

RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College affiliated to University of Calcutta)

B.A./B.Sc. THIRD SEMESTER EXAMINATION, DECEMBER 2019

SECOND YEAR [BATCH 2018-21]

COMPUTER SCIENCE (Honours)

Date : 11/12/2019

Time : 11 am – 1 pm

Paper : III [Gr- A]

Full Marks : 40

Unit-I

Answer any one question from question nos. 1 & 2:

[1×5]

1. a) Draw the Hass-diagram for poset $(P(S), \subseteq)$, where $P(S)$ is the power set of the set $S = \{1, 2, 3\}$. (3)
- b) Show that if any five integers from 1 to 8 are chosen, then at least two of them will have a sum 9. (2)
2. A certain type of missile hits its target with probability $p = 0.3$. Find the number of missiles that should be fired so that there is at least an 80% probability of hitting the target. (5)

Answer any two questions from question nos. 3 to 6:

[2×10]

3. a) State and prove the “Pigeon Hole Principle”. (3)
- b) There are six processes to be assigned to three processors. In how many ways can you distribute these processes over processors such that no processors will be idle? A processor can accept multiple processes but a single process is to be allocated by a single processor only. (3)
- c) Solve the recurrence relation together with the given initial condition $a_n = 5a_{n-1} - 6a_{n-2}$ for $n \geq 2, a_0 = 1, a_1 = 0$. (4)
4. a) Find the recurrence relation and give initial condition for the number of bit strings of length n that do not contain the pattern 111. (4)
- b) Use generating function to solve the recurrence relation $a_n - a_{n-1} = 6 a_{n-2}$, $n \geq 2$ with initial conditions $a_0 = 1, a_1 = 1$. (4)
- c) What is Quasigroup? (2)
5. a) Prove that $(Q, +, \cdot)$ is a commutative ring with unity, where Q is the set of rational numbers. (5)
- b) A multiple choice question has 10 questions with 3 options for each question. What is the probability that a student gets at least 7 questions correct by random guessing? (5)
6. a) In a community, 40% of families own a dog and 30% of families own a cat. Additionally, it is known that of those families that own a dog, 15% own a cat as well. Given a family owns a cat, what is the probability that it owns a dog? (5)
- b) A life insurance salesman sells on average 3 life insurance policies per week. Use poisson’s law to calculate the probability that in a given week he will sell (5)
 - i) Some policies
 - ii) 2 or more policies but less than 5 policies
 - iii) Assuming that there are 5 working days per week, what is the probability that in a given day he will sell one policy?

Unit-II

Answer any one question from question nos. 7 & 8:

[1×5]

7. Explain with example.

(2.5+2.5)

i) Arbitrarily Traceable Graph.

ii) Bipartite Graph

8. Prove that a tree with n vertices has $n-1$ edges.

(5)

Answer any one question from question nos. 9 & 10:

[1×10]

9. a) What is the size of an r -regular graph with n vertices?

(1.5)

b) Is it possible to exist an Euler trail in an Euler graph? Explain your answer.

(2)

c) Write down Ore's Theorem.

(1.5)

d) Check whether K_5 is planar graph or not.

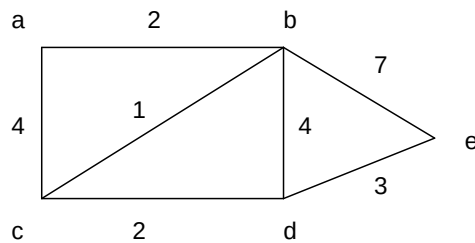
(2)

e) Show that the number of simple, labelled graph of n vertices is $2^{n(n-1)/2}$.

(3)

10. a) Using appropriate algorithm find the shortest path between vertices a and e from the following graph.

(4)



Show the necessary steps.

b) Write down the difference between Kruskal and Prim's algorithm?

(2)

c) What will be the different number of trees with n vertices?

(2)

i) If those are labelled trees.

ii) If those are rooted labelled trees.

d) How many different spanning trees are possible from graph K_5 ?

(2)

_____ × _____