Question Bank
Discrete Structure [CS-302]

1. What are the partial order set explain.
2. Show that the set of all integers are countable.
3. Show that the intersection of two equivalence relation is also equivalence.
4. Prove that A X (B-C) =A X B –A X C.
5. Find out the value of n for which the given inequality is true $2^n > 2n+1$ (using mathematical induction)
6. Using induction prove that the sum of cube of three successive numbers is divisible by 9.
7. For set R prove that mapping f: R->R defined by $f(x) = x^2$, x € R is many- one onto.
8. What is the algebraic structure of sets. Explain in details with respect to properties on set operations.
9. Show that the following matrices are the is a group on I with respect to multiplication of matrices.
   $\begin{matrix}1 & 0\\ 0 & 1\end{matrix}, \begin{matrix}-1 & 0\\ 0 & 1\end{matrix}, \begin{matrix}0 & 1\\ 1 & 0\end{matrix}$ and $\begin{matrix}0 & -1\\ 1 & 0\end{matrix}$
10. Is the set G={1,2,3,4,5} a group under (1) $+_6$ (2) X_6
11. Prove that, the set (I,+) of all multiples of integers by a fixed integer m is a subgroup.
12. What are the cyclic groups and monoids explain.
13. Find out the generators of cyclic group ({1,2,3,4,5,6},x_7)
14. Explain the elementary properties of Ring Structure.
15. Show that the set N is not a Ring with respect to the addition and multiplication.
16. If two polynomials f(x) and g(x) have been defined over the ring of integers like
    $f(x)= 2x^0+ 3x +6x^2$, $g(x)= 3x^0 -2x =7x^2-9x^2$ then find (1) f(x)+g(x) (2) f(x)g(x)
17. Whenever Ram and Shyam are present in party then there is some trouble in party.Today there is no trouble in the party. Hence Ram and shyam are not present in the party. Write it into symbolic representation.
18. If P= Ramesh is a player, q= Mohan is wise. Write it into sentences (i) ~(p^q) (ii) p^ ~q
19. What is homomorphism and isomorphism of groups explain.
20. Obtain the converse ,inverse and contra positive of the following conditional statement p->q
21. Prove the contradiction (pvq)^{p v(~q)}^{(~p)vq}^{(~p)v(~q)}
22. Create a machine for addition of two binary numbers
23. Create a machine for modulo 3.
24. Explain 5 strings generated by following grammar V={A,B,S,a,b} T={a,b}, P={S->AB, A->Aa, B->Bb, A->a, B->b}
25. For the given FSM find output string if inputs are (i) 011101 (ii) 011011

inputs	State	Outputs
0	S1	1
1	S1	1
1	S1	1
1	S1	1
0	S2	1
1	S0	0

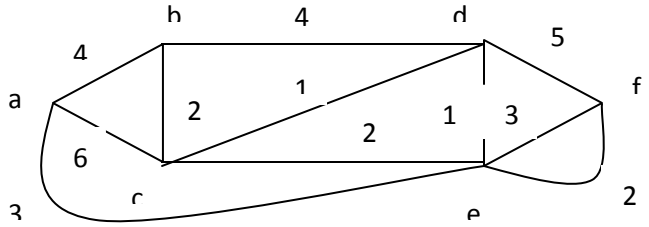
26. Prove that the sum of degree of all the vertices of the graph is equal to twice the number of edges.
27. Prove that total number of edges in a complete graph with n vertex is n(n-1)/2.
28. Explain prefix codes for graphs.
29. Explain the uses of matrices in graphs.
30. Determine the particular solution for the difference equation **June-2007**
    $a_r-2a_{r-1}=f(r)$ Where $f(r)=7r$.
31. Solve the Recurrence relation **June-2001**

a_r-5a_{r-1}+6a_{r-2}=2^r+r Where r>=2 with boundary conditions a_0=1 and a_1=1

32. Determine Discrete numeric function corresponding to given function.

$$A(z) = \frac{(1+z)^2}{(1+z)^4}$$ **Dec-2012**

33. Explain Lattice and theorem on lattices.
34. Explain Hasse Diagram of partial order set. **Dec-2012**
35. Explain Hamiltonian paths and circuit with the use of example.
36. Find out the Shortest path for the graph given above in figure.



37. Let S be a set of real numbers of the form "a+bV3" where a & b are the relational numbers. Show that S is a field with respect to addition & multiplication
38. Let (A, *) be a Monoid such that for every x in A, x*x = e, where e is an Identity element. Show that (A, *) is an Abelian group. **Dec-2011**
39. Find minimum state automata for Following FSM **June-2003**

State	Input 0	Input 1	Output
A	F	B	0
B	D	C	0
C	G	B	0
D	E	A	1
E	D	A	0
F	A	G	1
G	C	H	1
H	A	H	1

40. Solve the recurrence relation

A_r-5a_{r-1}+6$a_{r-2=2}{}^r$+r, r>=2

With boundary condition a_0=1and a1=1. **June-2001**