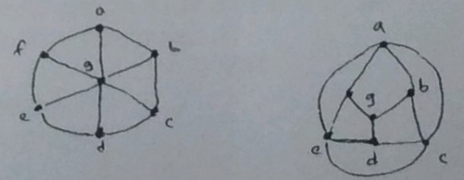
5. a) Solve the recurrence relation
   S (K) – 7S (K-1) + 10 S (K-2) = 0
   Where S(0) = 4
   S(1) = 17
   b) Define Isomorphism.

6. a) Explain Non-homogeneous recurrence relations with example.
   b) Prove that if G is a Cyclic group then G is Abelian?

7. a) State and prove Binomial theorem?
   b) Find the number. of ways of Placing 10 similar balls in 6 numbered boxes.

8. a) State and Prove Principle of Inclusion – Exclusion?
   b) What is the coefficient of $x^3 y^7$ in $(X+Y)^{10}$

9. a) Determine the chromatic numbers of each of the following graphs.



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Code No. 3256/CBCS

FACULTY OF INFORMATICS

M.C.A. I – Semester (CBCS) (Main & Backlog) Examination, February 2020

Subject: Discrete Mathematics

Time: 3 hours **Max. Marks: 70**

Note: Answer ONE question from each unit. All questions carry equal marks.

UNIT – I

1. (a) State and prove Demorgan's Law.
   (b) If relations R and S are both reflexive, show that R∪S and R∩S are also reflexive.

OR

2. (a) Show that (P→Q) is equivalent to (7P∪A).
   (b) What is an Equivalence Relation?
   Let X={1,2,3,.....,7} and
   R={(x,y)/x-y is divisible by 3}
   Show that R is an equivalence relation.

UNIT – II

3. Write short notes on
   (i) Composition of Function (ii) Inverse Function.
   (iii) Disjunctive Normal Form (DNF) (iv) Conjunctive Normal Form (CNF).

OR

4. Use the Kernough Map representation to find a minimal sum-of product expression of the following function.
   F(a,b,c,d) = Σ(0,1,2,3,13,15)

UNIT – III

5. (a) What is a Semigroup? Give an example for the same.
   (b) Let G be a group with identity e.
   Show that if X_2=x for some x in G, then x=e.

OR

6. (a) Explain the following terms.
   (i) Homomorphism (ii) Isomorphism.
   (b) Differentiate between Homogeneous and Non-homogeneous recurrence relations.

UNIT – IV

7. (a) State and prove principle of Inclusion and exclusion.
   (b) Find the number of arrangements of the letters of
   (i) MISSISSIPPI (II) TENNESSEE

OR

8. (a) State and prove "Binomial Theorem".
   (b) How many ways can a person invite 3 of his 6 friends to lunch every day for 20 days?

UNIT-V

9. (a) Show that a complete graph K_n is plener iff n≤4.
   (b) State and prove Euler's Formula.

OR

10. Explain the following terms:
   (i) Complete bipartite graph.
   (ii) Hamiltonian graph.
   (iii) Spanning tree.
   (iv) Chromatic number.

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Code No. 12151/CBCS/S

FACULTY OF INFORMATICS

MCA I Semester (CBCS)(Suppl.) Examination, August 2019

Subject: Discrete Mathematics

Time : 3 Hours

Max. Marks: 70

Note Answer one question from each unit. All questions carry equal marks

Unit-I

1. (a) Prove or disprove the statement that x and y are red numbers, $\left(x^2 = y^2\right) \Leftrightarrow (x = y)$ 7
   (b) How many different equivalence equilibrium relations are there on a set with the elements for n = 1,2,3,4 and 5? 7

OR

2. (a) Let R be a reflexive relation on a set A. Show that R is an equivalence relation with (a, b) and (a, c) in R imply that (b, c) $\in$ R. 7
   (b) Let (A, ≤) be poset, where A is a finite set, Prove that A contains at least one maximal element and at least one minimal element. 7

Unit-II

3. (a) Obtain the sum of products canonical forms of the following Boolean expression: $\overline{x_1} + \left[\left(x_2 + \overline{x_3}\right)\left(\overline{x_2 x_3}\right)\right]\left(x_1 + x_2\overline{x_3}\right)$ 7
   (b) Minimize the following function using the map technique $f : m\ (0,5,10,15) + \Sigma_f\ (1,7,11,13)$ Where Σ_f denotes don't care minterms. 7

