BANKURA UNIVERSITY

B. Sc. (HONOURS) SECOND SEMESTER EXAMINATIONS, 2022

Subject: Computer Science (Hons) **Course ID: 21512**

Course Title: Discrete Structures

Course Code: SH/CSC/202/C-4

Full Marks: 40 **Time: 2 Hrs**

The figures in the margin indicate full marks

Answer all the questions.

UNIT I

1. Answer *any five* of the following questions: **(5×2 = 10)**

a) Define equivalence relation.

b) Distinguish between functions and relations.

c) When a proposition is called contradiction?

d) Define planar graph?

e) What do you mean by time complexity?

f) Define pendant vertex. Give example.

g) Write differences between Hamiltonian circuit and Hamiltonian path.

h) Define minimum spanning tree of a weighted graph.

UNIT II

2. Answer *any four* of the following questions: **(4×5 = 20)**

a) Consider the set **Z** of integers. Define a**R**b by $b = a^r$ for some positive integer r. Show that **R** is a partial order relation on **Z.** Find all partitions of S={1, 2, 3} 3+2

b) In how many ways can the letters in the word "Mathematics" be arranged so that two a's must be separated. In how many ways can three red coloured balls be placed in 10 boxes that are numbered 1, 2… 10 so that each box can hold only one ball. 2.5x2

c) Using mathematical induction show that 1+2+3+ …… +n = $\frac{n(n+1)}{2}$ 5

d) Prove that a given connected graph G is an Euler graph if and only if all vertices of G are of even degree. 5

e) Prove that a complete graph of five vertices is nonplanar. 5

f) Let p be "It is cold" and q be "It is raining". Describe the following statements with verbal sentences- (i) ¬ p (ii) p∧q (iii) pvq (iv) qv¬ p

When an argument is said to be valid? 4+1

g) Show that the propositions ¬ (p∧q) and ¬p v ¬q are logically equivalent.

Show that the following argument is a fallacy: p→q, ¬p ⊢ ¬q 2.5x2

UNIT III

3. Answer *any one* of the following questions: (1×10 = 10)

a) Discuss big-Oh and big-Omega notations with suitable examples.

Show that T (n) = 2 T ($\frac{n}{2}$) + n is O (n log n) 5+5

b) Define complete graph.

Describe Prim's algorithm for determining the minimum spanning tree of a graph with a suitable example.

"The number of vertices of odd degree in a graph is always even" – Prove it. 1+6+3