Chapter Five: Permutations and Combinations

Creative Essay Type

1. ▶ $A=\begin{bmatrix}1 & 3 & -2\\ 2 & 5 & -4\\ 3 & 7 & -5\end{bmatrix}, B=\begin{bmatrix}3 & 2 & 1\\ 6 & 4 & 3\\ 9 & 8 & 4\end{bmatrix}, C=\begin{bmatrix}3\\ 7\\ 11\end{bmatrix}, D=\begin{bmatrix}x\\ y\\ z\end{bmatrix}$

[Cumilla Cadet College, Cumilla]

a. The digits from 0 to 9 are written in a telephone dial. If the telephone numbers of Dhaka are of 5 digits, how many telephone connections can be given in Dhaka, if the telephone numbers are not starting with 0 (zero). 2

b. Find A^{-1}. 4

c. Find the value of x, y, z with the help of determinant when BD = C. 4

Ans: See HSC EV Higher Mathematics 1st Paper 5th Chapter Note Ques. No. 12 of Answer Paper.

2. ▶ (i) MANNERS

(ii) There are 7 men and 6 women in a institute.

[Jhenidah Cadet College, Jhenidah]

a. An organization has recruited 5 employees in two institutes. In how many ways 2 employees can be recruited for one institute and 3 employees for other? 2

b. How many words can be formed taking 3 letters from the word (i) at a time? 4

c. Using (ii), in how many ways can a committee of 5 persons be formed consisting at best 3 men? 4

Ans: See HSC EV Higher Mathematics 1st Paper 5th Chapter Note Ques. No. 16 of Answer Paper.

3. ▶ Going to EXAMINATION center a group of 15 students is to travel in two vehicles, one of which will not hold more than 12 and the other not more than 5.

[BAF Shaheen College, Dhaka]

a. How many four digits meaningful numbers be formed by using 0, 1, 2, 4, 6? 2

b. In how many ways above groups of students in the stem can travel in two vehicles. 4

c. How many different words can be formed from the letters of the word taken at a time which underline marking in the stem. 4

Ans: See HSC EV Higher Mathematics 1st Paper 5th Chapter Note Ques. No. 21 of Answer Paper.

4. ▶ A group of 12 students has come from AUSTRALIA in a study tour. They have to travel in two vehicles.

[Milestone College, Dhaka]

a. Find the domain of the function, $f(x)=\frac{x+1}{3x-1}$ 2

b. If one of vehicles of the group of stems will not hold more than 9 and other not more than 5, then in how many ways can the group travel? 4

c. Find the number of arrangement that can be made of the letters of the word AUSTRALIA. 4

Ans: See HSC EV Higher Mathematics 1st Paper 5th Chapter Note Ques. No. 22 of Answer Paper.

Creative Multiple Choice

1. ${}^nP_0$ = what?

ⓐ 0 ⓑ $n!$

ⓒ n ⓓ 1 **ⓓ**

2. 0! = what?

ⓐ 0 ⓑ 1

ⓒ n ⓓ Infinite **ⓑ**

3. ${}^6P_3$ = what?

ⓐ 18 ⓑ 30

ⓒ 120 ⓓ 720 **ⓒ**

4. If ${}^nP_r = 120$ and ${}^nC_r = 20$, then what is the value of r?

ⓐ 6 ⓑ 5

ⓒ 3 ⓓ 2 **ⓒ**

5. ${}^nC_r$ = what?

ⓐ $\frac{n!}{r!(n-r)!}$ ⓑ $\frac{n!}{(n-r)!}$

ⓒ $n!$ ⓓ $\frac{n}{r(n-r)}$ **ⓐ**

6. In how many ways 5 coins can be dropped in 4 charity boxes?

ⓐ 4^{5-1} ⓑ 4^5

ⓒ 5^4 ⓓ 5^5 **ⓑ**

7. How many possible words can be formed by taking 5 letters each time from the English alphabet?

ⓐ 26! ⓑ 7893600

ⓒ 65780 ⓓ 30360 **ⓑ**

8. How many numbers greater than 7200 can be made using the digits 2, 3, 7, 8 one-time?

ⓐ 24 ⓑ 6

ⓒ 12 ⓓ 10 **ⓒ**

9. How many ways the numbers can be formed which are greater than 2000 and less than 3000 using the digits 1, 2, 3, 4 without any repetition of the digits?