OR

4. (a) Prove that if $f : A \to B$ *and* $g : B \to C$ are onto functions then gof is onto 7
   (b) Define Recursion. Explain Recursive functions with suitable examples. 7

Unit-III

5. (a) Suppose that A is the 2x2 matrix $\begin{bmatrix} 3 & -1 \\ 0 & 2 \end{bmatrix}$ for each integer n≥1, find an expression for A^n using recurrence relation. In particular give numerical entries of A^{100} 7
   (b) Solve the following recurrence relation $a_n - 2a_{n-1} = 4^{n-1}$ for n≥1 and a_0 =1, a_1 = 3 7

OR

6. (a) Let G be a group. Show that the function $f : G \to G$ defined by f(a) = a^{-1} is an isomorphism if and only if G is Abelian. 7
   (b) Show that $f : G \to G^1$ is an isomorphism, then $f^{-1} : G^1 \to G$ is also an isomorphism. 7

Unit-IV

7. (a) A multiple choice test has 15 questions and 4 choices for each answer. How many ways can the 15 questions be answered so that (i) exactly 3 answers are correct (ii) at least 3 answers are correct. 7
   (b) How many integers from 1 to 10^6 inclusive are neither perfect squares, perfect cubes, nor perfect fourth powers. 7

OR

8. (a) State and prove the multinational Theorem. 7
   (b) In how letters of the same kind are not in a single block. 7

Unit-V

9. (a) State and prove Grinberg's Theorem. 7
   (b) Show that if G is a simple planar graph with |v| ≥ 1, then the complement of G is non planar. 7

OR

10. (a) Explain Breadth First Search and Depth first search for a spanning tree. 7
    (b) Explain Prime algorithm for minimal spanning tree. 7

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Code No.12114 / BL

FACULTY OF INFORMATICS

MCA I-Year I-Semester (Backlog) Examination, July 2019

Subject: Discrete Mathematics

Time: 3 Hours Max.Marks: 70

Note: Answer one question from each unit. All questions carry equal marks.

Unit – I

1 a) Let m and n be integers. Prove that $n^2=m^2$ if and only if m=n or m = -n using methods of proof. If $p\rightarrow q$ is false, can you determine the truth value of $(\sim p)\vee(p\rightarrow q)$? Explain your answer.

b) Define the relation C on ZxZ by (a,b)C(s,d) iff a ≤c and b≤d. Prove that C is a lattice ordering on ZxZ.

OR

2 a) Let A be the set of non zero rational numbers. F or a,b ϵ A, define aRb is a/b is an integer. Prove that R is reflexive and transitive bugt not symmetric, anti-symmetric or asymmetric.

b) Prove that isomorphism is an equivalence relation on digraphs.

Unit – II

3 a) Minimize the following switching function
Σm (0, 1, 4, 5, 6, 11, 12, 14, 16, 20, 22, 28, 30, 31).

b) Simplify the following Boolean expression using laws of Boolean algebra
$\overline{(x+y)} + \overline{\overline{x}+\overline{y}}$

OR

4 a) Let f: $A\rightarrow B$ be a function with finite domain and range. Suppose that |Dom (f)| = n and |Range (f)| = m. Prove that f f is one to one, then m=n.

b) Explain the hashing functions with suitable examples.

Unit – III

5 a) Find the complete solution to $a_n-10a_{n-1}+25a_{n-2} = 2^n$ where $a_o = 2/3$ and $a_1 = 3$.

b) Solve the following recurrence relation using generating functions
$a_n - 5a_{n-1} + 6a_{n-2} = y^n$; $a_o=1$, $a_1=5$, n≥2.

OR

6 a) Let G_1 and G_2 be groups. Let f: $G_1xG_2\rightarrow G_2$ be the homomorphism from G_1xG_2 on to G_2 given by $f((g_1\ 9_2))=g_2$. Compute Ker(f).

b) Let G be a group with identity e. Show that if $x_2 = x$ for some x in G, then x=e.

Unit – IV

7 a) How many integral solutions are there of $x_1+x_2+x_3+x_4 = 20$ if $1 \le x_1 \le 6$, $1 \le x_2 \le 7$, $1 \le x_3 \le 8$ and $1 \le x_4 \le 9$.

b) Let D_n be the number of derangements of {1,2, …,n}. obtain the formula for D_n using principle of inclusion and exclusion.

