Code No.2912/AICTE

FACULTY OF ENGINEERING

B. E. (CSE) (AICTE) III – Semester (Main) Examination, December 2019

Subject: Discrete Mathematics

Time: 3 hours

Max. Marks: 70

Note: *Answer all questions from Part-A. Answer any FIVE questions from Part-B.*

PART – A (20 Marks)

1. Determine whether $(\sim q \wedge (p -> q)) -> \sim p$ is a tautology?
2. "All lions are fierce", "Some lions do not drink coffee", "Some fierce creatures do not drink coffee". Express the statements using quantifiers p(x), q(x), r(x).
3. Construct a recursive version of a binary search algorithm.
4. Among 100 people how many were born in the same month?
5. How many positive integers not exceeding 1000 are divisible by 7 or 11?
6. What is the solution of the recurrence relation $a_k = a_{k-1}+2a_{k-2}$ with $a_0=2$ and $a_1= 7$.
7. How can the final exams at a university be scheduled so that no student has two exams at the same time?
8. Show that K_n has a Hamilton circuit whenever n>=3.
9. Suppose that a connected planar simpler graph has 20 vertices each of degree 3 into how many regions do a representation of this planar graph split the plane?
10. What is the prefix form for ((x+y)/2) + ((x-4)/3)?

PART – B (50 Marks)

11. (a) If a,b,c are integers such that a/b and a/c then a/(mb+mc) whenever m and n are integers. 5

    (b) What are the solutions of the linear congruence 3x = 4 (mod 7). 5

12. (a) Using mathematical induction, show that n^3-n is divisible by 3 whenever n is a positive integer. 5

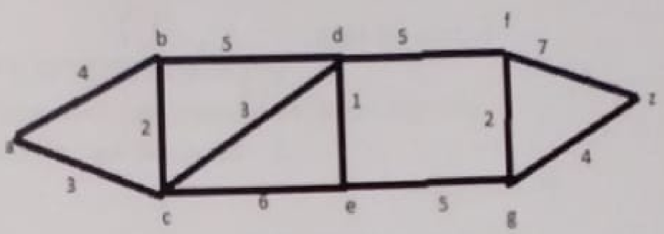
    (b) How many ways are there to distribute hands of 5 cards to each of four players from the standard deck of 52 cards? 5

13. Find the solution of recurrence relation $a_n=6a_{n-1}+11a_{n-2}+6a_{n-3}$ with $a_0=2$, $a_1=5$, $a_2=15$. 10

14. Consider the following relations on {1,2,3,4}
    R1 = {(1,2), (1,1), (2,1), (2,2), (3,4), (4,1), (4,4)}
    R2 = {(1,1), (1,2), (1,4), (2,1), (2,2), (3,3), (4,1), (4,4)}
    R3 = {(2,1), (3,1), (3,2), (4,1), (4,2), (4,3)}
    R4 = {(1,1), (1,2), (1,3), (1,4), (2,2), (2,3), (2,4), (3,3), (3,4), (4,4)}
    Which of there relations are equivalence relations? 10

15. Let A={1,2,3}, B={1,2,3,4} the relations R1 = {(1,1), (2,2), (3,3)} and R2 = {1,1), (1,2), (1,3), (1,4)} and obtain (a) RI ∩R2, (b) R1∩R2, (c) R1–R2, (d) R2–R1. 10

16. Find the shortest path between a and z 10



17. (a) Find sum of products expansion for the function $F(x,\overline{y},z)=(x+y)z$. 4

(b) Construct circuits that produce the following outputs. 6

(i) $(x+y)\overline{x}$.

(ii) $\overline{x}\,\overline{(y+\overline{z})}$.

(iii) $(x+y+z)(\overline{x}\,\overline{y}\,\overline{z})$.

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