SIDDHARTHA INSTITUTE OF SCIENCE &TECHNOLOGY:: PUTTUR
DEPARTMENT OF MATHEMATICS

DISCRETE MATHEMATICS

QUESTION BANK

UNIT-1
Mathematical Logic

1. a) Define statement and atomic statement. [2M]

b) Define tautology with examples. [2M]

c) Write the following statement in symbolic form, If either Jerry takes calculus or Ken takes sociology, then Larry will take English. [2M]

d) Write the negation of the statement "Today is Friday" and express this in simple English.[2M]

e) Define Universal Quantifier with example. [2M]

2. a) Construct the truth table for the following formula $\neg(\neg P \vee \neg Q)$ [5M]

b) Construct the truth table to Show that $\neg P \wedge (Q \wedge P)$ is a contradiction. [5M]

3. a)Define NAND,NOR & XOR and give their truth tables. [5M]

b) Define Exclusive & Inclusive disjunctions with an examples. [5M]

4. a)Show that $S \vee R$ is a tautologically implied by $(P \vee Q) \wedge (P \to R) \wedge (Q \to S)$ [5M]

b) Show that $(P \to Q) \wedge ((Q \to R) \Rightarrow (P \to Q)$ [5M]

5. a) What is principle disjunctive normal form? Obtain the PDNF of

$P \to ((P \to Q) \wedge \neg(\neg Q \vee \neg P))$ [5M]

b) What is principle conjunctive normal form? Obtain the PCNF of

$(\neg P \to R) \wedge (Q \leftrightarrow P)$ [5M]

6. a)Prove that $(\exists x)(P(x) \wedge Q(x)) \Rightarrow (\exists x)P(x) \wedge (\exists x)Q(x)$ [5M]

b)Show that $(\forall x)(P(x) \to Q(x)) \wedge (\forall x)(Q(x) \to R(x)) \Rightarrow (\forall x)(P(x) \to R(x))$ [5M]

7. a)Define Quantifiers and types of Quantifiers with examples. [5M]

b)Show that $(\exists x)\, M(x)$ follows logically from the premises

$(\forall x)(H(x) \to M(x))$ *and* $(\exists x)H(x)$ [5M]

8. a) Use indirect method of proof to prove that $(\forall x)(P(x) \vee Q(x)) \Rightarrow (\forall x)P(x) \vee (\exists x)Q(x)$ [5M]

b) Define Maxterms &Minterms of P & Q & give their truth tables [5M]

9. a) Show that S is a valid conclusion from the premises

$p \to q, p \to r, \neg(q \wedge r) and (s \vee p)$ [5M]

b) Obtain PCNF of $A = (p \wedge q) \vee (\neg p \wedge q) \vee (q \wedge r)$ by constructing PDNF [5M]

10. a) Show that $P \vee Q$ follows form P [5M]

b) Show that $\overset{s}{\Rightarrow} (\neg Q \wedge (P \to Q)) \to \neg P$ [5M]

UNIT-2

Relations & Algebraic Structures

1. a) Define Poset and Hasse diagram. [2M]

b) Let X = {1,2,3,4} and R = {(x,y) / x > y} give its Matrix form. [2M]

c) If $f : R \rightarrow R \ni f(x) = \frac{2x+3}{5}$, *find* $f^{-1}(x)$ [2M]

d) Define semi group with example. [2M]

e) Define homomorphism. [2M]

2. a) If R be a relation in the set of integers Z defined by $R = \{(x,y): x \in Z, y \in Z, (x-y) \text{ is divisible by } 6\}$ then prove that R is an equivalence relation. [5M]

b) Let A= { 1,2,3,4,5,6,7 } .determine a relation R on A by $aRb \Leftrightarrow 3 \text{ divides} (a-b)$,

show that R is an equivalence relation ? [5M]

3. Let A = { 1,2,3,4}and and let R ={ (1,1),(1,2) ,(2,1),(2,2), (3,4), (4,3), (3,3) , (4,4)} be an equivalence relation on R ? determine A/R. [10M]

4. Let A be a given finite set and P(A) its power set . let $\subseteq$ be the inclusion relation on the elements of P(A) .Draw the Hass diagram of (P(A) , $\subseteq$) for i) A = { a } ii) A ={ a ,b} iii) A = { a,b,c } iv) A = { a,b,c,d }. [10M]

5.a) Define a binary relation. Give an example. Let R be the relation from the set A = {1, 3, 4} on itself and defined by R = { (1, 1), (1, 3), (3, 3), (4, 4)} the find the matrix of R draw the graph of R . [5M]

b) verify ( ) ( ) for all are bijective from [5M]

6.a) Let , , then prove that ( ) ( ) [5M]

b) If such that $f(x, y) = 2x + 1$ *and* $g : R \rightarrow R$ *such that* $g(x) = \frac{x}{3}$

then verify that( ) [5M]

7.a) Prove that the set *Z* of all integers with the binary operation *,

defined as $a*b = a+b+1, \forall a,b \in Z$ is an abelian group. [5M]

b) Define and give an examples for group, semigroup, subgroup &abelian group. [5M]

Let $S = \{a,b, c\}$ and let * denotes a binary operation on „S" is given below also let $P = \{1,2,3\}$ and addition be a binary operation on „p" is given below. show that $(S,*)$ & $(P,\oplus)$ are isomorphic.[5M]

(+)	1	2	3
1	1	2	1
2	1	2	2
3	1	2	3

*	A	B	C
A	A	B	C
B	B	B	C
C	C	B	C

b) On the set Q of all rational number operation * is defined by $a * b = a + b - ab$

Show that this operation Q froms a commutative monoid. [5M]

9. a) Show that the set{1,2,3,4,5} is not a group under addition and multiplication modulo 6.[5M]

b) Show that the binary operation * defined on ( ) where is not associative. [5M]