OR

8 a) Determine the coefficient of x^5 in $(a+bx+cx^2)^{10}$.

b) State and prove Newtons and Pascals Identities.

Unit – V

9 a) Show that two simple graphs are isomorphic if and only if their complements are isomorphic.

b) Show that a simple graph with $|V| = n$ is not bipartite if $|E| > \lfloor n^2/4 \rfloor$.

OR

10 a) If G is a connected plane graph, then $|V| - |E| + |R| = 2$.

b) A simple graph with n vertices ($n \geq 3$) in which each vertex has degree at least n/2 has a Hamiltonian cycle.

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Code No. 3827 / S

FACULTY OF INFORMATICS

M.C.A. I-Semester (CBCS) (Suppl.) Examination, August 2017

Subject : Discrete Mathematics

Time : 3 Hours Max. Marks: 70

Note: Answer one question from each unit. All questions carry equal marks.

Unit – I

1 Translate each of the given statements into symbols using quantifiers, variables and predicate symbols.
- (i) There is a student who likes Mathematics but not History
- (ii) Not all numbers rational
- (iii) Note every graph is planar
- (iv) If x is rational implies that x is real
- (v) There is an integer x such that x is odd and x is prime
- (vi) For all integers x, such that x is odd and x is prime

OR

2 Define the terms:
(a) Welt ordering sets (b) Lattices (c) Ordered sets (d) Bounded lattices
(e) Distributive lattices and (f) Complemented lattices

Unit – II

3 (a) Write about Recursion functions and find the domain of the function f(x) = $\sqrt{2x-x^2}$.
(b) Let f be a subset of A x B. When does f define a function from A into B? Given example.

OR

4 (a) Find Disjunctive Normal Form (DNF) and conjunctive Normal Form (CNF) for the Boolean function f(x, y, z, w) = (xw + yzw) *y + y'+z1w) (product of sums).
(b) Explain switching networks with examples.

Unit – III

5 (a) Define first order linear Recurrence Relation.
(b) If F_n satisfies the Fibonacci relation Fn = $F_{n-1} + F_{n-2}$ for $n \geq 2$ with $F_o = 0$ and $F_1 = 1$. Find the general solution.

OR

6 (a) Define a group homomorphism. Also write about group isomorphism.
(b) Show that any cyclic group is isomorphic either to the integer Z under addition or to Z i.e., the integers under addition modulo.

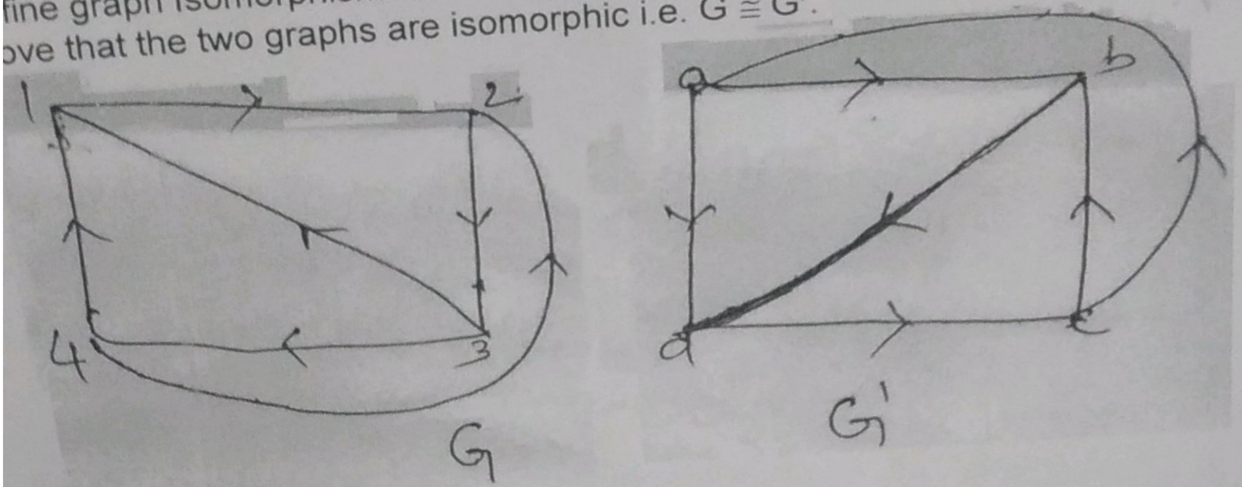
Unit – IV

7 (a) Discuss about various operations on sets with their respective Venn diagrams.
(b) Compute $\binom{8}{5}$

OR

8 (a) Write about Multinomial coefficients.
(b) Compute (i) $\binom{7}{2\ \ 3\ \ 2}$ and (ii) $\binom{8}{4\ \ 2\ \ 2\ \ 0}$

fine graph Isomorphism for directed and undirected graphs.
ove that the two graphs are isomorphic i.e. $G \cong G'$.



