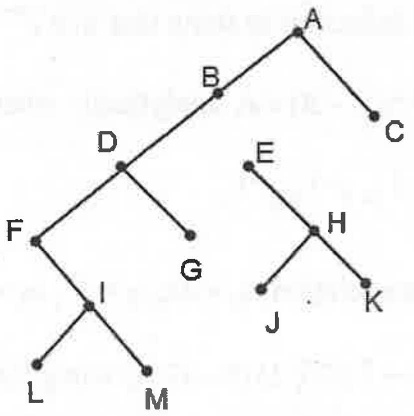
b. Find preorder, inorder and post order traversal.



32. a. If (L, ≤) is a lattice then for any a, b, c ∈ L, prove that (i) $a\wedge(b\vee c)\geq(a\wedge b)\vee(a\wedge c)$
(ii) $b\leq c$ then $a\vee b\leq a\vee c$.

(OR)

b.i. In Boolean algebra prove that $(x+y)(\overline{x}+z)=xz+\overline{x}y+yz=xz+\overline{x}y$.

ii. Simplify the Boolean expression $x\left[y+z\left(\overline{xy+xz}\right)\right]$.

* * * * *

Reg. No.

B.Tech. DEGREE EXAMINATION, DECEMBER 2018

1st to 6th Semester

15MA302 – DISCRETE MATHEMATICS

(For the candidates admitted during the academic year 2015 – 2016 to 2017-2018)

Note:
(i) **Part - A** should be answered in OMR sheet within first 45 minutes and OMR sheet should be handed over to hall invigilator at the end of 45th minute.
(ii) **Part - B** and **Part - C** should be answered in answer booklet.

Time: Three Hours Max. Marks: 100

PART – A (20 × 1 = 20 Marks)

Answer ALL Questions

1. $(p\rightarrow q)\wedge(r\rightarrow q)$ is equivalent to
(A) $(p\vee r)\rightarrow q$ (B) $(p\wedge r)\rightarrow q$
(C) Tautology (D) Contradiction

2. p → q is logically equivalent to
(A) $\neg p\rightarrow\neg q$ (B) $\neg p\rightarrow p$
(C) $\neg p\wedge q$ (D) $\neg p\vee q$

3. A premise may be introduced at any point in the derivation is called
(A) Rule P (B) Rule T
(C) Rule C (D) Rule CP

4. $\neg q,\ p\rightarrow q\Rightarrow$
(A) $\neg p$ (B) q
(C) p (D) $p\wedge q$

5. A collection of all well defined objects is called
(A) Set (B) Group
(C) Coset (D) Lattice

6. A digraph representing the partial order relation
(A) Helmut hasse (B) Poset
(C) Graph relation (D) Relation

7. If A is a non empty set with n elements, then number of possible relations on the set A is
(A) 2^n (B) 2^{n-1}
(C) 2^{n^2} (D) 2^{n+1}

8. How many possible function we get f:A→B, if $|A|=m$ and $|B|=n$
(A) 2^n (B) 2^m
(C) n^m (D) m^n

9. The order of recurrence relation $S(K)-4S(K-1)-11S(K-2)+30S(K-3)=4^K$ is
(A) 1 (B) 0
(C) 3 (D) 4

10. If O(G)=10 and if H is a proper subgroup of G, then the possible order of H is
(A) 2 (B) 1
(C) 3 (D) 6

11. The generating function of sequence 1, 1, 1,…. given by
(A) $\frac{1}{1+x}$ (B) $\frac{1}{1-x}$
(C) $\frac{1}{(1-x)^2}$ (D) $\frac{1}{x}$

12. The order of the identity element of a group of order 3 is
(A) 1 (B) 0
(C) 3 (D) 2

13. A vertex which is not adjacent to every other vertex is called ______ vertex.
(A) Isolated (B) Pendant
(C) Incident (D) Simple

14. The number of edges zero in
(A) Directed graph (B) Pseudo graph
(C) Null graph (D) Undirected graph

15. A minimum height of a 11 vertex binary tree is
(A) 4 (B) 5
(C) 3 (D) 6

16. Graph G is _____ graph, if all the vertices having same degree.
(A) Bipartite (B) Complete bipartite
(C) Proper subgraph (D) Regular

17. A ______ is a lattice which contains a least element and a greatest element and which is both complement and distributive.
(A) Boolean algebra (B) Algebra
(C) Lattice (D) Modular

18. $a.b.c + a.b$ is equal to
(A) a (B) b
(C) a.b (D) a+b.c

19. If (L, ≤) is any lattice and if b is a complement of a, then $a \vee b =$
(A) 0 (B) 1
(C) a (D) b

20. Given $D_{42} = \{1,2,3,6,7,14,21,42\}$ the complement of 14 is
(A) 3 (B) 1
(C) 7 (D) 2

PART – B (5 × 4 = 20 Marks)
Answer **ANY FIVE** Questions

21. Construct a truth table for $(p \vee q) \to (p \wedge q)$.

22. Use mathematical induction to show that $n! \geq 2^{n-1}$, *for* $n = 1,2,3,....$

23. Prove that $(A-C) \cap (C-B) = \phi$, analytically where A, B, C are sets.

24. Prove that $(g \circ f)^{-1} = f^{-1} \circ g^{-1}$.

25. Solve the recurrence relation $a_n - 2a_{n-1} = 3^n$, $a_1 = 5$.

26. Find the value of $+ - \uparrow 32 \uparrow 23 | 8 - 42$ by using the prefix expression.

27. Simplify the Boolean expression $a'.b'.c + a.b'.c + a'.b'.c'$, using Boolean algebra identies.

PART – C (5 × 12 = 60 Marks)
Answer **ALL** Questions

28. a. Show, by indirect method of proof, that $\forall x(p(x) \vee q(x)) \Rightarrow (\forall x p(x)) \vee (\exists x q(x))$.

(OR)

b. Show that the premises "one student in this class knows how to write programs in JAVA" and "everyone who known how to write programs in JAVA can get a high-paying job" imply the conclusion "someone in this class can get a high paying job".

29. a.i. If R is the relation on the set of positive integers such that $(a,b) \in R$ *iff* $a^2 + b$ is even, prove that R is an equivalence relation.

ii. If R is relation on the set of integers such that $(a,b) \in R$, *iff* $3a + 4b = 7n$, for the same integer n, prove that R is an equivalence relation.

(OR)

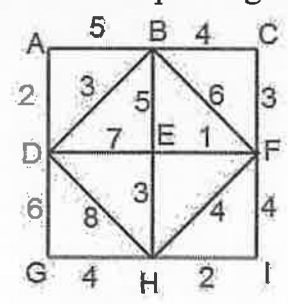
b. Let A = {1, 2, 3, 4, 5} and R = {(1, 1), (1,3), (1,5), (2,3), (2, 4)(3, 3), (3, 5), (4, 2), (4, 2), (4, 4), (5, 4)}. Find the transitive closure of R.

30. a. Solve the recurrence relation $a_{n+2} - 6a_{n+1} + 9a_n = 3(2^n) + 7(3^n), n \geq 0$ given that $a_0 = 1$ *and* $a_1 = 4$.

(OR)

b. State and prove Lagrange's theorem.

31. a. Use Kruskal's algorithm to find a minimum spanning tree for the weighted graph.



(OR)