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

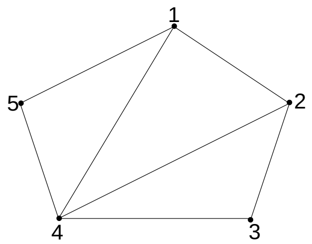
**SUBJECT CODE : 11MT/AC/MS34**

**B.C.A. DEGREE EXAMINATION, NOVEMBER 2015**
**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 $\neg(p \vee q) \equiv \neg p \wedge \neg q.$
2. If P(x): x is a person, L(x): x is a lover, R(x,y): x loves y, Symbolize the expression; “ All the world loves a lover”
3. Define well ordered set and give an example.
4. What is meant by dual of a statement in a Boolean algebra and write the dual of the statement $(1+a)*(b+0)=b.$
5. State and prove Euclids lemma.
6. Define Euler totient function.
7. Define bipartite graph and give an example.
8. Find the degree of each vertex in the following graph.




9. If $P(A)=.35, P(B)=.43$ and $P(A \cap B)=.13,$ Can $A$ and $B$ be dependent.
10. Write the two regression equations.

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

11. Prove that the following argument is valid: $p \rightarrow q, \neg p \vdash \neg p.$

12. If $D_n$ denotes positive divisors of an integer n. Draw the Hasse diagram for $D_{12}$, $D_{15}$and $D_{16}$.

13. Write the algorithm for finding sum-of-products form and obtain the sum-of-product form of the following Boolean expressions.(i) $xz' + y'z + xyz'$
(ii) $x(y'z)'$

**..2**

14. State and prove the fundamental theorem of arithmetic.

15. Define Eulerian and Hamiltonian graphs and give an example of each.

16. State and prove Euler's formula.

17. The probabilities of 3 students A, B, C solving a problem in Statistics are $\frac{1}{2}, \frac{1}{3}$ and $\frac{1}{4}$. A problem is given to all the 3 students. What is the probability that

(i) No one will solve the problem
(ii) Only one will solve the problem
(iii) At least one will solve the problem?

**SECTION – C** **(2 X 20 = 40)**
**ANSWER ANY TWO QUESTIONS**

18. a) Test the validity of the following argument:
If I study, then I will not fail mathematics.
If I do not play basketball, then I will study.
But I failed mathematics.
Therefore I must have played basketball.

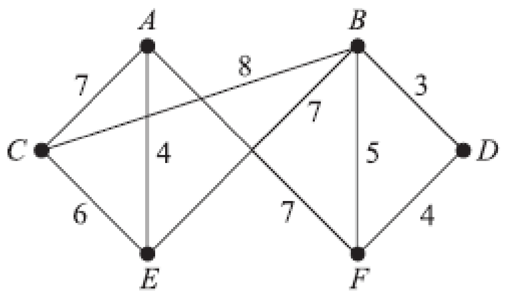
b) Prove that a Boolean Algebra satisfies the following laws.
(i) Idempotent laws (ii) Boundedness laws
(iii) Absorption laws (iv) Associative laws

19. a) (i) Prove that every integer n > 1 is either a prime number or a product of prime numbers.

(ii) If $n \geq 1$, Prove that $\sum_{\frac{d}{n}} \mu(d) = \left[\frac{1}{n}\right] = \begin{cases} 1 & if \quad n = 1 \\ 0 & if \quad n > 1 \end{cases}$

b) Describe the Konigsberg bridge problem.

20. a) Write kruskal's algorithm and find the minimal spanning tree of the following graph.




b) Find the coefficient of correlation between $X$ and $Y$ for the following data.

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|---|---|---|---|---|---|---|
| X | 10 | 14 | 15 | 28 | 35 | 48 |
| Y | 74 | 61 | 50 | 54 | 43 | 26 |

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