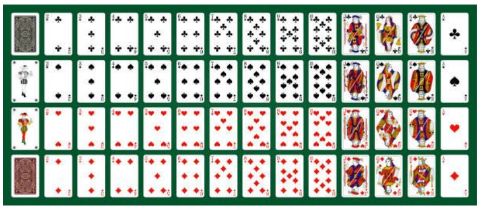
CHAPTER-7
PERMUTATIONS & COMBINATIONS
05 MARK TYPE QUESTIONS

Q. NO	QUESTION	MARK
1.	What is the number of ways of choosing 4 cards from a pack of 52 playing cards? In how (i) four cards belong to four different suits? (ii)two are red cards and two are black cards? (iii) four cards are of the same suit? (iv) four cards are face cards? (v) cards are of the same colour? 	5
2.	Members of the XYZ group, Ravi , Rahul , Kunal, Gyatri, Geeta and sunita are seated in a row for photo session. (i) Total numbers of ways of sitting arrangement of seven members ? (ii) Total number of arrangements so that Ravi and Gyatri are at extreme positions. (iii) Total number of arrangements if Geeta is sitting in the middle. (iv) Total number of arrangement if Kunal and Geeta are sit together. (v) Total number of arrangement if Kunal and Geeta never sit together.	5
3.	In a company , CEO wants to established a new branch, new branch required a committed of 5 numbers is to be formed out of 6 gents & 4 ladies . In how many ways this can be done, when i) At least two ladies are included. ii) At most two ladies are included.	5
4.	The longest rivers of north America is MISSISSIPPI River. How many ways can the letters of the word MISSISSIPPI be arranged such that i) All letters are used. ii) All I's are together. iii) All I's are not together. iv) All S's are not together.	5
5.		5

	During the math class, a teacher clears the concept of permutation and combination to the 11th standard students. After the class was over he asks the students some questions. (i) How many numbers between 99 and 1000 (bothexcluding) can be formed such that every digit is either 3 or 7. (ii) How many numbers between 99 and 1000 (both excluding) can be formed such thatthere is no restriction (iii) The number of numbers lying between 99 and 1000 which can be formed using the digits 2, 3, 7, 0, 6, 8 when no digit is being repeated (iv) How many numbers between 99 and 1000 (both excluding) can be formed such that the digit in hundred's place is 7. (v) How many numbers are there between 99 and 1000 which have exactly one of their digits as 7?	
6.	 Four friends are playing with cards. They are choosing 4 cards from a pack of 52 playing cards. Using these information answer the following questions. (i) How many of these four cards are of the same suit? (ii) How many of these four cards belong to four different suits? (iii) How many of these four cards are face cards? (iv) How many of these two are red cards and two are black cards? (v) How many of these four cards are of the same colour?	5
7.	Arrangement of the letters of the word INSTITUTIONS than find:- (a) Total arrangement. (b) If all vowels come together. (c) If no vowels come together. (d) Starting with I and end with S. (e) All vowels come together and all consonant come together.	5
8.	Using the digits 1, 2, 3, 4, 5, 6, 7, a number of 4 different digits is formed. Find (a) How many numbers are formed? (b) How many numbers are exactly divisible by 2? (c) How many numbers are exactly divisible by 25? (d) How many of these are exactly divisible by 4? (e) How many even number can be formed?	5

ANSWERS:

Q. NO	ANSWER	MARKS
1.	(i) There are four suits (diamond, spade, club and heart) of 13 cards each. Therefore, there are 13C4 ways of choosing 4 diamond cards, 13C4 ways of choosing 4 club cards, 13 C4 4 ways choosing 4 spade cards and 13C4 ways of choosing heart cards. Required number of ways 13C4+13C4+ 13C4+ $13C_1$ =4x 13C4=4x 13! 914! =2860 (ii) There are 13 cards in each suit. Four cards drawn belong to four different suits means one card is drawn from each suit. Out of 13 diamond cards one card can be drawn in ${}^{13}C_1$ ways. Similarly, there are ${}^{13}C_1$ways of choosing one club card, ${}^{13}C_1$ ways of choosing one spade card and ${}^{13}C_1$ ways of choosing one heart card. Number of ways of selecting one card from each suit = ${}^{13}C_1$ x ${}^{13}C_1$x ${}^{13}C_1$x ${}^{13}C_1$ =13^4 (iii) There are 12 face cards out of which 4 cards can be chosen in ${}^{12}C_4$ ways. Required number of ways = ${}^{12}C_4$ = 495 ways (iv) There are 26 red cards and 26 black cards. Therefore, 2 red cards can be chosen in ${}^{26}C_2$ ways and 2 black cards can be chosen in ${}^{26}C_2$ ways. Hence, 2 red and 2 black cards can be chosen in 26! 24! 2! =$(325)^2$=105625 ways. (v) Out of 26 red cards, 4 red cards can be chosen in ${}^{26}C_4$ ways. Similarly, 4 black cards can be chosen in ${}^{26}C_4$ ways. Hence, 4 red or 4 black cards can be chosen in ${}^{26}C_4$ + ${}^{26}C_4$ = 2 x ${}^{26}C_4$= 29900 ways	5
2.	(i) Total numbers of ways of sitting arrangement of seven members = 7! = 5040 (ii) Total number of arrangements so that Ravi and Gyatri are at extreme positions = Ravi __ ___ ___ ___ ___ ___ Gyatri Gyatri ___ ___ ___ ___ ___ ___ Ravi = 2 x 5! = 2 x 120 = 240 (iii) Total number of arrangements if Geeta is sitting in the middle. ___ ___ ___ Geeta ___ ___ ___ = 6 x 5 x 4 x 3 x 2 x 1 = 720 (iv) Total number of arrangement if Kunal and Geeta are sit together. ___ ___ ___ ___ ___ ___ Kunal ,Geeta = 2 x 6! = 1440 (v) Total number of arrangement if Kunal and Geeta never sit together. Total arrangement – always together = 5040 – 1440 = 3600	5