ⓐ 6 ⓑ 18

ⓒ 24 ⓓ 48 **ⓐ**

10. In how many ways can the letters of the word 'EQUATION' be rearranged?

ⓐ 40319 ⓑ 40320

ⓒ 181440 ⓓ 362880 **ⓐ**

11. How many permutations are possible by using all the letters of the word 'CRITICAL'?

ⓐ 40320 ⓑ 20160

ⓒ 10080 ⓓ 70 **ⓒ**

12. In how many different ways can the letters of the word 'MISSISSIPPI' be arranged?

ⓐ 34650 ⓑ 34649

ⓒ 11 ⓓ 10 **ⓑ**

13. In how many ways can 7 persons take seat in a round table?

ⓐ 720 ⓑ 2519

ⓒ 2520 ⓓ 2521 **ⓐ**

14. In how many ways 8 pearls be arranged in a necklace?

ⓐ 720 ⓑ 2520

ⓒ 5040 ⓓ 20160 **ⓑ**

15. What is the number of ways to distribute 52 cards equally among 4 persons?
ⓐ $\frac{52!}{(13!)^2}$ ⓑ $\frac{52!}{13!}$
ⓒ $\frac{52!}{(13!)^3}$ ⓓ $\frac{52!}{(13!)^4}$ **ⓓ**

16. In how many arrangement of 5 items taking from 10 items there always exist 2 particular items?
ⓐ 20 ⓑ 336
ⓒ 6720 ⓓ 36,28,800 **ⓒ**

17. How many straight lines can be drawn by 15 points where any three points are not collinear?
ⓐ 14 ⓑ 15
ⓒ 105 ⓓ 455 **ⓒ**

18. How many people were present in the meeting if the number of handshakes with each other is 45?
ⓐ 9 ⓑ 10
ⓒ 22 ⓓ 23 **ⓑ**

19. For $n!$ –
i. $n \in \mathbb{N} \cup \{0\}$
ii. $n \in \mathbb{Z}$
iii. $\frac{n!}{0!} = n!$
Which of the following is correct?
ⓐ i & ii ⓑ i & iii
ⓒ ii & iii ⓓ i, ii & iii **ⓑ**

20. For ${}^nP_r$ –
i. if $r = n$ the value is 1
ii. $n \geq r$
iii. $r < 0$
Which of the following is correct?
ⓐ i & ii ⓑ i & iii
ⓒ ii & iii ⓓ i, ii & iii **ⓐ**

21. If ${}^nP_r = 240$ and ${}^nC_r = 120$ then—
i. $r = 3$
ii. $n = 16$
iii. $n - {}^3C_r = 13$
Which of the following is correct?
ⓐ i and ii ⓑ i and iii
ⓒ ii and iii ⓓ i, ii and iii **ⓒ**

22. The letters of the word 'BUILDING' has –
i. number of rearrangement 20159
ii. number of permutations where two 'I's occupy the first and last place 720
iii. number of permutations where the vowels occur together 360
Which of the following is correct?
ⓐ i & ii ⓑ i & iii
ⓒ ii & iii ⓓ i, ii & iii **ⓐ**

23. The letters of word 'PARALLEL' can be arranged?
i. taking all at a time 3360
ii. without changing the order of vowels 1120
iii. without changing the order of consonants 168
Which of the following is correct?
ⓐ i & ii ⓑ i & iii
ⓒ ii & iii ⓓ i, ii & iii **ⓓ**

24. Taking the letters of the word 'THESIS' —
i. total number of arrangement taking all the numbers is 360
ii. total number of arrangement taking vowels together is 240
iii. total number of arrangement taking vowels that are not together is 240
Which of the following is correct?
ⓐ i and ii ⓑ i and iii
ⓒ ii and iii ⓓ i, ii and iii **ⓑ**

25. The number of arrangement of the word 'MATURITY' —
i. taking all the letters is 20160
ii. taking M in first place is 5040
iii. taking M not in first place is 17640
Which of the following is correct?
ⓐ i and ii ⓑ i and iii
ⓒ ii and iii ⓓ i, ii and iii **ⓑ**

26. It is possible to form by 10 sides —
i. 120 triangles
ii. 210 quadrilaterals
iii. 252 pentagons
Which of the following is correct?
ⓐ i and ii ⓑ i and iii
ⓒ ii and iii ⓓ i, ii and iii **ⓓ**

Answer the questions (27 & 28) on the basis of following information:
The letters of the word 'PARALLEL' can be arranged in different ways.

27. In how many ways can be arranged the word taking all letters?
ⓐ 40320 ⓑ 6720
ⓒ 3360 ⓓ 360 **ⓒ**

28. What is the number of arrangement taking all the vowels together?
ⓐ 360 ⓑ 3360
ⓒ 36000 ⓓ 40320 **ⓐ**

Answer the questions (29 & 30) on the basis of the following information:
Triangles can be formed by joining the angular points of a 16 sided polygon.

