Dear student following is a Moderate level [O ● O] test paper. Score of 18 Marks in 15 Minutes would be a satisfactory performance. Questions 1-9(+3, –1) (All questions have only one option correct)

Q.1 A college offers 7 courses in the morning and 5 in the evening. The number of ways a student can select exactly one course, either in the morning or in the evening-

(A) 12 (B) 35 (C) 24 (D) None

Q.2 The number of three digit natural numbers having digits in increasing order from left to right is-

(A) 343 (B) 84 (C) 210 (D) None

Q.3 In how many ways 10 boys and 5 girls can sit around a circular table so that no two girls sit together-

(A) $^{10}P_5$ (B) $9!\,^{9}P_5$ (C) $10!\,^{10}P_5$ (D) $9!\,^{10}P_5$

Q.4 There are two boys B_1 and B_2, B_1 has n different toys and B_2 has n_2 different toys. The number of ways in which B_1 & B_2 can exchange their toys in such a way that after exchanging they still have same number of toys but not the same set-

(A) $^{n_1+n_2}C_{n_1}$ (B) $^{n_1+n_2}C_{n_1} - 1$

(C) $^{n_1+n_2}C_{n_2}$ (D) None

Q.5 Number of different garlands using 3 flowers of one kind and 12 flowers of second kind is-

(A) 19 (B) $11! \times 2!$

(C) $^{14}C_2$ (D) None of these

Q.6 The number of signals that can be generated by using 6 differently coloured flags, when any number of them may be hoisted at a time is-

(A) 1956 (B) 1957

(C) 1958 (D) 1959

Q.7 The number of ways in which a mixed double game can be arranged amongst 9 married couples if no husband and wife play in the same game is-

(A) 756 (B) 1512

(C) 30 24 (D) None of these

Q.8 The value of the expression $^{k-1}C_{k-1} + {}^{k}C_{k-1} + \ldots\ldots\ldots + {}^{n+k-2}C_{k-1}$ is-

(A) $^{n+k-1}C_{k+1}$ (B) $^{n+k-1}C_{k-1}$

(C) $^{n+k}C_k$ (D) None of these

Q.9 The number of ways of arranging six persons (having A, B, C and D among them) in a row so that A, B, C and D are always in order ABCD (not necessarily together) is-

(A) 4 (B) 10 (C) 30 (D) 720

MATHEMATICS IIT JEE (AUGUST 5th WEEK CLASS TEST 2) (PERMUTATION & COMBINATION) ANSWER KEY

Name : .... Roll No. : ....

	A	B	C	D		A	B	C	D		A	B	C	D
1	⬭	⬭	⬭	⬭	4	⬭	⬭	⬭	⬭	7	⬭	⬭	⬭	⬭
2	⬭	⬭	⬭	⬭	5	⬭	⬭	⬭	⬭	8	⬭	⬭	⬭	⬭
3	⬭	⬭	⬭	⬭	6	⬭	⬭	⬭	⬭	9	⬭	⬭	⬭	⬭

ANSWER KEY

Que.	1	2	3	4	5	6	7	8	9
Ans.	A	B	D	B	A	A	B	B	C

SOLUTIONS

Sol.1 (A)

The student has seven choices from the morning courses out of which he can select one course in 7 ways.

For the evening course, he has 5 choices out of which he can select one course in 5 ways.

Hence total number of choices = 7 + 5 = 12

Sol.2 (B)

Here rule of product is not applicable, so right approach for this problem is that first select three distinct non zero digits which can be done in ${}^9C_3$ ways, then arrange then in increasing order which can be done in one way only.

The required no. of natural numbers is ${}^9C_3 \times 1 = 84$

Sol.3 (D)

10 boys can be seated in a circle in 9! ways.

There are 10 spaces in between the boys which can be occupied by 5 girls in ${}^{10}P_5$ ways.

Hence total number of ways = $9! \times {}^{10}P_5$.

Sol.4 (B)

Total number of toys = $n_1 + n_2$

Now let us keep all toys at one place and ask B_1 to pick up any n_1 toys out of these $n_1 + n_2$ toys. He can do it in ${}^{n_1+n_2}C_{n_1}$ ways, out of these ways there is one way when he pick up those n_1 toys which he was initially having.

Thus required number of ways are

$${}^{n_1+n_2}C_{n_1} - 1$$

Sol.5 (A)

Number of different garlands will be equal to number of different solutions of the equation a + b + c = 12 without taking order of a, b and c into consideration.

Sol.6 (A)

When one flag is used, the number of signals that can be generated is ${}^6P_1$. When two flags are used, the number of signals that can be generated is ${}^6P_2$, when three flags are used, the number of signals that can be generated is ${}^6P_3$ and so on. Hence, the number of different signals that can be generated is

${}^6P_1 + {}^6P_2 + {}^6P_3 + {}^6P_4 + {}^6P_5 + {}^6P_6$

= 6 + 30 + 120 + 360 + 720 + 720 = 1956

Sol.7 (B)

We can choose two men out of 9 in ${}^9C_2$ ways. Since no husband and wife are to play in the same game, two women out of the remaining 7 can be chosen in ${}^7C_2$ ways. If M_1, M_2, W_1 and W_2 are chosen, then a team may consist of M_1 and W_1 or M_1 and W_2. Thus the number of ways of arranging the game is

$$({}^9C_2)\,({}^7C_2)\,(2)$$

$$= \frac{9 \times 8}{2} \times \frac{7 \times 6}{2} \times 2 = 1512$$

Sol.8 (B)

We have ${}^{k-1}C_{k-1} + {}^kC_{k-1} + \ldots\ldots + {}^{n+k-2}C_{k-1}$

$= {}^kC_k + {}^kC_{k-1} + {}^{k+1}C_{k-1} \ldots\ldots. + {}^{n+k-2}C_{k-1}$

[Since ${}^kc_k = 1 = {}^{l-1}C_{k-1}$]

$= {}^{k+1}C_k + {}^{k+1}C_{k-1} + \ldots\ldots + {}^{n+k-2}C_{k-1}$

[Since ${}^kC_k + {}^kC_{k-1} = {}^{k+1}C_k$]

$= {}^{k+2}C_k + \ldots\ldots\ldots + {}^{n+k-2}C_{k-1} = \ldots\ldots.$

$= {}^{n+k-2}C_k + {}^{n+k-2}C_{k-1} = {}^{n+k-1}C_{k-1}$.

Sol.9 (C)

The number of ways of arranging ABCD is 4!. For each arrangement of ABCD, the number of ways of arranging six persons is same.

Hence required number is $\frac{6!}{4!} = 30$.