SUBJECT CODE : 15MT/AC/MS35

B.C.A. DEGREE EXAMINATION, NOVEMBER 2016
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. Explain about replacement process in Mathematical Logic.
2. Define disjunctive normal form of the given formula with an example.
3. Draw Hasse Diagrams for any two Partial ordered set.
4. For any a, b, c, d in a lattice $L, \leq$, if $a \leq b$ and $c \leq d$, then prove $a \vee c \leq b \vee d$.
5. Mention any two properties of Divisibility.
6. Define Mobius function $\mu\ n$.
7. Discuss about Enciphering K_E with an example.
8. Explain about encryption and decryption.
9. Find the number of 3-digit even numbers with no repeated digits.
10. Evaluate $\dfrac{12}{5, 3, 2, 2}$.

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

11. Obtain Principal Disjunctive normal form of the formula $\daleth P \vee Q$
   a) Using Truth table
   b) Without using Truth table.   (4 + 4)

12. Define Lattice and Prove Every Chain is a lattice.   (2 + 6)

13. Prove. Given integers a and b with b>0, there exists a unique pair of integers q and r such that $a = bq + r$, with $0 \leq r < b$. Moreover, $r = 0$ if, and only if, b/a.

14. Solve the following systems of simultaneous congruences:
   $02x + 3y \equiv 1\ mod\ 26$
   $7x + 8y \equiv 2\ mod\ 26$.

15. How many persons must be chosen in order that at least five of them will   have   birth days in the same calendar month?

16. Write a brief note about Tautology and Prove
   $Q \vee\ P \wedge \daleth Q\ \vee (\daleth P \wedge \daleth Q)$ is a tautology.   (4 + 4)

17. Find the value of n so that $2P\ n, 2\ + 50 = P\ 2n, 2$.

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

18. a. Explain about the Connectives NAND and NOR. Prove $\uparrow$, $\downarrow$ are functionally

   complete.   (2+2+6)

   b. Define Product Lattice of Two Lattices and Prove $L \times M, \wedge, \vee$ is a

   lattice.   (2 + 8)

19. a. State and Prove fundamental theorem of arithmetic   (10)

   b. Working in the 26-letter alphabet, use the matrix

   $A = \begin{array}{cc} 2 & 3 \\ 7 & 8 \end{array} \in M_2 \; Z/26Z$ to encipher the plaintext "NOANSWER'.   (10)

20. a) Prove $C \; m+n, 2 \; - \; C \; m, 2 \; - \; C \; n, 2 \; = mn.$ (10)

   b) Explain about Ramsey Numbers and Prove its Standard Properties.   (10)

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