SIDDHARTH GROUP OF INSTITUTIONS :: PUTTUR
Siddharth Nagar, Narayanavanam Road – 517583

QUESTION BANK (DESCRIPTIVE)

Subject with Code : MFCS(16CS507) Course & Branch: B.Tech - CSIT

Year &Sem: II-B.Tech& I-Sem**Regulation:R16**

UNIT – I

MATHEMATICAL LOGIC

1. a) Explain conjuction and disjuction with suitable examples. [5M]

b) Define tautology and contradiction with examples. [5M]

2. a) Show that (a) $(\neg P \wedge \neg Q \wedge R) \vee (Q \wedge R) \vee (P \wedge R) \Leftrightarrow R$ [5M]**(b)**

$(P \rightarrow Q) \rightarrow Q) \Rightarrow P \vee Q$ without constructing truth table [5M]

3. a) Show that $P \rightarrow Q, P \rightarrow R, Q \rightarrow \neg R, P$ are consistent [4M]

b) Give the converse, inverse and contrapositive of the proposition $P \rightarrow (Q \wedge R)$. [3M]

c) Show that $(P \rightarrow Q) \wedge ((Q \rightarrow R) \Rightarrow (P \rightarrow Q)$ [3M]

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

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

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

$(\neg P \rightarrow R) \wedge (Q \leftrightarrow P)$ 5M

5.(a) Show that $S \vee R$ is a tautologically implied by

$(P \vee Q) \wedge (P \rightarrow R) \wedge (Q \rightarrow S)$ 5M

(b) Show that $R \wedge (P \vee Q)$ is a valid conclusion from the premises

$P \vee Q, Q \rightarrow R, P \rightarrow M and \neg M$ [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 $(\forall x)(P(x) \rightarrow Q(x)) \wedge (\forall x)(Q(x) \rightarrow R(x)) \Rightarrow (\forall x)(P(x) \rightarrow R(x))$ [5M]

7.(a) Define Quantifiers and types of Quantifiers with examples. [6M]

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

$(\forall x)(H(x) \rightarrow M(x))$ *and* $(\exists x)H(x)$ [4M]

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

(b) Define Exclusive & inclusive disjunctions with an example [5M]

10.a) Show that S is a valid conclusion from the premises $p \rightarrow q, p \rightarrow r, \neg(q \wedge r) and (S \vee p)$.[5M]

b) Obtain PCNF of A= (p∧ q) ∨(~ p ∧ q) ∨ (q ∧ r) by constructing PDNF. [5M]

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UNIT II

RELATIONS,FUNCTIONS,ALGEBRAIC STRUCTURES

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

b) Let A= { 1,2,3,4,5,6,7 } .determine a relation R on A by aRb $\Leftrightarrow$ 3 divides (a – b) , show that R isan equivalence relation ? [5M]

2.a) 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 [5M] .

b) Define compatability relation & maximal compatability

3 .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]

4. a) Define Bijective function with an 2 examples . [5M]

b) Define primitive recursive function ?show that the function f(x, y) = x + y is primitive recursive. [5M]

5 a). Let $f: A \to B, g: B \to C, h: C \to D$ then prove that $ho(gof) = (hog)of$[5M]

(b) If $f: R \to R$ such that f(x) = 2x+1, and $g: R \to R$ such that g(x) = x/3 then verify that$(gof)^{-1} = f^{-1}og^{-1}$ `

[5M]**6.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) Define and give an examples for group, semigroup, subgroup &abelian group [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)Explain the concepts of homomorphism and isomorphism of groups with examples[5M]

8. a) 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,(+)) are isomorphic. [5M]

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

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

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) The necessary and sufficient condition for a non – empty subset H of a group (G, *) to be a subgroup is $a \in H, b \in H \Rightarrow a * b^{-1}$ [5M]

b)Show that the set={1,2,3,4,5} is not a group under addition & multiplication modulo 6