3.	i) At least two ladies are included. No of ways = $4c_2 X\ 6c_3 +\ 4c_1\ X\ 6c_4 + 4c_0\ X\ 6c_5 = 186$ ii) At most two ladies are included. No. of ways = $4c_2\ X\ 6c_3 +\ 4c_1\ X\ 6c_4 + 4c_0\ X\ 6c_5 = 186$	5
4.	i) All letters are used = $\frac{11!}{4!.4!.2!}$ = 34560 ii) All I's are together = $\frac{8!}{4!.2!}$ = 840 iii) All I's are not together = 34560 – 840 = 33810 iv) All S's are not together = $\frac{11!}{4!.4!.2!}$ - $\frac{8!}{4!.2!}$ = 34560 – 840 = 33810	5
5.	(i) When there are three 3's=1 When two 3's and one 7's=3!/2!=3 When one 3 and two 7's =3!/2!=3 When three 7's=1 Total possible number=1+3+3+1=8 (ii) Total possible number=900 (iii) Digits are 2, 3, 7, 0, 6, 8 i.e. six in all. We have to form a number between 99 and 1000. Clearly, they will be of three digits and their number will be $^6P_3=6\times5\times4=120$ Out of these, we have to exclude those numbers of 3 digits which have zero in the first place. When the first place is filled by 0, remaining numbers can be arranged in $^5P_2$ ways. Their number is $^5P_2=5\times4=20$ ∴ The required number is 120-20=100 (iv) Total possible number= $1\times 10 \times 10 = 100$ (v) Let a 3-digit number ABC Case (1) If A=7, then B and C can be any digit but not 7 so, total 9 digits (0,1,2,3,4,5,6,8,9) can replace B and C Then total such combinations =1(9)(9)=81 Case (2) If B=7 then A can be any digit but not 0 and 7, because if A=0 it will be a 2-digit number. And C can be any digit but not 7 Then total combinations =(8)(1)(9)=72 Case (3) If C=7 then A can be any digit but not 0 and 7, because if A=0 it will be a 2-digit number. And B can be any digit but not 7 Then total combinations =(8)(9)(1)=72 So, total numbers between 99 and 1000 which have exactly one of their digits as 7 are =81+72+72=225	5
6.	(i) Required number of ways=$^{13}C_4+^{13}C_4+^{13}C_4+^{13}C_4=4\times^{13}C_4=2860$ (ii) Required number of ways=$^{13}C_1\times^{13}C_1\times^{13}C_1\times^{13}C_1=13^4$ (iii) Required number of ways=$^{12}C_4=495$ (iv) Required number of ways=$^{26}C_2\times^{26}C_2=105625$ (v) Required number of ways=$^{26}C_4+^{26}C_4=2\times^{26}C_4=29900$	5
7.	In the word INSTITUTIONS . I – 3 , T – 3 ,S – 2 , N- 2,0 – 1 and U -1 (a)Total number of arrangements = $\frac{12!}{3!3!2!2!}$ (b)Vowels together are – IIIOU Require number of arrangement vowels together = $\frac{5!}{3!}\ \frac{8!}{3!2!2!}$ (c)Require number of arrangement vowels not together = $\frac{5!}{3!}\ \frac{7!}{3!2!2!}$	5

	(d) number of arrangement starting with I and end with S = $\frac{10!}{2!3!2!}$ (e) Total arrangement. All vowels come together and all consonant come together= 2! $\frac{5!}{3!}\frac{7!}{3!2!2!}$	
8.	(a) number of ways 4 digit form = 7 X 6 X 5 X 4 = 840 (b) last digit is number divisible by two if 2,4 and 6 so last digit can be filled up three ways remaining digit can be filled up = 6 X 5 X 4 =120 Required number = 3 X 120 = 360 (c)) number divisible by twenty if last two digit is 25 or 75 so two digit can be filled in two so remaining digit can be filled up = 4 X 5 = 20 Required number = 2 X 20 = 40 (d)) number divisible by four if last two digit must be 12, 16 , 24, 32 ,36,52,56,64,72 and 76that is ten ways remaining two digit can be filled up = 4 X 5 = 20 Required number = 10 X 20 = 200 (e)if the number is even then last digit can be 2,4 ,and this can be filled in three ways so remaining three digit can be filled up = 6X 6 X 6 = 216 Required number = 216 X 3 = 648	5