10.a)show that the set of all roots of the equation forms a group under multiplication. [5M]

b) Explain the concepts of homomorphism and isomorphism of groups with examples [5M]

UNIT-3
Elementary Combinatorics

1. a) In how many ways 5 students can be selected from 12 students without student. [2M]
b) How many different words can be formed with the letters of the word MISSISSIPPI. [2M]
c) Evaluate $\binom{12}{5,3,2,2}$ [2M]
d) Find the coefficient of x^3y^4 in the expansion of $(x+y)^7$ [2M]
e) State Binomial Theorem. [2M]

2. a) Enumerate the number of non negative integral solutions to the inequlity $x_1+x_2+x_3+x_4+x_5 \le 19$.[5M]
b) How many integral solutions are there to $x_1+x_2+x_3+x_4+x_5=20$ where each(i) $x_i \ge 2$ (ii) $x_i > 2$ [5M]

3. a) How many numbers can be formed using the digits 1, 3, 4, 5, 6, 8 and 9 if no repetitions are allowed? [5M]
b) What is the co-efficient of (i) x^3y^7 in $(x+y)^{10}$ (ii) x^2y^4 in $(x-2y)^6$

4. a) Out of 5 men and 2 women, a committee of 3 is to be formed. In how many ways [5M]
Can it be formed if at least one woman is to be included? [5M]

5. a) The question of mathematics contains two questions divided into two groups of 5 questions [5M] each.In how many ways can an examine answer six questions taking atleast two questions from each group.
b) How many permutations can be formed out of the letters of word “SUNDAY”? How many of these [5M]
(i) Begin with S? (ii) End with Y? (iii) Begin with S & end with Y? (iv) S &Y always together?

6. a) In how many ways can the letters of the word COMPUTER be arranged? How many of them [5M] begin with C and end with R? how many of them do not begin with C but end with R?
b) Outof 9 girls and 15 boys how many different committees can be formed each consisting of 6 [5M] boys and 4 girls?

7. a) Find the coefficient of (i) $x^3y^2z^2$ in $(2x-y+z)^9$ (ii) x^6y^3 in $(x-3y)^9$ x^6y^3 [5M]
b) Find how many integers between 1 and 60 that are divisible by 2 nor by 3 and nor by 5. [5M]
Also determine the number of integers divisible by 5 not by 2, not by 3.

8. a) Out of 80 students in a class, 60 play foot ball, 53 play hockey and 35 both the games. [5M]
How many students (i) do not play of these games? (ii) Play only hockey but not foot ball
b) A Survey among 100 students shows that of the three ice cream flavours vanilla,chocolate, [5M] straw berry.50 students like vanilla,43 like chocolate,28 like straw berry,13 like vanilla and chocolate 11 like chocolate and straw berry,12 like straw berry and vanilla and 5 like all of them. Find the following.
1. Chocolate but not straw berry
2. Chocolate and straw berry but not vanilla
3. Vanilla or chocolate but not straw berry

9. a) How many different license plates are there that involve 1,2or 3 letters followed by 4 digits ? [5M]
b)Find the minimum number of students in a class to be sure that 4 out of them are born on the same month.? [5M]

10. a) Applying pigeon hole principle show that of any 14 integers are selected from the set [5M] S = {1, 2, 3… 25 } there are atleast two whose seem is 26. Also write a statement that generalizes this result
b) Show that if 8 people are in a room, at least two of them have birthdays that occur on the

same day of the week. [5M]

UNIT-4
Recurrence Relation

1. a) State generating function. [2M]
   b) Determine the coefficients of x^{15} in $x^3(1-2x)^{10}$ [2M]
   c) Define Recurrence relation. [2M]
   d) Find order of recurrence relation $a_{n+2} - a_{n+1} = 2a_n$ [2M]
   e) Find the generating function for the sequence 1, 2, 3, 4… [2M]
2. a) Determine the sequence generated by (i) $f(x) = 2e^x + 3x^2$ (ii) $f(x) = e^{8x} - 4e^{3x}$. [5M]
   b) Find the sequence generated by the following generating functions
   (i) $(2x-3)^3$ (ii) $\frac{x^4}{1-x}$ [5M]
3. a) Solve $a_n = a_{n-1} + 2a_{n-2}$, $n > 2$ with condition the initial $a_0 = 0$, $a_1 = 1$ [5M]
   b) Solve $a_{n+2} - 5a_{n+1} + 6a_n = 2$ with condition the initial $a_0 = 1$, $a_1 = -1$ [5M]
4. a)Solve the R.R $a_{n+2} - 2a_{n+1} + a_n = 2^n$ with initial condition $a_0 = 2, a_1 = 1$ [5M]
   b) Using generating function solve $a_n = 3a_{n+1} + 2$, $a_0 = 1$ [5M]
5. a) Solve the following $y_{n+2} - y_{n+1} - 2y_n = n_2$ [5M]
   b) Solve $a_n - 5a_{n-1} + 6a_{n-2} = 1$ [5M]
6. a) Solve the recurrence relation $a_r = a_{r-1} + a_{r-2}$ Using generating function. [5M]
   b) Solve the recurrence relation using generating functions $a_n - 9a_{n-1} + 20a_{n-2} = 0$ for $n \geq 2$
   and $a_0 = -3, a_1 = -10$ [5M]
7. a) Solve the recurrence relation $a_n = a_{n-1} + \frac{n(n+1)}{2}$ [5M]
   b) Solve $a_k = k(a_{k-1})^2$, $k \geq 1, a_0 = 1$ [5M]
8. a) $a_n = 2a_{n-1} - a_{n-2}$ with initial conditions $a_1 = 1.5$ & $a_2 = 3$ [5M]
   b) $a_n = 3a_{n-1} - a_{n-2}$ with initial conditions $a_1 = -2$ & $a_2 = 4$ [5M]
9. a) Solve $a_n - 7a_{n-1} + 10a_{n-2} = 4_n$ [5M]
   b) Solve $a_n = a_{n-1} + 2a_{n-2}$ $n > 2$ with condition the initial $a_0 = 2$, $a_1 = 1$ [5M]
10. a) Solve $a_n - 5a_{n-1} + 6a_{n-2} = 2^n$, $n > 2$ with condition the initial $a_0 = 1$, $a_1 = 1$.
    Using generating functions. [5M]
    b) Solve $a_n - 4a_{n-1} + 4a_{n-2} = (n+1)^2$ given $a_0 = 0, a_1 = 1$ [5M]

