Hall Ticket No:

**MALLA REDDY ENGINEERING COLLEGE (AUTONOMOUS)**

**II B.Tech I Semester (MR20-2021-22 Batch) Mid Term Examinations-I, December-2021**

Branch: **CSE, AIML,CS,DS AND IOT** Time: **90 Mins** Date:

**Answer ALL the Questions**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S**  **NO.** | **Questions** | **Marks** | **BT Level** | **CO** |
|  | **Module-1** |  |  |  |
| **1** | Obtain the PCNF OF | 5 | L3 | 1 |
| **2** | Prove the Logical equivalence without using truth table | 5 | L3 | 1 |
| **3** | Explain briefly different connectives. Construct the truth table for | 5 | L2 | 1 |
| **4** | Translate the following statements in symbolic logic  Some integers are divisible by 5  All real numbers are complex numbers  Every real number is rational or irrational but not both | 5 | L1 | 1 |
| **5** | Explain about Quantifers and Predicates. | 5 | L2 | 1 |
| **6** | Define Tautology, Contradiction and Contingency. Show that the formula  is a Tautology using truth table. | 5 | L1 | 1 |
| **7** | Obtain a conjunctive normal form of | 5 | L3 | 1 |
| **8** | Obtain the PDNF of | 5 | L3 | 1 |

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| **S**  **NO.** | **Questions** | **Marks** | **BT Level** | **CO** |
|  | **Module-2** |  |  |  |
| **1** | Show that the following premises are inconsistent**.**  i)If jack misses many classes through illness, then he fails high school.  ii) If fails high school, then he is uneducated.  iii) If jack reads a lot of books, then he is not uneducated.  iv) Jack misses many classes through illness and reads a lot of books. | 5 | L6 | 2 |
| **2** | Show that from  The conclusion follows | 5 | L5 | 2 |
| **3** | Demonstrate that R is a valid inference from the premises  , and P. | 5 | L2 | 2 |
| **4** | Discuss about Hasse diagram. Let X= {2,3,6,12,24,36}and the relation ≤ be such that x≤y if x divides y then draw the required Hasse diagrams. | 5 | L2 | 2 |
| **5** | Demonstrate different properties of a binary relation | 5 | L2 | 2 |
| **6** | Using indirect method of proof show that leads to conclusion r. | 5 | L3 | 2 |
| **7** | Verify the validity of the following argument “every living thing is a plant or an animal. Joe’s gold fish is alive and it is not a plant. All animals have hearts. Therefore Joe’s gold fish has a heart. | 5 | L6 | 2 |
| **8** | Explain about Lattice and write some properties. | 5 | L2 | 2 |

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| **S**  **NO.** | **Questions** | **Marks** | **BT Level** | **CO** |
|  | **Module-3** |  |  |  |
| **1** | Let R = { ( 1, 2), (2, 1), (3, 2), (3, 4), (2, 2)} and S = { (4, 2), (2, 3), (2, 5), (3, 1), (1, 3)}find and | 5 | L3 | 2 |
| **2** | Discuss about Inverse function, composition function and Recursive function with examples | 5 | L1 | 2 |
| **3** | Let f: R→R and g: R→R, where R is the set of real numbers. Find and where f(x) = x2 and g(x) = x+4. State where these functions are injective, surjective, bijective? | 5 | L1 | 2 |
| **4** | If then find and show that | 5 | L3 | 2 |

**Prepared By Name:**

**Signature: HOD Signature**

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**MALLA REDDY ENGINEERING COLLEGE (AUTONOMOUS)**

**II B.Tech I Semester (MR20-2021-22 Batch) Mid Term Examinations-I, December-2021**

Subject Code & Name: A0507- **DISCRETE MATHEMATICS** Max. Marks: **25M**

Branch: **CSE, AIML,CS,DS AND IOT** Time: **90 Mins** Date:

**Answer ALL the Questions:**

|  |  |  |
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| S.No | Questions | Ans |
| 1 | A \_\_\_\_\_\_\_\_is a declarative sentence that is either true or false  a) Proposition b) Statement c) Both d) None | **C** |
| 2 | Connectives are used for making   1. combined prepositions b) compound propositions   c) Symbolic purpose d) All the above | **B** |
| 3 | indicates |  |
|  | If p then q b)If and only if q c) p and q d) p or q | **A** |
| 4 | indicates  a)If p then q b) If and only if q c) P and q d) P or q | **B** |
| 5 | are when it will be false  a) Both statements are true b) Both statements are false c) Either one of the statement is true d) None | **B** |
| 6 | are when it will be true  a) Both statements are true b) Both statements are false c) Either one of the statement is true d) All the above | **A** |
| 7 | 1. Contingency b)False c)Tautology d) Contradiction | **C** |
| 8 | 1. Contingency b)False c)Tautology d) Contradiction | **D** |
| 9 | 1. b)  c)  d) All the above | **A** |
| 10 | A product of the variables and their negations in a formula is  a)elementary product b) elementary sum c) elementarty product and sum d) None | **A** |
| 11 | A sum of the variables and their negations is called an  a)elementary product b) elementary sum c) elementarty product and sum d) None | **B** |
| 12 | Today is a week day (D) and I am a student(S)   1. b)  c)  d) | **B** |
| 13 | 1. P b) Q c) T d) F | **A** |
| 14 | is a   1. Wff b) Statement c) Symbol d) None | **D** |
| 15 | 1. P b) Q c) Both d) None | **A** |
| 16 | 1. b)  c)  d) All the above | **D** |
| 17 | 1. b) P c) Q d) | **A** |
| 18 | P F   1. F b) T c) P d) All the above | **A** |
| 19 | P   1. T b) P c) F d) None | **C** |
| 20 | P (P Q)   1. Q b) P c) P Q d) P Q | **B** |
| 21 | ¬ (P Q)   1. ¬ (P Q) b) (¬P ¬Q) c) (¬P ¬Q) d) (P Q) | **C** |
| 22 | |  |  | | --- | --- | | (P → Q) ∧ (Q → R) |  | | 1. P → Q b) Q → R c) P → R d) R → P |  | |  |  | |  |  | |  |  | | **C** |
| 23 | P→ Q   1. ¬Q → ¬P b) ¬Q → P c) Q → ¬P d) Q → P | **A** |
| 24 | 1. For P,Q statements how many min terms is possible | **B** |
| 25 | DNF STANDS FOR   1. Distributed normal form b) Disjunctive normal form c) Disk normal form d) Delay normal form | **B** |
| 26 | PCNF stand for   1. Principled conjunctive normal form b) Principal conjunctive normal form c) Principle conjunctive normal form   d) Principal conjunctive normal form | **D** |
| 27 | For P,Q statements how many min terms is possible   1. 2 b) 4 c) 6 d) 8 | **B** |
| 28 | For P,Q ,R statements how many max terms is possible   1. 2 b) 4 c) 6 d) 8 | **D** |
| 29 | For the P,Q statements min terms are   1. P∧ ¬Q b) ¬P ∧ Q c) ¬P ∧ ¬Q d) All the above | **D** |
| 30 | For the P, Q statements max terms are   1. ¬P ¬Q b) ¬P Q c) PVQ d) All the above | **D** |
| 31 | ¬ (P → Q )   1. P b) ¬Q c) Both d) None | **A** |