10.a) Showthat every homomorphic image of an abelian group is abelian. [5M]

b)The necessary and sufficient condition for a non-empty sub-set H of a Group (G,*)

to be a sub group is a∈H,b∈H=>$a*b^{-1}$∈h [5M]

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UNIT III

ELEMENTARY COMBINATORICS

1.(a) Enumerate the number of non negative integral solutions to the inequlity

$x_1 + x_2 + x_3 + x_4 + x_5 \leq 19$. [5M]

b) How many integral solutions are there to $x_1 + x_2 + x_3 + x_4 + x_5 = 20$ where each

(i) $x_i \geq 2$? (ii) $x_i > 2$? [5M]

2 a) How many numbers can be formed using the digits 1, 3, 4, 5, 6, 8 and 9 if no repetitions areallowed? [5M]

(b) What is the co-efficient of (i) $x^3 y^7$ in $(x + y)^{10}$? (ii) x^2y^4 in $(x - 2y)^6$ [5M]

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

b) Find the number of arrangements of the letters in the word ACCOUNTANT. [5M]

4 a). The question paper of mathematics contains two questions divided into two Groups of5questions each. In howmany ways can an examine answer six questions Takingatleast twoquestions from each group [5M]

b) How many permuatations can be formed out of the letters of word " SUNDAY" ? How many of these (i) Begin with S? (ii) end with Y? (iii) begin with S & end with Y ? (iv) S &Y always together ? [5M]

5 (a) Inhowmany ways can the letters of the word COMPUTER be arranged? Howmany of them begin with C and end with R? howmany of them do not begin with C but end with R?

b)Outof 9 girls and 15 boys howmany different committees can be formed each consistingof 6 boysand 4 girls? [5M]

6.(a) Define product rule? State Binomial theorem?Define permutation? [5M]

b) Find the coefficient of (i) $x^3y^2z^2$ in $(2x - y+z)^9$. (ii) x^6y^3 in $(x - 3y)^9$.

7.(a) Prove that Inclusion – Exclusion principle for two sets A & B.

b)Find how many integers between 1 and 60 that are divisible by 2 nor by 3 and nor by 5. 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 . 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, 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 vannila
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 ?

b) Find the minimum number of students in a class to be sure that 4 out of them are born on the same month.?

10.a) Applying pigeon hole principle show that of any 14 integers are selected from the set S = { 1,2,3,……..,25 } there are atleast two whose seem is 26. Alsao 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.

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UNIT IV

RECURRRENCE RELATION

1.a) Find the generating function for the sequence 1,1,1,3,1,1,………….

b) Find the coefficient of x^{20} in $(x^2 + x^3 + x^4 + x^5 + x^6)^5$? [5M]

2.a) Determine the sequence generated by

(i) $f(x) = 2e^x + 3x^2$ (ii) $7 e^{8x} – 4 e^{3x}$. [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 $a_{n+2}- 5 a_{n+1} + 6 a_n = 2$, with condition the initial $a_0 = 1$, $a_1 = - 1$. [5 M]

4.a) Solve the RR $a_{n+2} - 2a_{n+1}+ a_n =2^n$ with initial condition $a_0=2$ & $a_1=1$. [5M]

b) Using generating function solve $a_n = 3 a_{n-1} +2$, $a_0= 1$. [5M]

5. a) Solvethe following $y_{n+2} - y_{n+1} – 2 y_n = n^2$. [5M]

b)Solve $a_n - 5 a_{n-1} + 6 a_{n-2} = 1$. [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 $a_k =k(a_{k-1})^2$, $k \geq 1$, $a_0 = 1$

8.Solve the recurrence relations

a) $d_n=2d_{n-1}-d_{n-2}$ with initial conditions $d_1=1.5$ and $d_2 =3$. [5M]

b)$b_n=3b_{n-1}-b_{n-2}$ with initial conditions $b_1=-2$ and $b_2 =4$. [5M]