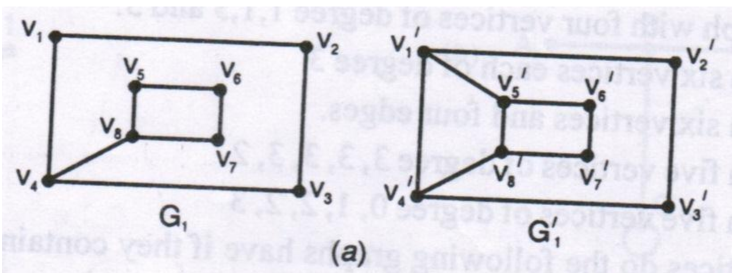
UNIT-5
Graph Theory

1. a) Define Path. [2M]
   b) Define complete graph. [2M]
   c) State Eulers formula. [2M]
   d) State handshaking theorem. [2M]
   e) Define Spanning Tree. [2M]

2. a) Explain In degree and out degree of graph. Also explain about the adjacency matrix representation of graphs. Illustrate with an example? [5M]
   b) Give an example of a graph that has neither an Eulerian circuit nor a Hamiltonian circuit. [5M]
3. a)Show that the maximum number of edges in a simple graph with n vertices is $\frac{n(n-1)}{2}$
   b) Explain about complete graph and planar graph with an example [5M]
4. a) A graph G has 21 edges, 3 vertices of degree4 and the other vertices are of degree 3.Find the number of vertices in G? [5M]
   b)Define isomorphism. Explain Isomorphism of graphs with a suitable example [5M].
5. a) Suppose a graph has vertices of degree 0 , 2, 2, 3 and 9 . How many edges does the graph have ? [5M]
   b) Give an example of a graph which is Hamiltonian but not Eulerian and vice versa [5M]
6. a) Let G be a 4 – Regular connected planar graph having 16 edges. Find the number of regions of G. [5M]
   b) Draw the graph represented by given Adjacency matrix [5M]

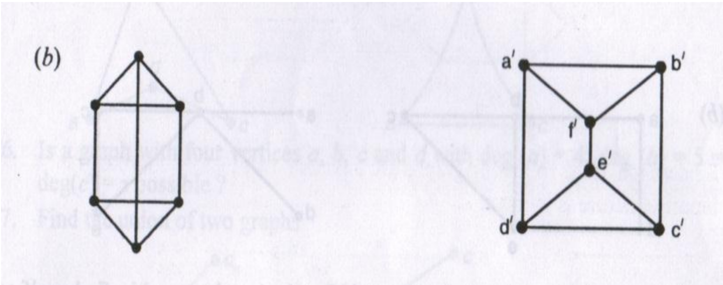
$$\text{(i)}\begin{bmatrix} 1 & 2 & 0 & 1 \\ 2 & 0 & 3 & 0 \\ 0 & 3 & 1 & 1 \\ 1 & 0 & 1 & 0 \end{bmatrix} \qquad \text{(ii)}\begin{bmatrix} 1 & 0 & 2 & 1 \\ 0 & 1 & 1 & 2 \\ 2 & 1 & 1 & 0 \\ 1 & 2 & 0 & 1 \end{bmatrix}$$

7. a)Show that in any graph the number of odd degree vertices is even. [5M]
   b)Identify whether the following pairs of graphs are isomorphic or not? [5M]



(a)

8. a)Explain about the Rooted tree with an example ? [5M]
   b)Show that the two graphs shown below are isomorphic ? [5M]



9. a)Find the chromatic polynomial & chromatic number for $K_{3,3}$ [5M]
   b)Explain graphcoloring and chromatic number give an example [5M]
10. Explain Depth- First-Search, Breadth-First-Search Algorithm [10M]

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Siddharth Nagar, Narayanavanam Road – 517583

QUESTION BANK (OBJECTIVE)

Subject with Code : DM (18HS0836) **Course & Branch**: B.Tech – CSE

Year & sem : II B.Tech II SEM , **Regulation :R18**

UNIT I

MATHEMATICAL LOGIC

1. In the statement $P \to Q$, the statement P is called [ ]

   A) Consequent B) Antecedent C) Both A&B D) Sequent

2. What is the negation of the statement "I went to my class yesterday" [ ]

   A) I did not go to my class yesterday B) I was absent from my class yesterday

   C) It is not the case that I went to my class yesterday D) All the above

3. Which of the following statement is well formed formula [ ]

   A) $P \to Q \to \wedge Q$ B) $(P \wedge Q) \to R$ C) $((Q \wedge (P \to Q)) \to R)$ D) None

4. $((P \to Q) \vee \neg(P \to Q)) \wedge (P \to (P \to Q)) \Leftrightarrow$ [ ]

   A) T B) F C) Contingency D) None

5. $P \uparrow Q \Leftrightarrow$ [ ]

   A) $P \wedge Q$ B) $\neg(P \vee Q)$ C) $\neg(P \wedge Q)$ D) $P \vee Q$

6. The Rule CP is also called [ ]

   A) Contradiction of proof B) Conditional proof C) Consistency of premises D) None

7. If $H_1, H_2, ---, H_m$ are the premises and their conjunction is identically false then

   The formulas $H_1, H_2, ---, H_m$ are called [ ]