| 32 | ¬(P Q) Equivalence Value   1. P ¬Q b) ¬P Q c) P Q d) None | **A** |
| 33 | P Q Equivalent Value   1. (P → Q) ∧ (Q → P) b) (P∧ Q) (¬Q ∧¬P) c) (¬P Q) ∧ (¬Q P) d) All the above | **D** |
| 34 | P∧P   1. P b) Q c) Both d) None | **A** |
| 35 | Conjunction of two tautologies is a ………………….   1. Tautology b) Contradiction c) Contingency d) None | **A** |
| 36 | (P ∧ Q) → P is a…………   1. Tautology b) Contradiction c) Contra positive d) None | **C** |
| 37 | P ∧ (Q R)=   1. (P ∧ Q) (P ∧ R) b) P (Q ∧ R) c) (P Q) ∧ (P R) d) None | **A** |
| 38 | Disjunction of two tautologies is a   1. Tautology b) Contradiction c) Contra positive d) None | **A** |
| 39 | P (P ∧ (P Q)) is logically equivalent to   1. P b) Q c) P Q d) P ∧ Q | **B** |
| 40 | The negation of “Some birds can fly” is   1. All birds can fly b) All birds can fly c) Their exist only few birds can fly d) One bird can fly | **A** |
| 41 | The negation of (∀x)(P(x) Q(x)) is   1. (x) P(x) Q(x) b) (∀ (x) P(x) Q(x) c) P(x) Q(x) d) ¬P(x) Q(x) | **A** |
| 42 | The negation of (x)(P(x)→Q(x)) is   1. ¬P(x) → Q(x) b) (x) P(x) → Q(x) c) P(x)→ ¬Q(x) d) None | **B** |
| 43 | The symbolic form of the statement “ All roses are beautiful “   1. x(R(x) → Q(x)) b) R(x) → Q(x) c) x(R(x) → Q(x)) d) None | **C** |
| 44 | CNF STANDS FOR  a)Distributed normal form b) Conjunctive normal form c) Disk normal form d) Delay normal form | **B** |
| 45 | (P ∧ Q) → R   1. (P ∧ (Q ∧ R)) b) (P → (Q V R)) c) (P  (Q → R)) d) (P → (Q → R)) | **D** |
| 46 | The equivalent value of the statement formula (P (~ P ∧ Q)) is  a) ( ~ P ∧ ~ Q) b) ( P ∧ Q) c) ( ~P ∧ ~ Q) d) ( ~ P ∧ Q) | **A** |
| 47 | Jack (J) and Jill (J)went up the hill translate to the symbolic form   1. J&J b) JVJ c) J^J d) None | **C** |
| 48 | If P(x): x is a prime number , then which of the following is true   1. P(1) b) P(5) c) P(8) d) P(9) | **B** |
| 49 | (P Q) ∧ ¬P === > Q   1. Modus ponens b) Modus tollens c) Hypothetical syllogism d) disjunctive syllogism | **D** |
| 50 | ¬(P→Q) is logically equivalent to   1. ¬ P ∧ Q b) P Q c) P ∧ ¬Q d) None | **C** |
| 51 | A \_\_\_\_\_ is simply a set of ordered pairs.   1. Relation b) Set c) Order d) None | **A** |
| 52 | A \_\_\_\_\_\_\_ is an ordered collection of objects.   1. Relation b) Function c) Set d) Proposition | **C** |
| 53 | What is the Cartesian product of A = {1, 2} and B = {a, b}?   1. {(1, a), (1, b), (2, a), (b, b)} b) {(1, 1), (2, 2), (a, a), (b, b)}   c) {(1, a), (2, a), (1, b), (2, b)} d) {(1, 1), (a, a), (2, a), (1, b)} | **C** |
| 54 | Which of the following two sets are equal?  a) A = {1, 2} and B = {1} b) A = {1, 2} and B = {1, 2, 3} c) A = {1, 2, 3} and B = {2, 1, 3} d) A = {1, 2, 4} and B = {1, 2, 3} | **C** |
| 55 | The relation { (1,2), (1,3), (3,1), (1,1), (3,3), (3,2), (1,4), (4,2), (3,4)} is   1. Reflexive b) Transitive c) Symmetric d) Asymmetric | **B** |
| 56 | Hasse diagram are drawn   1. Partially ordered sets b) Lattices c) Boolean algebra d) None of these | **A** |
