

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** How many 4 letter words can be formed using a, b, c, d and e when repetition is allowed
 (A) 120 (B) 625 (C) 150 (D) None
- (A) 12! (B) $\frac{12!}{2}$
- Q.2** A colour box has 3 red colours of different shades, 2 white colours of different shades and 7 green colours of different shades. In how many ways can 3 colours be taken from the box if at least one of them is red-
 (A) ${}^3C_1 + {}^3C_2 \times {}^9C_1 + {}^3C_3 \times {}^9C_0$
 (B) ${}^3C_2 \times {}^9C_1 + {}^3C_2 \times {}^9C_1 + {}^3C_3 \times {}^9C_0$
 (C) ${}^3C_1 \times {}^9C_2 + {}^3C_2 \times {}^9C_1 + {}^3C_3 \times {}^9C_0$
 (D) ${}^3C_1 \times {}^9C_1 + {}^3C_2 \times {}^9C_2 + {}^3C_3 \times {}^9C_3$
- (C) $\frac{11!}{2}$ (D) None of these
- Q.6** How many numbers between 400 and 1000 can be made with the digits 2, 3, 4, 5, 6 and 0
 (A) $3 \times {}^5P_2$ (B) 5P_2
 (C) $3 \times {}^5P_1$ (D) None of these
- Q.3** How many 7 - letter words can be formed using the letters of the word ALABAMA
 (A) $7 \times 6 \times 5$ (B) 7!
 (C) $7 \times 7 \times 7$ (D) None of these
- Q.7** A gentleman has 6 friends to invite. In how many ways can he send invitation cards to them if he has three servants to carry the cards-
 (A) 3^6 (B) 6P_3
 (C) 6! (D) $6 \times 5 \times 4$
- Q.4** Consider 23 different coloured beads in a necklace. In how many ways can the beads be placed in the necklace so that 3 specific beads always remain together
 (A) $20! 3!$ (B) $\frac{20! 3!}{2}$
 (C) $\frac{19! 3!}{2!}$ (D) None of these
- Q.8** A letter lock consists of three rings each marked with 10 different letters. In how many ways it is possible to make an unsuccessful attempt to open the lock-
 (A) 1000 (B) 999
 (C) 998 (D) None of these
- Q.5** 10 distinct balls have to be put in 3 different boxes. In how many ways can we do this if the order in which we put the balls in the boxes is also considered-
 (A) 120 (B) $5! \times 5!$
 (C) $5 \times 5!$ (D) None of these
- Q.9** A library has two books each having three copies and three other books each having two copies. In how many ways can all these books be arranged in a shelf so that copies of the same book are not separated-
 (A) 120 (B) $5! \times 5!$
 (C) $5 \times 5!$ (D) None of these



MATHEMATICS IIT JEE (AUGUST 5th WEEK CLASS TEST 1) (PERMUTATION & COMBINATION) ANSWER KEY

Name :				Roll No. :								
	A	B	C	D	A	B	C	D	A	B	C	D
1	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	4	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	7	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	5	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	8	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	6	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	9	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

ANSWER KEY

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

SOLUTIONS
Sol.1 (B)

The number of words that can be formed is equal to the number of ways of filling the four places.

i.e. first place can be filled in 5 ways. If repetition is allowed, all the remaining places can be filled in 5 ways each.

⇒ $5 \times 5 \times 5 \times 5 = 625$ words can be formed

Sol.2 (C)

We have got 3 red colours, 2 white colours & 7 green colours.

There are 3 ways to take 3 colours from the box.

(i) 1 Red 2 Other no. of ways ${}^3C_1 \times {}^9C_2$

(ii) 2 Red 1 Other no. of ways ${}^3C_2 \times {}^9C_1$

(iii) 3 Red 0 Other no. of ways ${}^3C_3 \times {}^9C_0$

Thus total no. of ways is

$${}^3C_1 \times {}^9C_2 + {}^3C_2 \times {}^9C_1 + {}^3C_3 \times {}^9C_0$$

Sol.3 (A)

ALABAMA has 4 A's but the rest are all different. Hence the number of words that can be formed is

$$\frac{7!}{4!} = 7 \times 6 \times 5 = 210$$

Sol.4 (B)

By theory, let us consider 3 beads as one. Hence we have, in effect, 21 beads, 'n' = 21. The number of arrangements = $(n - 1)! = 20!$

Also, the number of ways in which 3 beads can be arranged between themselves is $3! = 3 \times 2 \times 1 = 6$.

Thus the total number of arrangements = $(1/2) \cdot 20! \cdot 3!$.

Sol.5 (B)

Let the balls be B_1, B_2, \dots, B_{10} and the boxes be b_1, b_2, b_3

Let us also introduce two identical markers X(say).

Now, if we take any permutations of 10 distinct balls and these two identical markers then these two markers divide the balls in 3 parts (in order) which we can put in the boxes b_1, b_2, b_3 , in the same order. So each permutation of these 12 objects in which 10 are distinct and 2 identical give a way of the required arrangement. So number of required ways = No. of permutation of these 12

$$\text{objects} = \frac{12!}{2!}.$$

Sol.6 (A)

(Here nothing has been given about repetition of digits, therefore, we will assume that repetition of digits is not allowed).

Any number between 400 and 1000 will be of three digits.

Since the number should be greater than 400, therefore, hundreds place can be filled up by any one of the three digits 4, 5 and 6 in 3 ways.

Remaining two places can be filled up by remaining five digits in 5P_2 ways.

$$\therefore \text{Required number} = 3 \times {}^5P_2 = 3 \times \frac{5!}{3!} = 60.$$

Sol.7 (A)

Invitation cards may be sent to each of the six friends by any one of the three servants in 3 ways.

$$\therefore \text{Required number} = 3 \times 3 \times 3 \times 3 \times 3 \times 3 = 3^6 = 729$$

Sol.8 (B)

Each of the three rings can have any one of the 10 different letters below the given mark in 10 ways.

$$\begin{aligned} \therefore \text{Total number of attempts} \\ = 10 \times 10 \times 10 = 1000 \end{aligned}$$

But out of these 1000 attempts only one attempt is successful.

$$\begin{aligned} \therefore \text{Required number of unsuccessful attempts} \\ = 1000 - 1 = 999 \end{aligned}$$

Sol.9 (A)

Regarding all copies of the same book as one book, we have only 5 books.

These 5 books can be arranged in $5!$ ways. But all copies of the same book being identical can be arranged in only one way.

$$\begin{aligned} \therefore \text{Required number} \\ = 5! \times 1 \times 1 \times 1 \times 1 \times 1 = 120 \end{aligned}$$