29. How many triangles can be formed?
ⓐ 120 ⓑ 240
ⓒ 560 ⓓ 3360 **ⓒ**

30. How many diagonals are there in the polygon?
ⓐ 16 ⓑ 32
ⓒ 104 ⓓ 120 **ⓒ**

Answer the questions (31 & 32) on the basis of the following information:
KACHUA is the name of a place.

31. In how many ways can the letters of the word be arranged?

ⓐ 720 ⓑ 360

ⓒ 180 ⓓ 90 **ⓑ**

32. In how many ways can the word be arranged keeping the two A's together?

ⓐ 6! ⓑ 5!

ⓒ $\frac{6!}{2!}$ ⓓ $\frac{5!}{2!}$ **ⓑ**

Answer the questions (33 & 34) on the basis of the following information:

1, 2, 3, 4, 5, 6, 7, 8, 9 these nine digits can be arranged in many different ways.

33. In how many ways can these digits be arranged keeping even digits at the first and last place?

ⓐ 2880 ⓑ 60480

ⓒ 100800 ⓓ 362880 **ⓑ**

34. In how many ways can these digits be arranged keeping odd digits at the first, middle and last place?

ⓐ 2880 ⓑ 17280

ⓒ 43200 ⓓ 100800 **ⓒ**

Answer the questions (35 & 36) on the basis of following information:

A committee of 6 persons is to be formed within 8 boys and 2 girls.

35. In how many ways the committee can be formed taking the girls in each case?

ⓐ 16 ⓑ 28

ⓒ 70 ⓓ 105 **ⓒ**

36. In how many ways the committee can be formed not taking the girls in each case?

ⓐ 315 ⓑ 105

ⓒ 70 ⓓ 28 **ⓓ**

37. How many numbers are divided by 2 from the 3 digit numbers formed by 1, 2, 0? *[DU. 16-17]*

ⓐ 6 ⓑ 18

ⓒ 4 ⓓ 12 **ⓓ**

38. How many ways the word 'MATHEMATICS' can be arranged so that the letter 'T' always in first and last position? *[DU. 16-17]*

ⓐ 10080 ⓑ 9680

ⓒ 50720 ⓓ 90720 **ⓓ**

39. How many ways the word 'TEXTILE' can be arranged so that the letter 'E' always in first and last position? *[DU. 16-17]*

ⓐ 1260 ⓑ 120

ⓒ 60 ⓓ 80 **ⓒ**

40. In how many ways a group of 3 boys and 2 girls can be formed from 6 boys and 5 girls? *[DU. 15-16]*

ⓐ 10 ⓑ 20

ⓒ 50 ⓓ 200 **ⓓ**

41. How many arrangements can be made with the letters of the word "COURAGE" so that they begin with a vowel? *[DU. 14-15]*

ⓐ 180 ⓑ 720

ⓒ 2880 ⓓ 5040 **ⓒ**

42. How many numbers can be formed between 100 and 500 using the digits 1, 2, 3, 4, 5, 6, 7 without repetition? *[DU. 13-14]*

ⓐ 60 ⓑ 120

ⓒ 210 ⓓ 240 **ⓑ**

43. How many triangle can be formed from the line segment of lengths1, 2, 3, 4? *[DU. 13-14]*

ⓐ 1 ⓑ 2

ⓒ 3 ⓓ 4 **ⓐ**

44. How many arrangements can be made with the letters of the word 'CALCULUS' so that the letter 'U' always in first and last position? *[DU. 11-12]*

ⓐ 90 ⓑ 180

ⓒ 280 ⓓ 360 **ⓑ**

45. How many arrangements can be made with the letters of the word 'Engineering' keeping all 'e' together? *[DU. 10-11]*

ⓐ 1512 ⓑ 1680

ⓒ 15120 ⓓ 277200 **ⓒ**

46. How many combination can be made with the letters of the word 'SCHOOL' taking 3 letters at a time? *[DU. 07-08]*

ⓐ 10 ⓑ 14

ⓒ 4 ⓓ 15 **ⓑ**

47. How many ways a committee of 5 students can be formed from 6 male and 5 female students taking at least a male and a female student? *[DU. 09-10]*

ⓐ 144 ⓑ 360

ⓒ 455 ⓓ 720 **ⓒ**

48. How many arrangements can be made with the letters of the word 'Courage' so that a consonant always in the first position? *[BUET. 13-14]*

ⓐ 720 ⓑ 1260

ⓒ 2106 ⓓ 2160 **ⓓ**

49. How many ways can 8 different pearls be strung on a band to form a necklace? *[BUET. 12-13]*

ⓐ 7! ⓑ 8!