| 57 | propositional function is a statement containing  a) Variables b) Statements c) Sentences d) Logics | **A** |
| 58 | If a formula contains no occurrences of free variables we call it a   1. Sentence b) Variables c) Statements d) Logics | **A** |
| 59 | 1. P b)  c)  d) | **A** |
| 60 | 1. b)  c)  d) | **B** |
| 61 | 1. P b)  c) Q d) | **C** |
| 62 | 1. b)  c)  d) | **D** |
| 63 | 1. b)  c)  d) | **A** |
| 64 | |  |  | | --- | --- | | a) Q b) P c)  d) |  | | **A** |
| 65 | 1. b)  c)  d) | **B** |
| 66 | 1. b)  c)  d) | **D** |
| 67 | Properties of Binary Relations in no’s   1. 2 b) 3 c) 4 d) 1 | **B** |
| 68 | Properties of Binary Relations in no’s   1. for every x Є X, x R x b) for every x Є X, y R x c) for every x Є X, x R y d) None | **B** |
| 69 | Example for reflexive property | **C** |
| 70 | Symmetric Means  a) for every x or y in X, whenever  x R X, then y R Y b) for every x , y in X, whenever  x R Y, then y R X c) for every x and y in X, whenever  x R y, then y R x d) None | **C** |
| 71 | Example for Symmetric   1. The relation equality of set is symmetric b) The relation of similarity in the set of triangles in a plane is symmetric c) The relation of being a sister is not symmetric in the set of all people d) All the above | **D** |
| 72 | Transitive means   1. for every x, y, and z are in X,  whenever x R y and y R z , then x R z b) for every x, y, and z are in X,  whenever x R y and z R y , then y R z c) Both d) None | **A** |
| 73 | Ir reflexive Means   1. for every x Є X , (x, x) Є X b) for every x Є X , (x, x) Є X c) Both d) None | **B** |
| 74 | anti symmetric means  a) for every x and y in X,  whenever x R y and y R x, then x = y b) for every x and y in X, whenever x R y and y R x, then x = y c) All the above d) None | **A** |
| 75 | equivalence relation means  a)Reflexive b)Transitive c)Symmetric d)All the above | **D** |
| 76 | partial order relation  a) irreflexive, anti symmetric, and transitive b) reflexive, symmetric, and transitive. c) reflexive, anti symmetric, and transitive. d)None | **C** |
| 77 | Hasse diagram is a \_\_\_\_ of a poset  a)Diagram b)Graph c)Sub graph d)Loops | **A** |
| 78 | Any object belonging to a set is called a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  a)Member set b)Elementary c)A and B d)None | **C** |
| 79 | If A= {1,2,3,4} and R={(1,1),(2,2), (3,3),(4,4), (1,2),(2,1)} then R is  a)Reflexive and symmetric b) Reflexive but not symmetric c) symmetric but not transitive d) Ir reflexive and symmetric | **A** |
| 80 | A relation R is compatible if it is  a) Reflexive and symmetric b) Reflexive but not symmetric c) symmetric but not transitive d) Ir reflexive and symmetric | **A** |
| 81 | If f: Z🡪 Z, f(x)=2x+1 then f is \_\_\_\_\_\_  a)\_ A function but not one – one b) One – one and onto function c) One – one but not onto function d) Onto but not onto | **B** |