   A) Consistent B) Tautology C) Inconsistent D) None

8. The α *and* β are string of formulas. If α *and* β have at least one variable in

   Common then the sequent $\alpha \xrightarrow{s} \beta$ is [ ]

   A) String of formula B)String C) Sequent D) Axiom

9. Symbolize the statement "Every apple is red" [ ]

   A) $(\exists x)(A(x) \wedge R(x))$ B) $(\forall x)(A(x) \wedge R(x))$

   C) $(\exists x)(A(x) \to R(x))$ D) $(\forall x)(A(x) \to R(x))$

10. $\neg(\forall x)A(x)$ [ ]

A) $(\forall x)A(x)$ B) $\neg(\exists x)A(x)$ C) $(\exists x)\neg A(x)$ D) None

11. A statement is a declarative sentence that is [ ]

A) True B) False C) True & False D) None

12. A Formula of disjunctions of minterms only is known as [ ]

A) DNF B) CNF C)PDNF D)PCNF

13. $P \vee \neg P =$ [ ]

A) P B) T C)F D) ~P

14. Let P: He is old q :He is clever, write the statement "He is old but not clever" in symbolic form

[ ]

A) $p \wedge q$ B) $p \wedge \neg q$ C) $\neg p \wedge \neg q$ D) $\neg(\neg p \wedge \neg q)$

15. The proposition $p \wedge p$ is equivalent to [ ]

A) 1 B) p C)7p D)None

16. The connectives $\wedge$ *and* $\vee$ are also called ------------- to each other [ ]

A) NAND B) NOR C) XOR D) dual

17. The symbolic form of "All men are mortal" where M(x):x is a men H(x):x is mortal

[ ]

A)M(x)□ H(x) B)(x)[M(x)□ H(x)] C)(эx)(M(x)□ H(x)] D)none

18. 7(p□ q)= [ ]

A) 7pv7q B) p^7q C) p□ q D) p□7q

19. Statement:Naveen sits between madhuand mohan is a [ ]

A) 3-place predicate B)4-place predicate C)2-place predicate D)none

20. We symbolize "for all x" by the symbol is [ ]

A) $(\forall x)$ B) $(\exists x)$ C)[x] D) $\forall$

21. In (x)[p(x)→Q(x)] the scope of the quantifier is [ ]

A)p(x) B)Q(x)→p(x) C)p(x)→Q(x) D)none

22. (p→q)⇔ [ ]

A) pvq B)pv7q C)7pvq D)none

23. If p is true , q is false then p→q is [ ]

A) true B)false C)true or flase D)none

24. p↓q<=> [ ]

A)7(pvq) B)7(p^q) C)p^q D)pvq

25. A formula consisting of a product of elementary sum is called [ ]

A)CNF B)DNF C)PDNF D)PCNF

26. 7(pvq) <=> [ ]

A) 7p^7q B) 7pv7q C) p^q D) pvq

27. A proposition obtained by inserting the word not in the appropriate place is called [ ]

A) conjunction B)disjunction C) Negation D)Implication

28. p,p□ q [ ]

A)p B) q C)p□ q D) 7p

29. p^(qvr) <=> [ ]

A) (pvq) ^(qvr) B) (pvq) ^(p ^ r) C) (p^q) v (p^r) D) (p^q) v (q^r)

30. The logical truth or a universal valid statement is called [ ]

A)contingency B)tautology C)absurdity D)contradiction

31. Implication I_{11} is [ ]

A) p,p□ q=>q B) p,q=>p^q C) 7q,p□ q=>p D)none

32. New propositions are obtained by the given proposition with the help of [ ]

A)conjunction B) connectives C) compound proposition D) none

33. Equivalence E_{18} is [ ]

A) p,p□ q=>q B) p,q=>p^q C) 7q,p□ q=>p D)none

34. R v(p^7p) <=> [ ]

A)p B) 7p C) R D) 7R

35. p^q => [ ]

A)p B) Q C) both A and B D) none

36. In (x)[p(x) ^Q(x)] the scope of the quantifier is [ ]

A)p(x) B)Q(x) ^p(x) C)p(x) ^Q(x) D) Q(x)

37. Which of the following is contrapositive law [ ]

A) $p \to q \equiv \sim q \to \sim p$ B) $p \to q \equiv \sim q \to p$ C) $p \wedge p \equiv p$ D) none

38. Every Rectangle is a Square [ ]

A)T B) F C) both T & F D) none

39. A formula consisting of a sum of elementary productsis called [ ]

A)CNF B)DNF C)PDNF D)PCNF

40. p^7p= [ ]

A) P B)T C)F D)7P

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UNIT II

RELATIONS,FUNCTIONS,ALGEBRAIC STRUCTURES

1. Let A = {1, 2, 3, 4}. Let *f*, g and h be functions of A into R. Which one of them is one- one? [ ]
   (A) $f(1) = 3, f(2) = 4, f(3) = 5, f(4) = 3$ (B) $g(1) = 2, g(2) = 4, g(3) = 5, g(4) = 3$
   (C) h(1) = 2, h(2) =4, h(3) = 3, h(4) = 2 (D) None of above
2. Let A = [-1, 1]. Which of these functions are bijective on A? [ ]
   (A) $f(x) = x^2$ (B) $g(x) = x^3$ (C) $h(x) = x^4$ (D) None of above
3. Let S = {a, b, c, d}. Which of the following sets of ordered pairs is a function of S into S? [ ]
   (A) {(a, b), (c, a), (b, d), (d, c), (c, a)} (B) {(a, c), (b, c), (d, a), (c, b), (b, d)}
   (C) {(a, c), (b, d), (d, b)} (D) {(d, b), (c, a), (b, e), a, c)}
4. If x1=x2 => f(x1)=f(x2) then the function f is said to be [ ]
   A)injective B)surjective C)bijective D)none
5. If every element of y has the pre-image in x under the function of f then f is [ ]
   A)one-one B)on-to C)one-to-one D)none
6. If f^{-1}exits for „f" then obviously f^{-1} is also [ ]
   A) one-one B) on-to C)one-one & on-to D)none
7. If $f(x)=x^2+1$ &$g(x)=x-1$ then fog(x)= [ ]
   A)x^2-2x+2 B)x^2-2x-2 C)x^2-2x D)none
8. A mapping I_x::x→x is called an [ ]
   A)Reflexive B)identity C)inverse D)none
9. The algebraic system $(S,\circ)$ is called___is the operation o is associative[ ]
   A) Group B) Monoid C) Semi group D) Abelian group

