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 5All real numbers are complex numbersEvery 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 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **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 fromThe 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 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **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**

Hall Ticket No:

**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:**

|  |  |  |
| --- | --- | --- |
| S.No |  Questions | Ans |
| 1 | A \_\_\_\_\_\_\_\_is a declarative sentence that is either true or falsea) Proposition b) Statement c) Both d) None | **C** |
| 2 | Connectives are used for making1. 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 falsea) 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 truea) 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 isa)elementary product b) elementary sum c) elementarty product and sum d) None | **A** |
| 11 | A sum of the variables and their negations is called ana)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 a1. 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 $∧$ $¬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 FOR1. Distributed normal form b) Disjunctive normal form c) Disk normal form d) Delay normal form
 | **B** |
| 26 | PCNF stand for1. 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 possible1. 2 b) 4 c) 6 d) 8
 | **B** |
| 28 | For P,Q ,R statements how many max terms is possible1. 2 b) 4 c) 6 d) 8
 | **D** |
| 29 | For the P,Q statements min terms are1. P∧ ¬Q b) ¬P ∧ Q c) ¬P ∧ ¬Q d) All the above
 | **D** |
| 30 | For the P, Q statements max terms are1. ¬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 Value1. P $⇔$ ¬Q b) ¬P $⇔$ Q c) P $⇔$ Q d) None
 | **A** |
| 33 | P $⇔$ Q Equivalent Value1. (P → Q) ∧ (Q → P) b) (P∧ Q) (¬Q ∧¬P) c) (¬P $∨$ Q) ∧ (¬Q $∨$ P) d) All the above
 | **D** |
| 34 | P∧P1. 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 a1. Tautology b) Contradiction c) Contra positive d) None
 | **A** |
| 39 | P $∨$ (P ∧ (P $∨$ Q)) is logically equivalent to1. P b) Q c) P $∨$ Q d) P ∧ Q
 | **B** |
| 40 | The negation of “Some birds can fly” is1. 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)) is1. $∃$ (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)) is1. ¬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 FORa)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)) isa) ( ~ 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 form1. 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 true1. P(1) b) P(5) c) P(8) d) P(9)
 | **B** |
| 49 | (P $∨$ Q) ∧ ¬P === > Q1. Modus ponens b) Modus tollens c) Hypothetical syllogism d) disjunctive syllogism
 | **D** |
| 50 | ¬(P→Q) is logically equivalent to1. ¬ 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)} is1. 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 containinga) Variables b) Statements c) Sentences d) Logics | **A** |
| 58 | If a formula contains no occurrences of free variables we call it a1. 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’s1. 2 b) 3 c) 4 d) 1
 | **B** |
| 68 | Properties of Binary Relations in no’s1. 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 Meansa) 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 Symmetric1. 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 means1. 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 Means1. 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 meansa) 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 meansa)Reflexive b)Transitive c)Symmetric d)All the above | **D** |
| 76 | partial order relationa) 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 poseta)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 isa)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 isa) 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 isa)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)} isa) Reflexive b)Transitive c)Symmetric d)Asymmetric | **C** |
| 85 | A partial ordered relation is transitive, reflexive anda)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) isa)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} isa) {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 meansa)1-1 b)1-2 c)n-1 d)1-n | **A** |
| 103 | Surjectivea)Onto b)One-one c)Into d)All the above | **A** |
| 104 | Bijective meansa) 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 meansa)  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 meansa)  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 calleda)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 representsa)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 representsa)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 representsa)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 aa) Function b) Not a function c) Sets d) None | **B** |

**Prepared By Name:**

 **Signature: HOD Signature**