| 82 | The non-zero set of integers under multiplication is  a) A binary operation b) An elementary group c) A monoid d) A group | **C** |
| 83 | The inverse of 9 in the group of addition modulo 12 is  a)3 b)5 c)7 d)10 | **A** |
| 84 | The relation { (1,2), (1,3), (3,1), (1,1), (3,3), (3,2), (1,4), (4,2), (3,4)} is  a) Reflexive b)Transitive c)Symmetric d)Asymmetric | **C** |
| 85 | A partial ordered relation is transitive, reflexive and  a)Antisymmetric b)Bisymmetric c)Anti Reflexive d)Asymmetric | **A** |
| 86 | If f: Z🡪 Z,  then =\_\_\_\_\_\_\_\_\_\_\_\_\_  a)  b)  c)  d)None | **A** |
| 87 | Let S={1,3,5,7,9,11,13,15,17,19,21}. What is the smallest integer N >0 such that for any set of N integers, chosen from S, there must be two distinct integers that divide each other?  a)10 b)7 c)9 d)8 | **D** |
| 88 | Consider the divides relation, m|n, on the set A={2,3,4,5,6,7,8,9,10}. The cardinality of the covering relation for this partial order relation (i.e., the number of edges in the Hasse Diagram) is  a)4 b)6 c)5 d)7 | **D** |
| 89 | Which of the following is not a well formed formula?  a)  b) c)  d) | **B** |
| 90 | The set O of odd positive integers less than 10 can be expressed by \_\_\_\_\_\_\_\_\_\_\_ .  a) {1, 2, 3} b) {1, 3, 5, 7, 9} c) {1, 2, 5, 9} d) {1, 5, 7, 9, 11} | **B** |
| 91 | Power set of empty set has exactly \_\_\_\_\_ subset.  a)One b)Two c)Zero d)Three | **A** |
| 92 | What is the Cardinality of the Power set of the set {0, 1, 2}.  a)8 b)5 c)7 d)6 | **A** |
| 93 | The members of the set S = {x | x is the square of an integer and x < 100} is  a) {0, 2, 4, 5, 9, 58, 49, 56, 99, 12} b) {0, 1, 4, 9, 16, 25, 36, 49, 64, 81} c) {1, 4, 9, 16, 25, 36, 64, 81, 85, 99} d) {0, 1, 4, 9, 16, 25, 36, 49, 64, 121} | **B** |
| 94 | A function is said to be \_\_\_\_\_\_\_\_\_\_\_\_\_\_, if and only if f(a) = f(b) implies that a = b for all a and b in the domain of f.  a) One-to-many b) One-to-one c) Many-to-many d) Many-to-one | **B** |
| 95 | The function  from the set of integers to itself is onto. Is it True or False?  a)True b)False c)Both d)None | **A** |
| 96 | The inverse of function is \_\_\_\_\_\_\_\_\_\_.  a) b)  c)  d) | **B** |
| 97 | The g -1({0}) for the function g(x)= ⌊x⌋ is \_\_\_\_\_\_\_\_.  a) {x | 0 ≤ x < 1} b) {x | 0 < x ≤ 1} c) {x | 0 < x < 1} d) {x | 0 ≤ x ≤ 1} | **B** |
| 98 | The function f(x) = x3 is bijection from R to R. Is it True or False?  a)True b)false c)Both d)None | **A** |
| 99 | Let f and g be the function from the set of integers to itself, defined by f(x) = 2x + 1 and g(x) = 3x + 4. Then the composition of f and g is \_\_\_\_\_\_\_\_.  a)6x+9 b)6x+7 c) 6x+6 d)6x+8 | **A** |
| 100 | The domain of the function that assign to each pair of integers the maximum of these two integers is \_\_\_\_\_\_\_\_.  a)N b)Z c) Z +  d) Z+ X Z+ | **D** |
| 101 | A function is a special type of  a)Graph b)Relation c)Pair d)Sets | **B** |