9 a) Solve $a_n - 7 a_{n-1} + 10 a_{n-2} = 4^n$. [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 function . [5M]

b) Solve $a_n - 4a_{n-1} + 4a_{n-2} = (n+1)^2$ given $a_0 = 0$, $a_1 = 1$. [5M]

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UNIT –V

GRAPH THEORY

1.a) Determine the number of edges in **(i)** Complete graph K_n
(ii) Complete bipartite graph $K_{m,n}$**(iii)** Cycle graph C_n
(iv) Path graph P_n**(v)** Null graph N_n [5M]

b)Show that the maximum number of edges in a simple graph with n vertices is n (n-1) / 2 [5M]

2.a) Define isomorphism. Explain Isomorphism of graphs with a suitable example. [5M]

b) Explain graphcoloring and chromatic number give an example. [5M]

3. a) Explain about complete graph and planar graph with an example [5M]

b) Define the following graph with one suitable examples for each graphs
(i) complement graph (ii) subgraph (iii) induced subgraph (iv) spanning subgraph [5M]

4 .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]

5.a) Define Spanning tree and explain the algorithm for Depth First Search (DFS) traversal of a graph with suitable example [5M]

b) 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]

6 . (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]

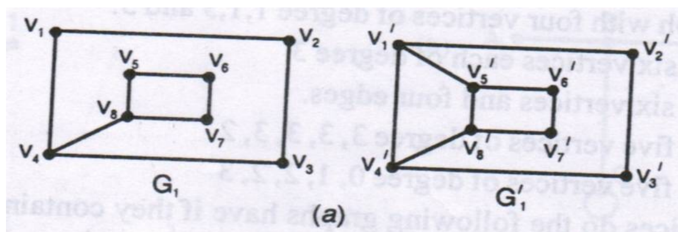
7 . a) Let G be a 4 – Regular connected planar graph having 16 edges. Find the number of regions of G . [5M]

b)Draw the graph represented by given Adjacency matrix [5M]

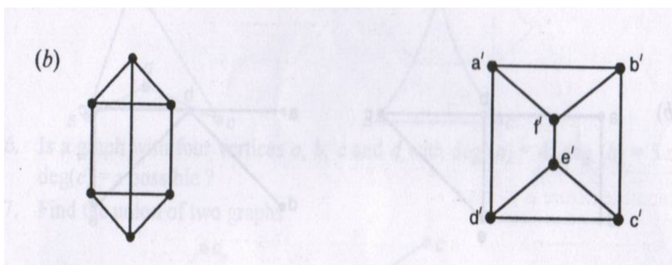
$$\text{(i)}\begin{bmatrix}1&2&0&1\\2&0&3&0\\0&3&1&1\\1&0&1&0\end{bmatrix}\qquad\text{(ii)}\begin{bmatrix}0&1&0&1\\1&0&1&0\\0&1&0&1\\1&0&1&0\end{bmatrix}$$

8 .a) Show that in any graph the number of odd degree vertices is even . [5M]

b) Is the following pairs of graphs are isomorphic or not ? [5M]



9. a) Show that the two graphs shown below are isomorphic ? [5M]



b) Explain about the Rooted tree with an example ? [5M]

10. (a)(i)Find the chromatic polynomial & chromatic number for $K_{3,3}$ [5M]

(ii) Define Euler circuit, Hamilton cycle ,Wheel graph ? [5M]

(b) Define Spanning tree and explain the algorithm for Breadth First Search (BFS) traversal of a graph with suitable example [5M]

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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 yesterdayB) 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) Non
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. pv7p= [ ]

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

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

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

15. The proposition p^p is equivalent to [ ]

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

16. The connectives ^ and v 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. If f:x→y is invertable the $f^{-1}$of = [ ]
   A)f B) f^{-1} C)I_x D)none
10. The algebraic system $(S,\circ)$ is called __ is the operation o is associative[ ]
    A) Group B) Monoid C) Semi group D) Abelian group