10. If $(I, +)$ is a Monoid where I is the set of integers and + is the operation of addition then the identity element is [ ]

A) 1 B) 0 C) -1 D) None

11. Let g be a homomorphism from (X,o) to (Y,*). If $g : X \to Y$ is one-to-one and onto then g is called [ ]

A) Bijection B) Isomorphism C) Epimorphism D) Monomorphism

12. relation is reflexive then there must be a [ ]

A) Node B) loop c) vertex d) edge

relation which satisfies reflexive, symmetric, & transitive is called as – [ ]

A) Equivalence B) compatibility c) partion of set d) covering

14. If A={2,4,6,8,10,12} then the set builder form is [ ]

A) { 2X/ X is natural number < 7 } B){ 2X/ X is natural number < 9 }

C) { 2X/ X is natural number < 5 } D){ 2X/ X is natural number < 17 }

15. If U={1,2,3,4,5,6,7} find the set specified with bit string of 1010100 is [ ]

A) {1,2,3,4,5,6,7} B){1,3,,5,} C){1,2,3,4,} D) {1,2,3}

16. If U={a,b,c,d,e,f,g,h} find the set specified with bit string of the set A = { a,d,f,h } is [ ]

A) 10010111 B) 10010101 C) 10101010 D) 10001010

Relation R in a set „X‟ is ----------------- if for every x,y,zϵX and xRy∩yRzthenxRz [ ]

A)Antisymmetric B) Transitive C) symmetric D) none

18. Given $f(x) = x^3$ and $g(x) = x + 2$, for $x \in R$ then $f \circ g$ is [ ]

A) $x + 2$ B) $x^3 + 2$ C) $(x+2)^3$ D) $x - 2$

19. Let $f : R \to R$ be given by $f(x) = x^3 - 2$. Find f^{-1} [ ]

A) $(x+2)^{\frac{1}{3}}$ B) $(x-2)^{\frac{1}{3}}$ C) $x^3 + 2$ D) $x^3 - 3$

20..If the set contains n elements, then the number of subsets is [ ]

A) n B) n+1 C)2^n D)2^{n+1}

21. If A = {1, 3, 4} , B = {1, 2, 3, 4, 5} then [ ]

A) A = B B) B A C)A B D)None

22. The set of binary digits in tabular form is [ ]

A) {1, 1} B) {0, 1} C) {0, 0} D) {0, 1, 0}

23. If B = {x / x is a multiple of 4, x is odd}, the set B is [ ]

A) Null B) Power set C) Empty set D) Index set

24. The family of subsets of any set is called as [ ]

A) Proper subset B) Subset C) Set of sets D) Power set

25.The inverse of the identify element is the [ ]

A)inverse element B) Identity element C)idempotent element D) nilpotent element

26. A group with addition binary operation is known as [ ]

A)Abelian group B)Groupoid C)subgroup D)additive group

27. A group with multiplication binary operation is known as [ ]

A)Abelian group B) additive group C) multiplicative group D)none

28. A group G is said to be_____if the commutative law holds [ ]

A)groupoid B)semigroup C)Abelian D)none

29. In order word (s,0) is a semigroup if for any x,y,zϵs then xo(yoz)= [ ]

A)(xoy)*z B)(xoz)oy C)(xoy)oz D)x*(y*z)

30. semigrouphomorphism satisfies [ ]

A) on-to B)one-one C)one-one&on-to D)none

31. Every homomorphic image of an abelian group is [ ]

A)sub group B)semigroup C)abeliangroup D)none

32. A non-empty subset H of a group (G,*) a subgroup iff_ where aϵH,bϵH [ ]

A)abϵH B)a*bϵH C)$a*b^{-1}$ϵ D)$a^{-1}*b$ϵH

33. The identity element (if it exists) of any algebraic structure is [ ]

A)multiple B)unique C)one D)zero

34.. The non zero set of intergers under multiplication is [ ]

A)monoid B)semigroup C)Group D)none

35. the order of the identity element of a group G is[ ]

A)1 B)2 C)0 D)3

36. The order of 4 in the group of addition modulo 12 is [ ]

A)3 B)5 C)7 D)10

37. The group of all one- one & onto mappings from S to S there the order of S is n , and is called a ....group. [ ]

A) anabelian B) symmetric C) alternating D) commutative

38. The order of alternating group , if the set S has n elements is [ ]

A) n B) n! C) n/2 D) n! /2

39.Let A={1,2,3}then the nature of the relation R={(1,2)(2,1)(1,3)(3,1)} is________ [ ]

A) Symmetric B)Assymmetric C)Reflexive D)Transitive

40.Let A={1,2,3}then the nature of the relation R={(1,1)(2,2)(3,3)(2,3)} is________ [ ]

B) A)Equivalance B)Assymmetric C)Reflexive D)Transitive

41. Let A={2,3,4}then the nature of the relation R={(2,2)(3,3)(4,4)} is________ [ ]

C) A)Symmetric B)Assymmetric C)Reflexive D)Transitive

42.Let A={1,2,3,4}then the nature of the relation R={(1,1)(1,2)(2,2)(2,4)(1,3)(3,3)} is___[ ]

