MATHS   **Max.Marks:80**

SECTION-1
(SINGLE CORRECT CHOICE TYPE)

Section-I (Single Correct Answer Type, Total Marks: 24) contains 8 multiple choice questions. Each question has four choices (A), (B), (C) and (D) out of which ONLY ONE is correct. For each question you will be awarded 3 marks if you darken ONLY the bubble corresponding to the correct answer and zero marks if no bubble is darkened. In all other cases, minus one (-1) mark will be awarded.

41.   Number of 3-digited numbers in which the digit at hundreds place is greater than

the other two digits is

A) 204   B) 240   C) 281   D) 285

42.   Six persons A, B, C, D, E and F are to be seated at a circular table. In how many

ways can this be done if A must always have either B or C on his right and B

must always have either C or D on his right .

A) 12   B) 20   C) 38   D) 18

43   The number of seven digited natural numbers in which only 2 and 3 are present

as digits(used atleast once) when no two 2's are consective in any number is

A) 26   B) 33   C) 32   D) 53

44. Total number of ways in which n^2 number of identical balls can be put in n

    numbered boxes (1, 2, 3, ... n) such that i^{th} box contains atleast i number of

    balls is

    A) $n^2 C_{n-1}$ B) $n^2-1 C_{n-1}$ C) $\left(\dfrac{n^2+n-2}{2}\right)_{C_{n-1}}$ D) $\dfrac{n^2+n}{2} C_{n-1}$

45. Let N be the number of 7 - digit numbers the sum of whose digits is even .

    The number of positive divisors of N is

    A) 64   B) 72   C) 88   D) 126

46. If n and $2^n - 1$ are prime numbers, then the sum of all the divisors of $(2^n - 1)2^{n-1}$

    is

    A) $2^{n-1}(2^n - 1)$ B) $2^n(2^n - 1)$ C) 2^{2n} D) $4^n - 1$

47. Letters were written to n persons and the addresses on the n - envelopes were correctly written. Let f(n) be the number of ways of putting the letters in the envelops so that no letters goes in to the correctly addressed envelope. Then $f(n) =$

A) $f(n-1) + f(n-2)$ B) $(n-1)f(n-1) + (n-2)f(n-2)$

C) $(n-1)[f(n-1) + f(n-2)]$ D) $nf(n-1) + (n-1)f(n-2)$

48. A, B, C, D develop 18 items. 5 items jointly by A and C, 4 items by A and D, 4 items by B and C and 5 items by B and D. The number of ways of selecting 8 items out of 18 so that the selected ones belong equally to A, B, C, D is

A) 5226 B) 5626 C) 4418 D) 4936

SECTION-2
(MORE THAN ONE TYPE)

Section - II (Multiple Correct Answers Type, Total Marks: 16) contains 4 multiple choice questions. Each question has four choices (A), (B), (C) and (D) out of which ONE or MORE may be correct. For each question you will be awarded 4 marks if you darken ALL the bubble(s) corresponding to the correct answer(s) ONLY and zero marks otherwise. There are no negative marks in this section.

49. A train carrying 6 passengers from a station stops in 5 stations and does not take any more passengers. If at least one passenger gets down in each station the number of different ways, the group of passengers choose to get down is

A) $5^6 - 5_{C_1}4^6 + 5_{C_2}3^6 - 5_{C_3}2^6 + 5_{C_4}1^6$ B) $6_{C_2}.5!$

C) Coefficient of x^6 in $6!(e^x - 1)^5$ D) 1800

50.   Let m be a factor of 120. If λ be the number of positive integral solutions of

$x_1 x_2 x_3 = m$ then λ is divisible by

A) 2   B) 3   C) 5   D) 7

51   Let $S = \{1, 2, \ldots, n\}$. If X denotes the set of all subsets on S containing exactly two

elements. Then the value of $\sum_{A \in X} (\min A)$ *where* $\sum$ runs over all possible subsets is

given by

A) $^{n+1}C_3$ B) $\frac{1}{6}(n^2 - 1)n$ C) $^n C_3$ D) $\frac{1}{6}(n-1)^3$

52.   Using the elements –3, –2, –1 0, 1, 2, 3

A) The number of 3 × 3 matrices having trace 0 is $37(7^6)$

B) The number of 3 × 3 matrices is 7^9

C) The number of 3 × 3 skew symmetric matrices is 7^3

D) The number of 3 × 3 symmetric matrices is 7^6

SECTION-3
[INTEGER TYPE]

Section-III (Integer Answer Type, Total Marks: 24) contains 6 questions. The answer to each of the questions is a single-digit integer, ranging from 0 to 9. The bubble corresponding to the correct answer is to be darkened in the ORS. For each question you will be awarded 4 marks if you darken ONLY the bubble corresponding to the correct answer and zero marks otherwise. There are no negative marks in this section.

53. There are 3 rows containing 2 seats in each row. The number of ways in which 3 persons can be seated such that no row remains empty is p then $\frac{p}{16}=$

54. There are n coplanar lines, no two are parallel and no three are concurrent. If the maximum   number of different new lines that can be formed by joining the points of intersection of the   given lines is (k. $^{n}C_{4}$) then k = _____

55. Number of ways of arranging the letters of the word BANANA so that letters of the same kind are together is _____

56. Number of ways of selecting 4 letters from the letters of the words EQUATION so that "E" "Q" "U" always occur and A never occurs is

57. Number of ways of writing 120 as the product of two factors alone is

58. If $\alpha = x_1 x_2 x_3$ *and* $\beta = y_1 y_2 y_3$ and be two three digit numbers, the number of

    pairs *α and β* and can be formed so that α can be subtracted from β without

    borrowing is $3^P 5^q 11^r$ then the value of p+ q+ r is

SECTION-4

[Matrix Matching Type]

Section-IV (Matrix-Match Type, Total Marks: 16) contains 2 questions. Each question has four statements (A, B, C and D) given in Column I and five statements (p, q, r, s and t) in Column II. Any given statement in Column I can have correct matching with ONE or MORE statement(s) given in Column II. For example, if for a given question, statement B matches with the statements given in q and r, then for the particular question, against statement B, darken the bubbles corresponding to q and r in the ORS. For each question you will be awarded 2 marks for each row in which you have darkened ALL the bubble(s) corresponding to the correct answer(s) ONLY and zero marks otherwise. Thus, each question in this section carries a maximum of 8 marks. There are no negative marks in this section.

59. A function is defined as $f : \{x_1, x_2, x_3, x_4, x_5, x_6\} \rightarrow \{y_1, y_2, y_3\}$

Column I	**Column II**
A) Number of onto functions	P) is divisible by 9
B) Number of functions in which $f(x_i) \neq y_i$	Q) is divisible by 5
C) Number of invertible functions	R) is divisible by 4
D) Number of many one functions	S) is divisible by 3

60.

	Column I		**Column II**
A)	A car will hold 2 persons in the front seat and 1 in the rear seat. If among 6 persons only 2 can drive, the number of ways, in which the car can be filled is	P)	$^{21}C_3$
B)	Six identical coins are arranged in a row. The total number of ways in which the number of heads is equal to the number of tails, is	Q)	$^{14}C_3$
C)	Number of ways in which 22 similar things are distributed to 4 people with each person getting atleast one	R)	20
D)	Number of ways in which a team of 10 members can be selected from 23 members so as to always include 7 particular members and to exclude 2 particular members is	S)	40