



TEST-I

Max. Marks : 15

1. If a section has 110 students with 50 students opted for JAVA. 40 students opted for PYTHON, and 30 students opted for neither JAVA nor PYTHON, then how many students in the section opted for both JAVA and PYTHON?
2. The next permutation of 1432 in the reverse lexicographic order is
3. The coefficient of x^{61} in $(x^8 + x^9 + x^{10} + \dots)^7$ is
4. Give an example of self conjugate partition of 15.
5. One of the ways to get the number of partition of 10 with exactly 4 parts is to find the coefficient of x^{10} in the generating function
6. The generating function for the number of partitions with no part greater than k is
7. If there are three candidates and 30 voters then the number of election outcomes are
8. A bit is either 0 or 1, a byte is a sequence of 8 bits. Find the number of bytes that begin with 11 and do not end with 11.
9. How many ways are there to form a sequence of 10 letters from 4 a's, 4 b's, 4 c's and 4 d's if each letter must appear at least twice?
10. A palindromic number is a number that remains the same when its digits are reversed (Example: 1221). That is, it remains same when written forwards or backwards. Assuming any single digit number to be palindromic, find the total number of palindromic integers from 0 till 10^5 .

$(10 \times \frac{1}{2} = 5 \text{ Marks})$

P. T. O. .

11. Use generating functions to show that there are 2^{n-1} ways of enumerating the unrestricted compositions of positive integer n . Illustrate this result with a suitable example.
12. Show that the number of partitions of n in which the largest part is not repeated is equal to the number of unrestricted partitions of $n - 1$, where $n > 1$.
13. By inclusion exclusion principle, find the number of derangements of n symbols $1, 2, 3, \dots, n$.
14. How many ways are there to collect dollar 24 from 4 children and 6 adults if each person gives at least one dollar, but each child can give at most 4 dollars and each adult at most 7 dollars?
15. Given $n = 5$ and marks 1, 2, 3, 4, 5, find the 50^{th} and 100^{th} permutation in the Fike's order.

(5 × 2 = 10 Marks)