D) A)Symmetric B)Assymmetric C)Reflexive D)Transitive

43.The matrix of relation R={(a,a)(a,c)(b,b)(c,c)} is [ ]

A)[ ] B) [ ] C) [ ] D) [ ]

44. The matrix of relation R={(1,2)(2,1)(1,3)} is [ ]

A)[ ] B) [ ] C) [ ] D) [ ]

45. The matrix of relation R={(1,1)(3,1)(2,3)} is [ ]

A)[ ] B) [ ] C) [ ] D) [ ]

46The matrix of relation R={(a,a)(b,b)(c,c)} is [ ]

A)[ ] B) [ ] C) [ ] D) [ ]

SIDDHARTH GROUP OF INSTITUTIONS :: PUTTUR

Siddharth Nagar, Narayanavanam Road – 517583

QUESTION BANK (OBJECTIVE)

Subject with Code : DM (18HS0836) **Course & Branch**: B.Tech – CSE

Year & sem : II B.Tech II SEM , **Regulation :R18**

UNIT III

ELEMENTARY COMBINATORICS

1. Enumerating r-permutations without repetitions P(n,r)= [ ]

   A) $\frac{n!}{r!(n-r)!}$ B) $\frac{n!}{r!}$ C) $\frac{n!}{(n-r)!}$ D) None

2. How many 3 digit number can be formed using the digits 1,3,4,5,6,8 and 9 [ ]

   A) 7*6*5 B) 3! C) $\frac{7!}{3!}$ D) 7^3

3. How many 5-card hands have 2clubs and 3hearts. [ ]

   A) C(13,2) C(12,3) B) C(13,2) C(13,3) C) C(52,5) D) None

4. If a student is to answer true or false questions and there are five questions, the number of ways, he can answer is [ ]

   A) 10 B) 16 C) 32 D) 5

5. The number of two-digit words, if repetitions are allowed is [ ]

   A) 576 B) 676 C) 52 D) 650

6. The four-digit numbers, that can be formed from the digits 1,2,3,4,5,6,7 if there will be no repetitions are [ ]

   A) 24 B) 6 C)840 D) 120

7. The three-digit numbers, that can be formed from the digits 1,2,3,4,5 if repetitions are allowed is [ ]

   A) 125 B) 120 C) 60 D) 36

8. The number of ways sitting five people around a table is [ ]

   A) 24 B) 120 C) 312 D)720

9. The number of ways of drawing 2 cards with replacement from a deck of 52 cards is [ ]

   A)2704 B) 1326 C) 52 D) 2652

10. The number of ways of drawing 2 cards without replacement from a deck of 52 cards is[ ]

    A)2704 B) 1326 C) 52 D) 2652

11. There are 12 red balls and 8 blue balls in a box. The number of ways of selecting 5 red balls and 3 blue balls is [ ]
    A) 42126 B)44352 C) 12118 D) 24352
12. The number of positive integer solutions of x+y+z=6 is[ ]
    A) 24 B) 20 C) 10 D)15
13. The number of two digit even number is [ ]
    A) 45 B) 24 C)81 D)50
14. The three-digit numbers, that can be formed from digits 1,2,3,4,5, if repetitions are not allowed is
    A) 125 B) 60 C) 45 D) 90
15. The number of non-negative integer solutions of x+y+z=6 is [ ]
    A) 24 B) 20 C) 60 D)28
16. The number of non-negative integer solutions of x+y+z=9 is [ ]
    A) 55 B) 45 C) 60 D)72
17. The number of positive integer solutions of x+y+z<7 is [ ]
    A) 20 B) 60 C) 120 D) 90
18. The number of permutations of the word SUCCESS is [ ]
    A) 960 B) 420 C) 120 D) 840
19. The number of permutations of the word HAPPY is [ ]
    A) 90 B) 120 C) 60 D) 40
20. The number of permutations of the word LAPTOP is [ ]
    A) 240 B) 120 C) 360 D) 40030
21. The number of combinations of five objects among eight objects, if the repetitions are allowed and order is not important is [ ]
    A) 645 B) 792 C) 896 D) 962
22. The number of combinations of three objects among six objects, if the repetitions are allowed and order is not important is [ ]
    A) 56 B)96 C) 48 D) 120
23. There are two groups, each consists of four questions each. If a student is to answer 2 from one group and 3 from another group, the number of ways that he can answer is [ ]
    A) 48 B)24 C)72 D) 30
24. The coefficient of x^5y^2 in the expansion of $(x+2y)^7$ is [ ]
    A) 42 B) 84 C) 120 D) 96
25. The coefficient of x^5y in the expansion of $(2x+y)^6$ is [ ]

A) 192 B) 128 C) 120 D) 144

26. |AUB|=62, |A|=32, |B|=42, then |A∩B|= [ ]

A) 24 B) 15 C) 36 D) 12

27. The number of integers<500 and divisible by 3 or 6 or 7 is [ ]

A) 214 B) 248 C) 324 D) 194

28. The number of integers<250 and divisible by 7 or 11 is [ ]

A) 54 B) 48 C) 74 D) 9

29. The number of non negative integer solutions of $x_1 + x_2 + x_3 + x_4 = 8$ have..... [ ]

A) 165 B)164 C) 166 D)163

30. The coefficient of x^4y^7 in the expansion of $(x – y)^{11}$ is ..... [ ]

A)-330 B) 330 C) – 332 D) 332

31. The number of non negative integer solutions of $x_1 + x_2 + x_3 = 11$ have..... [ ]

A)65 B)74 C) 75 D)78

32. The coefficient of x^2y^2 in the expansion of $(2x + 3y)^{10}$ is ..... [ ]

A)1620 B)162 C) 1820 D)1520

33. If n(A)=20,n(B)=30 and n(A∩B)=5 then n(AUB)= [ ]

A) 40 B) 55 C) 45 D)

34.By solving C (n , 2) = 28 , n = ... [ ]

A) 9 B) 8 C) 7 D) 10

35. The number of circular permutations of n objects taken all n at a time is .... [ ]

A) n – 1 B) (n – 1)! C) n D) n!

