

B.C.A. DEGREE EXAMINATION, NOVEMBER 2011  
THIRD SEMESTER

COURSE : ALLIED – CORE  
PAPER : MATHEMATICS FOR COMPUTER SCIENCE - I  
TIME : 3 HOURS MAX. MARKS : 100

SECTION – A (10 X 2 = 20)  
ANSWER ALL THE QUESTIONS

1. Prove that  $p \rightarrow (p \vee q)$  is tautology.
2. Define conditional proposition.
3. Define a Lattice.
4. Define a Boolean Algebra.
5. Define a sum and product expression in Boolean Algebra.
6. Define Isomorphism of graphs and give an example.
7. Define a tree.
8. If  $xy = c^2$ , find  $\frac{dy}{dx}$ .
9. Evaluate:  $\int \tan \theta \, d\theta$ .
10. Evaluate:  $\int \frac{x^2}{x+2} \, dx$ .

SECTION – B (5 X 8 = 40)  
ANSWER ANY FIVE QUESTIONS

11. Establish  $\neg(P \wedge Q) = (\neg P \vee (\neg P \vee Q)) \Rightarrow \neg(P \vee Q)$ .
12. Show that the direct product of any two distributive lattices is also a distributive lattice.
13. In Boolean algebra  $L$ , state and prove De Morgan's Laws.
14. If all the vertices of an undirected graph are each of odd degree  $k$ , show that the number of edges of the graph is a multiple of  $k$ .
15. Show that a tree with  $n$  vertices has  $(n - 1)$  edges.
16. a) Evaluate:  $\int \frac{\cos x}{\sqrt{4 - \sin^2 x}} \, dx$ .  
b) Evaluate:  $\int \frac{3x-2}{\sqrt{4x^2-4x-5}} \, dx$ .
17. a) If  $u = \log(\tan x + \tan y + \tan z)$ , then show that  $\sum \sin 2x \frac{\partial u}{\partial x} = 2$ .  
b) If  $u = x^2y + y^2z + z^2x$ , Find  $\frac{\partial u}{\partial x}, \frac{\partial u}{\partial y}, \frac{\partial u}{\partial z}$ .

**SECTION – C**  
**ANSWER ANY TWO QUESTIONS**

**(2 X 20 = 40)**

18. a) Construct the truth table for  $\neg(p \vee (q \wedge r)) \leftrightarrow ((p \vee q) \wedge (p \rightarrow r))$ .  
b) Draw the Hasse diagram of  $D(18)$ , and show that  $D(18)$  is not a Boolean algebra. (10+10)
19. a) Define spanning tree and minimal spanning tree with examples. (2+2+2)  
b) Write Prim's algorithm to find a spanning tree. (14)
20. a) Evaluate:  $\int \frac{2x+3}{x^2+2x+5} dx$ . (5)  
b) Evaluate:  $\int \frac{\cot x}{\log(\sin x)} dx$  (5)  
c) If  $x^m y^n = (x + y)^{m+n}$ , show that  $x \frac{dy}{dx} = y$ . (10)