| 102 | Injective function means  a)1-1 b)1-2 c)n-1 d)1-n | **A** |
| 103 | Surjective  a)Onto b)One-one c)Into d)All the above | **A** |
| 104 | Bijective means  a) A maping is both 1-n and onto b) A mapping is both n-1 and onto c) A mapping is both 1-1 and onto d)None | **C** |
| 105 | If  and , where A= {1, 2, 3}, are given by f = {(1, 2), (2, 3), (3, 1)}  and   g = {(1, 3), (2, 2), (3, 1)} Then =  a) {(1, 2), (2, 1), (3, 3)}, b) {(1, 1), (2, 2), (3, 3)} c) {(1, 1), (2, 3), (3, 2)} d) {(1, 3), (2, 1), (3, 2)} | **A** |
| 106 | If and , where A= {1, 2, 3}, are given by f = {(1, 2), (2, 3), (3, 1)}  and   g = {(1, 3), (2, 2), (3, 1)} Then =  a) {(1, 1), (2, 3), (3, 2)} b) {(1, 1), (2, 2), (3, 3)} c) {(1, 3), (2, 1), (3, 2)} d) {(1, 2), (2, 1), (3, 3)}, | **A** |
| 107 | If and , where A= {1, 2, 3}, are given by f = {(1, 2), (2, 3), (3, 1)} and   g = {(1, 3), (2, 2), (3, 1)} Then =  a) {(1, 3), (2, 1), (3, 2)} b) {(1, 1), (2, 2), (3, 3)} c) {(1, 1), (2, 3), (3, 2)} d) {(1, 2), (2, 1), (3, 3)}, | **A** |
| 108 | If  and , where A= {1, 2, 3}, are given by f = {(1, 2), (2, 3), (3, 1)}   and      g = {(1, 3), (2, 2), (3, 1)} Then find  a) {(1, 1), (2, 2), (3, 3)} b) {(1, 3), (2, 1), (3, 2)} c) {(1, 1), (2, 3), (3, 2)} d) (1, 2), (2, 1), (3, 3)}, | **A** |
| 109 | ,then =  a)  b)  c)  d)All the above | **D** |
| 110 | Inverse functions means  a)  be a one-to-one and onto mapping b) be a one-to-one and into mapping c) be a many-to-one and onto mapping d)None | **A** |
| 111 | ,  =  a)  b)  c)  d)All the above | **A** |
| 112 | =  a)  b)  c)  d)none | **A** |
| 113 | Identity function means  a)  b)  c)  d) | **D** |
| 114 | |  |  | | --- | --- | | , ,  a)  b)  c)  d) None |  | | **A** |
| 115 | , then A is called  a)Daomain b)Co-domain c)Image d)Preimage | **A** |
| 116 | , then B is called  a)Daomain b)Co-domain c)Image d)Preimage | **B** |
| 117 | and , where A= {1, 2, 3}, are given by f = {(1, 2), (2, 3), (3, 1)}   and      g = {(1, 3), (2, 2), (3, 1)},  a) {(1, 1), (2, 2), (3, 3)} b) {(1, 3), (3, 1), (1, 2)} c) {(1, 2), (2, 1), (3, 3)} d)None | **C** |
| 118 | ,  and , =  a)  b) c)  d) | **A** |
| 119 | , then =  a)  b)  c)  d)All the above | **D** |
| 120 | S={( 1,-1),( 2,-1),( 3,0)}is a  a)Function b)Sets c)Both d)None | **A** |
| 121 | Identity function represents  a)S={(1,2),(2,1),(2,2)} b) S={(1,1),(2,2),(3,3)}  c) S={(1,3),(2,2),(3,1)} d) S={(1,2),(2,3),(3,1)} | **B** |
| 122 | Constant function represents  a)S={(1,b),(2,c),(3,c)} b) S={(1,a),(2,b),(3,a)}  c) S={(1,c),(2,c),(3,c)} d) S={(1,c),(2,b),(3,a)} | **C** |
| 123 | Onto function represents  a)S={(1,a),(2,b),(3,c),(4,d)} b) S={(1,a),(2,b),(3,c),(d)}  c) S={(1,a),(2,b),(3,a)} d) None | **A** |
| 124 | , =  a)  b)  c)  d) All the above | **C** |
| 125 | R={( 1,-1),(1,0),( 2,-1),( 3,0)}is a  a) Function b) Not a function c) Sets d) None | **B** |

**Prepared By Name:**

**Signature: HOD Signature**