36. If anti clock wise & clock wise order of arrangements are not distinct then the number of circular permutations of a distinct items is ..... [ ]

A) N – 1 B) (n – 1)! C) ½ (n – 1)! D) none

37. The coefficient of $x^2 y^3z^2$ in the expansion of $(x + y + z)^7$ is ..... [ ]

A)120 B)200 C) 820 D)210

38. The number of ways of dividing a set of size 5 into 3 mutually disjoint ordered subsets of sizes 2, 1 , and 2 is ...... [ ]

A) 50 B) 30 C)40 D)35

34. If C (n,1) = C (n, 2) then n = ... [ ]

A) 2 B) 1 C) 3 D) 4

40.The coefficient of $x^2 y^2z^2$ in the expansion of $(x + y + z)^6$ is ..... [ ]

A)90 B)100 C) 80 D)10

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QUESTION BANK (OBJECTIVE)

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UNIT V

GRAPH THEORY

1. A regular graph of degree______has no lines. [ ]

A) 0 B) 1 C) 2 D) 3

2. The maximum degree of any vertex in a simple graph with n vertices is [ ]

A) n B) n+1 C) n-1 D) n+2

3. A graph G has 21 edges, 3 vertices of degree 4 and other vertices of degree 3. Find the number of vertices in G. [ ]

A) 10 B) 11 C) 12 D) 13

4. The maximum number of edges in a simple graph with n vertices is [ ]

A) n(n-1)/2 B) (n-1)/2 C) n(n+1)/2 D) n(n1)

5. A graph which allows more than one edge to join a pair of vertices is called [ ]

A) Simple graph B) Multi-graph C) Null graph D) Weighted graph

6. A graph G with no self loops is called a [ ]

A) Simple graph B) Multi-graph C) Null graph D) Weighted graph

7. A graph having loops but no multiple edges called a [ ]

A) Simple graph B) Multi-graph C) Pseudo graph D) Weighted graph

8. A simple graph G, in which every pair of distinct vertices are adjacent is called [ ]

A) Simple graph B) Multi-graph C) Null graph D)Complete graph

9. A binary tree T has n leaves. The number of nodes of degree 2 in T is [ ]

A) n-1 B) n C) n+1 D) 2n

10. The total number of edges of a complete graph K_n is… [ ]

a) n b) n^2 c) $\frac{n(n+1)}{2}$ d) $\frac{n(n-1)}{2}$

11. A graph without edges is called a ……graph [ ]

A) trivial graph B) null graph C)infinite graph D) simple graph

12. A graph is regular , if the degree of each vertex is ……… [ ]

A) same B) not same C) always zero D) always one

13. Which is used to find the connected component of graph? [ ]

A) BFS B) DFS C) Simple Graph D)Tree

14. A regular graph of degree______has no lines. [ ]

A) 0 B) 1 C) 2 D) 3

15. BFS stands for [ ]

A) Best First Search B) Bid First Search C) Breadth First Search D) Bi First Search

16. A graph G has 21 edges, 3 vertices of degree 4 and other vertices of degree 3. Find the number of vertices in G. [ ]

A) 10 B) 11 C) 12 D) 13

17. The maximum degree of any vertex in a simple graph with n vertices is [ ]

A) n B) n+1 C) n-1 D) n+2

18. Eular's rule is [ ]

A) v+e+r=2 B) v-e+r=2 C) ve-r=2 D) v+er=2

A. planar graph has only ___ infinite region(s). [ ]

A) one B) two C) Three D) four

20. If a connected planar graph G has e edges, v vertices and r regions, then [ ]

A) v+e+r=2 B) v-e+r=2 C) ver=2 D) v+er=2

21. A connected graph that contains an Euler Circuit is called [ ]

A) Euler trail B) Semi-Euler graph C) Euler graph D) Hamilton graph

22. A complete bipartite graph $K_{m, n}$ is planar if and only if [ ]

A) m>3 or n>3 B) m<3 or n> 3 C) m<=3 or n<=3 D) m>=3 or n>3 b

23. A graph G=(V,E) is called a ___ graph if its vertices V can be partitioned into twosubsets V_1 and V_2such that each edge of G connects a vertex of V1 to a vertex of V2 .[ ]

A) simple B) bipartite C) complete bipartite D) multi graph

24. The chromatic number of completebipartite graph is ……. [ ]

A) 1 B) 2 C) 3 D) 0

25. A complete graph with n vertices will have_____edges [ ]

A) (n-1)(n-2)/2 B) n(n-1)/2 C) (n-2)/2 D) n(n-2)/2

26. A graph which allows more than one edge to join a pair of vertices is called a [ ]

A) simple graph B) null graph C) multi graph D) Pseudo graph .