OR

(a) Explain what is meant by spanning tree.
(b) Give two algorithms to find minimal spanning tree of a finite connected labeled graph G.

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Code No: 12151/CBCS

FACULTY OF INFORMATICS

MCA I – Semester (Main) Examination, Dec/Jan 2018-19

Subject: Discrete Mathematics

Time: 3 Hours **Max. Marks: 70**

Note: Answer one question from each unit. All questions carry equal marks.

Unit I :

1) Prove that the following are tautology.
   a) $[\sim(p \vee q) \vee (\sim p) \wedge q] \vee p$ 7
   b) $\{[p \rightarrow (q \vee r) \wedge (\sim p)\} \rightarrow (p \rightarrow r)$ 7

OR

2) Write about Binary relation and properties with an example. 14

Unit II :

3) Explain principal Normal forms conjunctive Normal form (CNF) and disjunctive Normal form. Find the CNF and DNF for the Boolen function f(x,y,z,w)(yz+z'w) 14

OR

4) Explain switching networks and logic circuits with an example. 14

Unit III :

5) Explain the Recurrence Relation and the types of various Recurrence Relations. 14

OR

6) a) Define group homomorphism and group isomorphism. 5
   b) Show that any cyclic group is isomorphism either to the integer Z under addition (or) to z_m i.e., the integers under addition modulo m. 9

Unit IV :

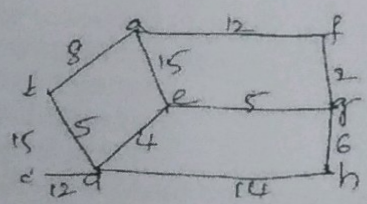
7) Discuss about permutations with repetitions and permutations without repetition with an examples. 14

OR

8) State and Prove Binomial theorem. 14

Unit V :

9) a) Define spanning sub-graph. 2
   b) Find the minimal spanning tree for the following graph. 12



OR

10) a) Define Binary tree and complete binary tree. 4
    b) Draw a binary search tree for {7,33,4,65,40,10,5,12,11} 10

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1325-17-862-018

Code No. 878 / CBCS

FACULTY OF INFORMATICS

M.C.A. I-Semester (CBCS) (Main & Backlog) Examination, January / February 2018

Subject: Discrete Mathematics

Time: 3 Hour **Max.Marks: 70**

Note: Answer one question from each unit. All questions carry equal marks.

Unit – I

1 a) Prove that (AUB)^(~A)^(~B) is a contradictory.
b) Construct the truth table for ~(p^q).

OR

2 a) What is a binary relation? How to represent it by groups?
b) Define Tautology with example.

Unit – II

3 a) What is hash function? Define with example.
b) Define function and its properties.

OR

4 a) Consider the lattices D6 = {1,2,3,6} and D30 ={1,2,3,5,6,10,30} and show that their exists a homomorphism f between D6 and D30.
b) Write properties of Boolean algebra.

Unit – III

5 a) Solve the recursive relation $f_n = 5f_{n-1} - 6f_{n-2}$ where $F_o = 1$ and $F_1=4$.
b) What is linear recursive relations with example?

OR

6 a) Prove that cyclic group of same order are isomorphic.
b) Define finite and infinite groups.

Unit – IV

7 a) How many different arrangements are there for the letter a,a,a,b,b?
b) Define the Set Builder notation.

OR

8 a) State and prove the theorem of Pascal's identity.
b) Let A, B and C be sets, show that AU(B^C) = (CUB)^A.

Unit – V

9 a) Define the following terms:
a) Even and Odd vertex
b) Degree of vertex
c) Undirected graph
d) Degree of graph
b) Define Graph? Explain complete graph with example.

OR

10 a) What is a plannar graph? Write the properties of plannar graph.
b) Define Binary tree with example.

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