Reg No:.....
Name :.....

K25FY2257

Second Semester FYUGP Computational Mathematics Examination
APRIL 2025 (2024 Admission onwards)
KU2MDCCMT101 (NUMERICAL ABILITY)
(DATE OF EXAM: 26-4-2025)

Time : 90 min

Maximum Marks : 50

Part A (Answer any 6 questions. Each carries 2 marks)

1. Compute P(7, 2). 2

2. Determine the value of $\sum_{i=1}^{6}(i^2+1)$. 2

3. In how many ways can one distribute 10 identical white marbles among 6 different containers ? 2

4. In how many ways can one distribute 7 apples and 6 oranges among 4 children so that each child receives at least one apple ? 2

5. If S is a set and $c_i, 1 \leq i \leq t$ are conditions satisfied by some elements of S , then define S_1 and S_2. 2

6. What is the sequence generated by the function $\frac{1}{1-x}$? 2

7. What is the exponential generating function of the sequence $a_0, a_1, a_2, ..., a_r, ...$? 2

8. What is the exponential generating function of the sequence $a_0, a_1, a_2, ..., a_r, ...$? 2

Part B (Answer any 4 questions. Each carries 6 marks)

9. (a) How many permutations are there for the letters of the word SOCIOLOGICAL ?
   (b) In how many arrangements are A and G are adjacent ?
   (c) In how many arrangements are all the vowels adjacent ?
   6

10. Prove that for each integer $n > 0$, $\binom{n}{0} - \binom{n}{1} + \binom{n}{2} - ... + (-1)^n\binom{n}{n} = 0$. 6

11. Determine the number of integer solutions of the equation $x_1 + x_2 + x_3 + x_4 = 32$, where $x_i \geq 0$ for all $i = 1, 2, 3, 4$ 6

12. Determine the number of positive integers n where $1 \leq n \leq 2000$ and n is not divisible by 2 or 5. 6

13. What is the sequence generated by the function $\frac{x^4}{1-x}$? 6

14. Determine the sequence generated by the exponential generating function $f(x) = e^{-x} - 3x^4 + x^2 + 9x$. 6

Part C (Answer any 1 question(s). Each carries 14 marks)

15. (a) State and prove the Binomial theorem.
   (b) Write the expansion of $(2x + 5y)^7$.
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16. A student is to answer 7 out of 10 questions in an examination. In how many ways he can make his selection if
   (a) there are no restrictions ?
   (b) he must answer the first 2 questions ?
   (c) he must answer at least 4 of the first 6 questions ?
   (d) he must answer the questions numbered 2, 6 and 9 ?
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