27. If G is a connected graph with n vertices and m edges, a spanning tree of g must have___ edges [ ]

A) n B) n+1 C) n+3 D) n-1

28. A given connected graph is a Eular graph if and only if all vertices of G are of [ ]

A) same degree B) even degree C) odd degree D) Different degree

29. An_____through a graph is a path whose edge list contains each edge of the graph exactly once. [ ]

A) Eular path B) Eular circuit C) Eular graph D) Eular region

30. An_____is a graph that possesses a Eular circuit. [ ]

A) Eular path B) Eular circuit C) Eular graph D) Eular region

31. A circuit in a connected graph which includes every vertex of the graph is known as [ ]

A) Eular B) Universal C) Hamiltonian D) Clique

32. If G is agraph within vertices, then a Hamiltonian cycle in G will contain exactly____ edges. [ ]

A) n-1 B) n C) n+1 D) n+2

33. The length of a Hamiltonian path in a connected graph of n vertices is [ ]

A) n-1 B) n C) n+1 D) n+2

34. A circuit in a connected graph which includes every vertex of the graph is known as [ ]

A) Eular B) Universal C) Hamiltonian D) Clique

35. The number of colors required to properly color the vertices of every planar graph is [ ]

A) 2 B) 3 C) 4 D) 5

36. The vertices of a planar graph with less than 30 edges is_____colorable . [ ]

A) 1 B) 2 C) 3 D) 4

37. A simple connected planar graph with 17 edges and 10 vertices cannot be_____colorable.[ ]

A) 1 B) 2 C) 3 D) 4

38. The chromatic number of an isolated vertex is [ ]

A) one B) two C) three D) four

39. The Chromatic number of a graph having atleast one edge is atleast [ ]

A) one B) two C) three D) four

40. Every______graph is 5colorable [ ]

A) simple B) bipartite C) planar D) Euler

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UNIT IV

RECURRENCE RELATIONS

1) The series $1 + x + x^2 +$------------ = [ ]

a) $\sum x^r$ b) $\sum(-1)x^r$ c) $\sum(-a)^r x^r$ d)none

2) The co-efficient of $(x^3+x^4+x^5+---)^5$ is=---- [ ]

a)126 b)127 c)125 d)none

3) The solution of linear recurrence relation is ----methods [ ]

a)4 b)3 c)2 d)none

4) Iteration method is also called as-------method [ ]

a) not substitution b)characteristic root c)step by step d)none

5) Which method ,the solution is obtained as the sum of two parts---- [ ]

a)substitution b)characteristic root c)step by step d)none

6) When fn= 0,thentheequation is----- [ ]

a)homogeneous b)non-homogeneous c)none

7) If the characteristic equation has 2,1 roots, then the solution is---- [ ]

a) $a_n=b_1 2^n +b_2(-1)^n$ b) $a_{n=}(b_1+2b_2)(-1)^n$ c) $(2b_1+(-1)b_2)r^n$ d)none

8) The solution of linear non-homogeneous equation is=------ [ ]

a) $a_n=a_n^{(h)}+a_n^{(p)}$ b) $a_{n=}A_0+A_1n+A_2n^2$ c) Ab^n d)none

9)-----is called a particular solution [ ]

a) $a_n^{(h)}$ b) $a_n^{(p)}$ c) $a_n=a_n^{(h)}+a_n^{(p)}$ d)none

10) $a_n=2a_{n-1}$ is a homogeneous linear recurrence relation of order------ [ ]

a)2 b)3 c)1 d)none

11) If $f(n)=2^n$ and 2 is the root of the characteristic equation,thenthetrial solution is --- [ ]

a)$A2^n n^2$ b)$A2^2 n^2$ c)$A^2 2^2 n^2$ d)none

12) The associated linear homogeneous recurrence relation solution is=---- [ ]

a)$a_n^{(h)}$ b)$a_n^{(p)}$ C) a_N D)none

13)$\sum a_n x^n$ is equal to----------- [ ]

a)$a_0+a_1x+a_2x^2+$--- b)$a_0x+a_1x^2+a_2x^3+$-- C) $a_0 + a_1$ X D)none

14) A recurrence relation is a formula that relates for any integer------ [ ]

a)$n\geq1$ b)$n\leq1$ c)$n=0$ d)none

15) If the solution is$a_n=(b_1+b_2n+b_3n^2)2^{n,}$,then the value of"r" is---------- [ ]

a)2 b)3 c)1 d)none

16) If f(n) is constant then the trial solution is --- [ ]

a)Ab^n b)A c)$Ab^n s^n$ d)none

17) Solving recurrence relation for ----types [ ]

a)2 b)3 c)1 d)none

18) If $a_k=2a_{k-1}+k$,for all $k\geq2,a_1=1$, then the value of a_3=----- [ ]

a)12 b)11 c)4 d)none

19) If $a_{n+2}-4a_{n+1}+4a_n=2^n$,then the equation is [ ]

a)homogeneous b)non-homogeneous c)characteristic d)none

20) Trail solution of $a_n^{(p)}$ is $A_0+A_1n+A_2n^2+$----$+A_mn^m$,then the degree is----- [ ]

a)2 b)m c)n d)none

21. The generating function of 1 is [ ]

A) ___ B)___ C)____ D)____

22. The generating function of 3^n is [ ]

A)____ B)____ C)__ D)__

23. The generating function of n is [ ]

A) ___ B) ___ C) ___ ( ) D) ___ ( )

24. The generating function of 1+n is [ ]

A) ___ B) ___ C) ___ ( ) D) ___ ( )

25. The generating function of the sequence 1, -2 , 4 , -8 ,16 ……is [ ]

A) ___ B) ___ C) ___ ( ) D) ( ) ___ 2

26. The exponential generating function of the sequence 1,1,1,1…….is [ ]

A) e^{x} B) e^{-x} C) e^{2x} D) e^{-2x}

27. The exponential generating function of the sequence 1,0 ,-1, 0 , 1 ,0, -1 ,0 , 1, …….is

A) Cos x B) sinx C) cos2x D) e^{2x} .

28. $1+x+x^2+x^3+$--------= [ ]

A) $\frac{1}{1+x}$ B) $\frac{1}{1+x^2}$ C) $\frac{1}{(1-x)^2}$ D) $\frac{1}{(1-x)}$

29. the order of RR $a_{n+1} - 2a_n = 2$ is …… [ ]

A) 2 B) 1 C) 3 D) 4

30. The order of $a_{n-2} + a_{n-1} + a_n$ is….. [ ]

A) 1 B) 2 C)3 D)4

Prepared by G K MUNI LAKSHMI