

**STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI 600 086**  
(For candidates admitted during the academic year 2011 – 12)

**SUBJECT CODE : 11MT/AC/MS34**

**B.C.A. DEGREE EXAMINATION, NOVEMBER 2012**  
**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. Define an argument and prove that the argument  $p, p \rightarrow q \vdash q$  is valid.
2. Negate each of the following statements:  
(a)  $\exists x \forall y, p(x, y)$  (b)  $\exists y \exists x \forall z, p(x, y, z)$
3. Define a Lattice.
4. Define the OR Gate and the AND Gate.
5. State any four properties of divisibility.
6. Define the Mobius function.
7. Define a subgraph and give an example.
8. Define a complete graph and draw the complete graph with six vertices.
9. State Boole's inequality.
10. The probability that a student passes a Physics test is  $2/3$  and the probability that he passes both a Physics test and an English test is  $14/45$ . The probability that he passes at least one test is  $4/5$ . What is the probability that he passes the English test?

**SECTION – B**

**(5 X 8 = 40)**

**ANSWER ANY FIVE QUESTIONS**

11. Show that (i)  $p \wedge q$  logically implies  $p \leftrightarrow q$   
(ii)  $p \leftrightarrow \neg q$  does not logically imply  $p \rightarrow q$
12. Express the Boolean expression  $E = z(x' + y) + y'$  as a sum-of-products and then in its complete sum-of-products form.
13. State and prove division algorithm.
14. Give an example of a non-planar graph and prove that it is non-planar.

15. Let  $G$  be a graph with  $n > 1$  vertices. Then show that the following are equivalent:
- $G$  is a tree
  - $G$  is cycle-free and has  $n - 1$  edges.
  - $G$  is connected and has  $n - 1$  edges
16. A bag contains 17 counters marked with the numbers 1 to 17. A counter is drawn and replaced; a second drawing is then made. What is the probability that:
- The first number drawn is even and the second odd?
  - The first is odd and the second even?
- How will your results in (i) and (ii) be effected if the first counter drawn is not replaced?
17. State and prove Baye's theorem.

## SECTION – C

(2 X 20 = 40)

## ANSWER ANY TWO QUESTIONS

18. (a) Show that the following argument is a fallacy  $p \rightarrow q, \neg p \vdash \neg q$
- (b) Show that the following are equivalent in a Boolean algebra:
- $a + b = b$
  - $a * b = a$
  - $a' + b = 1$
  - $a * b' = 0$
- (10+10)
19. (a) State and prove the fundamental theorem of arithmetic.
- (b) If  $n \geq 1$ , show that  $\sum_{d|n} \mu(d) = \begin{cases} 1 & \text{if } n = 1 \\ 0 & \text{if } n > 1 \end{cases}$  (12+8)
20. (a) Describe the Konigsberg bridge problem.
- (b) Obtain the rank correlation coefficient for the following data:

X	68	64	75	50	64	80	75	40	55	64
Y	62	58	68	45	81	60	68	48	50	70

(8+12)



