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Reg. No. : .....

Code No. : 5916 **Sub. Code : PCSM 13**

M.Sc. (CBCS) DEGREE EXAMINATION,
NOVEMBER 2020.

First Semester

Computer Science – Core

MATHEMATICAL FOUNDATIONS FOR
COMPUTER SCIENCE

(For those who joined in July 2017 onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. If A and B are sets and $A \cup B = A \cap B$ then

   (a) $A = \phi$ (b) $B = \phi$

   (c) $A = B$ (d) None of these

2. How many different non isomorphic Abelian groups of order 4 are there?

   (a) 2 (b) 3

   (c) 4 (d) 5

3. A boolean function may be transformed into

(a) Logical diagram

(b) Logical Graph

(c) Map

(d) Matrix

4. $E*x=x\ *E=x$ is

(a) Commutative (b) Inverse

(c) Associative (d) Identity

5. A ———————— is an ordered collection of objects

(a) Relation (b) Function

(c) Set (d) Proposition

6. The Cardinality of the set of odd positive integers less than 10?

(a) 10 (b) 5

(c) 3 (d) 20

7. The number of element in the power set $\{\{a,b\},c\}$ is

(a) 8 (b) 4

(c) 3 (d) 7

8. A self complemented, distributive lattice is called

(a) Boolean algebra

(b) Modular lattice

(c) Complete lattice

(d) Self dual lattice

9. If lattice $(C,\leq)$ is a complemented chain, then

(a) $|C| \leq 1$ (b) $|C| \leq 2$

(c) $|C| > 1$ (d) C doesn't exist

10. Let $D_{30} = \{1,2,3,5,6,10,15,30\}$ and relation be a partial ordering on D_{30}. The lab of 10 and 15 respectively is

(a) 10 (b) 15

(c) 30 (d) 20

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).
Each answer should not exceed 250 words.

11. (a) Prove that isomorphism is an equivalence relation on diagraphs?

Or

(b) Let $f(x): x_2 - 3x + 2$. Find $f(x_2)$ and $f(x+3)$.

12. (a) Explain in brief about Euclidean algorithm.

Or

(b) State and explain binomial theorem.

13. (a) If $A=\{1,2,3\}, B=\{4,5\}$ $A\times B$ and $B\times A$.

Or

(b) Explain in brief about modular arithmetic.

14. (a) Explain in brief about testing the prime numbers.

Or

(b) How many classes are there for loop-free diagraphs with 3 vertices?

15. (a) Find the generating function of $n\wedge 2-2$?

Or

(b) Describe about division theorem in detail.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b)
Each answer should not exceed 600 words.

16. (a) Draw Hasse diagram for the poset $(P(S),\subseteq)$ where $S=\{1,2,3,4\}$.

Or

(b) Describe an algorithm to decide whether a graph is bipartite.

17. (a) Solve $an=an-1+n$ where $a_0=2$ by substitution?

Or

(b) Let G be a group of order p, where p is a prime. Find all subgroups of G.

18. (a) Find truth table for $(P\leftrightarrow\sim Q)\leftrightarrow(Q\rightarrow P)$?

Or

(b) Describe principle of inclusion with an example.

19. (a) Solve Recurrence relation $U_{n+2}+U_{n+1}+U_n\ U_2=1,\ U_3=2$?

Or

(b) Prove that the cancellation laws hold good in group G?

20. (a) Describe chromatic number with example.

Or

(b) Explain in brief about duality law with example.

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