

QP CODE 2033510102

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# DMI-ST. EUGENE UNIVERSITY

ZAMBIA

DEGREE EXAMINATION – JUNE 2024

Semester: III 351GC01 MATHEMATICS FOR COMPUTER SCIENCE

Time: 3:00 Hours

Max. Marks: 100

Answer any FIVE Questions (5 x 20 = 100 Marks)

1. a) For all  $n \geq 1$  prove that  $1 + 2 + 3 + \dots + n = \frac{n(n+1)}{2}$ . (10 Marks)  
b) Prove that for all  $2^n > n$  for all positive integers  $n$ . (10 Marks)
2. a) In how many ways can 4 red, 3 yellow and 2 green discs be arranged in a row if the discs of the same color are indistinguishable? (5 Marks)  
b) Find  $r$ , if  $5 \times {}_4P_r = 6 \times {}_5P_{r-1}$ . (5 Marks)  
c) If  $n_{C_9} = n_{C_8}$ , find  $n_{C_2}$ . (5 Marks)  
d) A person has 2 parents, 4 grandparents, 8 great grand parents and so on. Find the number of his ancestors during the ten generations preceding his own. (5 Marks)
3. a) Solve the equation  $x^4 + x^3 - x^2 - 2x - 2 = 0$ . Given that one root is  $\sqrt{2}$ . (10 Marks)  
b) Solve the equation  $x^4 - 5x^3 + 4x^2 + 8x - 8 = 0$  Given that one root is  $1 + \sqrt{5}$ . (10 Marks)
4. a) Two dice are thrown and the sum of the numbers which come up on the dice is noted. Let us consider the following events associated with this experiment. (10 Marks)  
A: 'the sum is even'.  
B: 'the sum is a multiple of 3'.  
C: 'the sum is less than 4'.  
D: 'the sum is greater than 11'.  
Which pairs of these events are mutually exclusive?  
b) A coin is tossed three times, consider the following events. (10 Marks)  
A: 'No head appears',  
B: 'Exactly one head appears' and