ⓒ $\frac{7!}{2}$ ⓓ $\frac{8!}{2}$ **ⓒ**

50. After a meeting all members shake hand with each other. If the number of handshakes is 66 then how many members were present there? *[BUET. 12-13]*

ⓐ 11 ⓑ 12

ⓒ 24 ⓓ 33 **ⓑ**

51. How many numbers can be formed greater than 4000 using the digits 0, 3, 5, 6, 8 without repetition? *[BUET. 11-12]*

ⓐ 144 ⓑ 168

ⓒ 192 ⓓ 336 **ⓑ**

52. How many different word can be formed from 7 consonants and 3 vowels consisting of 3 consonants and 2 vowels? *[BUET. 10-11]*

ⓐ 4200 ⓑ 5600

ⓒ 8320 ⓓ 12600 **ⓓ**

53. 5 persons have to select from 6 boys and 4 girls for admission to a particular course. How many ways to select them taking 2 girls exactly? *[BUET. 08-09]*

ⓐ 110 ⓑ 120
ⓒ 125 ⓓ 130 **ⓑ**

54. What is the value of ${}^{n}C_{r} + {}^{n}C_{r-1}$? *[KUET. 11-12, BUTEX. 11-12]*

ⓐ ${}^{n+3}C_{r-1}$ ⓑ ${}^{n-3}C_{r+1}$
ⓒ ${}^{n+1}C_{r}$ ⓓ ${}^{n-1}C_{r}$ **ⓒ**

55. How many telephone connection can be made of city Khulna consisting of 6 digits and starting from 72, 73, or 76? *[KUET. 10-11]*

ⓐ 10^4 ⓑ 10^6
ⓒ 3×10^4 ⓓ 3×10^6 **ⓒ**

56. How many arrangements can be made with the letters of the word 'Institute' so that the vowels always take the even position? *[KUET. 09-10]*

ⓐ 240 ⓑ 280
ⓒ 380 ⓓ 440 **ⓐ**

57. How many arrangements can be made with the letters of the word 'Immediate' having 't' at the beginning and 'a' at the end? *[CUET. 14-15]*

ⓐ 45360 ⓑ 10080
ⓒ 1260 ⓓ 630 **ⓓ**

58. How many combinations can be made with the letters of the word 'Thesis' taking 4 letters at a time? *[CUET., RUET. 11-12]*

ⓐ 24 ⓑ 12
ⓒ 11 ⓓ 7 **ⓒ**

59. If $\frac{n!}{3!(n-2)!} = 5$ then what is the value of n? *[RUET. 09-10]*

ⓐ 0 ⓑ 4
ⓒ 5 ⓓ 6 **ⓓ**

60. How many ways 6 boys can seat a bench of 3 seats? *[RUET. 09-10]*

ⓐ 3! ⓑ 6! ⓒ ${}^{6}C_{3}$ ⓓ ${}^{6}P_{3}$ **ⓓ**

61. How many ways 5 persons can stand a line? *[BUTEX. 10-11]*

ⓐ 24 ⓑ 120
ⓒ 720 ⓓ 5040 **ⓑ**

62. In case of decagon, how many diagonal can be formed from 10 vertices? *[RU. 08-09]*

ⓐ 45 ⓑ 35 ⓒ 20 ⓓ 10 **ⓑ**

63. A How many triangle can be formed joining the angular points of a plane area consisting of 12 sides? *[ChU. 14-15]*

ⓐ 12! ⓑ ${}^{12}P_{3}$
ⓒ 220 ⓓ 110 **ⓒ**

64. There are 4 letters and 4 envelops with specific address. In how many ways each of all 4 letters can be put on the wrong addressed envelope? *[RU 16-17]*

ⓐ 6 ⓑ 8
ⓒ 9 ⓓ 12 **ⓓ**

65. A permutation is made taking all letters of the word CLIFTON. In how many times the two vowels will occur together? *[ChU 16-17]*

ⓐ 7! ⓑ $\frac{2}{7}$
ⓒ $\frac{7}{2}$ ⓓ $6! \times 2!$ **ⓓ**

66. How many numbers(1, 2, 3 or 4 digit) can be formed which are divisible by 3 from the digits 0, 1, 2, 6 using once only? *[SUST. 16-17]*

ⓐ 18 ⓑ 30 ⓒ 24 ⓓ 32 **ⓓ**

67. How many words can be formed taking one vowel and two consonants from the letters of the word "PERMUTATION" so that in each case the vowel are in the middle position? *[BUTEX. 16-17]*

ⓐ 155 ⓑ 105
ⓒ 180 ⓓ 135 **ⓑ**