26/05/22

1475/II

B.C.A. (PART-I) 2nd Semester Examination, 2022

B.C.A.

(Discrete Mathematics)

BCA-201

Time : Three Hours] [Maximum Marks : 70

Note: (i) Answer **five** questions in all.

(ii) Question **No. 1** is compulsory.

(iii) Answer two questions from section **A** and **B** each.

(iv) All questions carry equal marks.

1. Answer any four parts of the following:

(a) If set $A = \{1, 2, 3, 4\}$ and $B = \{3, 4, 5, 6\}$ then find the value of A-B and B-A.

(b) Prove that the fourth root of unity $1, -1, i, -i$ form the abelian multiplicative group.

(c) If the preposition "x^2 is divided by 4" is given, then prove that x is even.

(d) Find recurrence relation of the Fibonacci series $s = \{1, 1, 2, 3, 5, 8, - - - -\}$.

(e) What is complete graph and regular graph?

SECTION–A

2. What is an equivalence relation? Show that if a relation on a set $A = \{1, 2, 3\}$ is satisfying an identify relation then the relation is also equivalence

3. Four girls and five boys are to be arrange in straight line. Find how many ways this can be done with following conditions:

   (i) Without any restriction $\frac{n!}{(n-r)!}$

   (ii) If all the boys sit together

   (iii) If all girls and boys sit together

   (iv) If no girls sit together

4. Obtain the principal disjunctive normal form and principal of conjunctive normal form of the following: $((Q \vee \sim R) \Rightarrow P) \wedge (Q \Leftrightarrow R)$

5. Solve the recurrence relation $a_{n+2} - 5a_{n+1} + 6a_n = 2$ with initial condition $a_0 = 1$, and $a_1 = -1$

SECTION–B

6. (a) Given function $f(x) = \frac{1}{1+x^2}$, $g(x) = 2x + 3$ find :

(i) $f^{-1}(x)$

(ii) $g^{-1}(x)$

(iii) $fog\,(x)$

(iv) $gof\,(x)$

(b) State and prove "De Morgan Law".

7. (a) Construct truth table for $(p \Leftrightarrow q) \Leftrightarrow (p \wedge \sim q)$

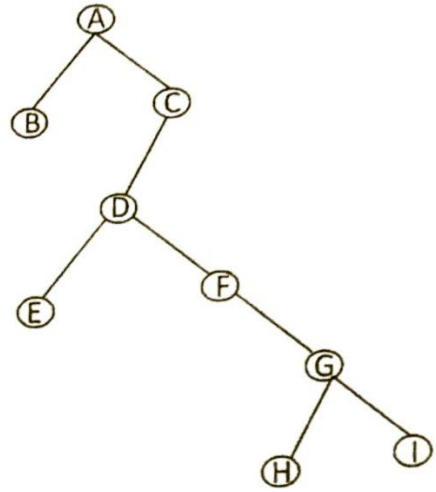
(b) What do you mean by Tautology? Prove that the formula $(x \Rightarrow y) \vee (y \Rightarrow x)$ is a tautology.

8. (a) Find the tree traversal of the given tree in the following order :

(i) Pre order

(ii) In order

(iii) Post order



(b) Explain elementary properties of a Graph. Describe any two of them.

9. Attempt **any two** of the following:

(a) Find n and x if $nc_x = 56$ and $nP_x = 336$.

(b) Explain Bijective function.

(c) Write notes on types of graph.

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