11.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

12.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

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

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

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

A) Equivalence B) compatibilityc) partion of set d) covering

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

A) 40 B) 55 C) 45 D) 50

16.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 }

17 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}

18. 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

19. A Relation R in a set 'X' is ---------------- if for every x,y,zϵX and xRy∩yRzthenxRz [ ]

A)AntisymmetricB) TransitiveC) symmetric D) none

20.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) $x-2$

21.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

22 .The example for singleton set is [ ]

A) {1} B) {a} C){2} D)All the above

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

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

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

A) A = B B) B⊆A C)A⊆B D)None

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

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

25.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

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

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

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

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

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

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

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

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

30. A group G is said to be ____if the commutative law holds [ ]

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

31. 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)

32. semigrouphomorphism satisfies [ ]

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

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

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

34. If H is any subgroup of a group G then HH= [ ]

A)H^{-1} B)e C)1 D)H

35. 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

36. An algebric structure (s,*) which has an identity element and also satisfies closure,associative law is called a [ ]

A)subgrokup B)groupoid C)monoid D)none

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

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

38. If a*e=a then e is called____element for the operation * [ ]

A)left identity B)Right identity C)identity D)none

39.If e*a=a then e is called____element for the operation * [ ]

A)left identity B)Right identity C)identity D)none

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

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

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

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

42. The inverse of 4 in the multiplicative group of integers modulo 7 is [ ]

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

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

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

44. 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

45. If G is a group , H is a sub group of G and $a,b \in G$, then the relation $a \equiv b$ (mod H) is [ ]

A) Reflexive B) Symmetric C) reflexive & symmetric D) an equivalence relation

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

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

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

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

48.If G is a group and $a,b \in G$,then $(ab)^{-1}$ = [ ]

A) $a^{-1}b^{-1}$ B) ab^{-1} C) $a^{-1}b$ D)$b^{-1}a^{-1}$

49..The solution of ax= b in a group G , wherea,$b \in$ G is [ ]

A) ab^{-1} B) $a^{-1}b^{-1}$ C) $a^{-1}b$ D) a^{-1}

50. If e_1 and $e_2$are two identity elements of a group G , then [ ]

A)$e_1 < e_2$ B) $e_1 = e_2$ C) $e_1 > e_2$ D) e_1e_2

51.If G is a finite group of order n , and $a \in$ Gthen [ ]

A) $e^n = a$ B)a^n=a c) $a^n = e$ D) $a^n \neq e$

52.If the order of an element$a \in$ G is n and the order of a^{-1} is m ,then [ ]

A) m< n B) m > n C) m = n D) m = an

53. The order of 4 in the additive group of integers mod 6 is [ ]

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

54.The inverse of 8 in the multiplicative group of integers mod 11 is [ ]

A)7 B)9 C)5 D)6

55..If G is a group and $a,b \in$ G, then [ ]

A) $a^2b = a^2b^2$ B) $(a.b)^2 = a^2.b^2$ C) $a.b = a^2 . b^2$ D) $a.b \neq a^2 b^2$

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QUESTION BANK (OBJECTIVE)

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Year &Sem: II- B.Tech& I-Sem**Regulation:R16**

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 [ ]

   1. 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 $|A\cap B|=$ [ ]

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)= [ ]

B) 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 $x^2y^3z^2$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

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

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

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

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

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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

19.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

Type

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 $(x^3+x^4+x^5+\text{---})^5$ 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)$A2^nn^2$ b)$A2^2n^2$ c)$A^22^2n^2$ 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)$\sum a_nx^n$ 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) Arecurrence 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^ns^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) $\frac{1}{1-x}$ B) $\frac{1}{1+x}$ C) $\frac{1}{1-2x}$ D) $\frac{x}{1-2x}$

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

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

23.The generating function of n is [ ]

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

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

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

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

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

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 P. Sasikala& Rukmani