INSTRUCTIONS TO CANDIDATES

1. Please do not open this Booklet till you are said to do so.
2. **Duration of Test – 1.5 Hours**
3. Before commencement of the exam, please fill up necessary information in the space provided below and also in the answer sheet.
4. Use HB Pencil only to darken the circle for answer in the question.
5. For each correct answer, one mark will be awarded. For each wrong answer $^1/_4{}^{th}$ of the earmarked for each question will be deducted. If more than one circle is darkened for a question, it will be treated as wrong answer for questions not answered i.e., blanks, a zero will be given
6. Rough Work, if any must be done on the pages, specified as SPACE FOR ROUGH WORK only and nowhere else in the question paper booklet or in the answer sheet.

Marking the Answers
Example:
For Question No. 12, if the candidate Considers, the correct answer to be C, he is to mark as shown below
(Correct Method) 12. (A) (B) (●) (D)

Paper	
Topics *(Maximum Marks-50)*	
1.Permutation & Combination **2.**Sequence & Series **3.**Logarithm **4.**Set Relations & Function **5.**Blood Relations	
To be Filled by Students	
Name of Candidate	
Roll No. **(Mobile No)**	
Question Paper Booklet Code	**KDK**

Signature of the Candidate

1. $15C_{3r} = 15C_{r+3}$, then r is equal to
   (a) 2 (b) 3
   (c) 4 (d) 5

2. In an election, there are five candidates contesting for three vacancies; an elector can vote any number of candidates not exceeding the number of vacancies. In how many ways can one cast his votes?
   (a) 12 (b) 14
   (c) 25 (d) None of these

3. There are 6 men and 4 women in a group, then the number of ways in which a committee of 5 persons can be formed of them, if the committee is to include at least 2 women are:
   (a) 180 (b) 186
   (c) 120 (d) 105

4. If these are 40 guests in a party. If each guest takes a shake hand with all the remaining guests. Then the total number of hands shake is _____
   (a) 780 (b) 840
   (c) 1,560 (d) 1,600

5. In how many ways can 5 Doctors 4 Professors, and 6 Auditors be seated in a row so that all person of the same profession sit together?
   (a) 3! × 5! (b) 3! × 5! × 4!
   (c) 3! × 5! ×4! x 6! (d) 3! × 5! × 6!

6. In how many ways can an interview panel of 3 members be formed from 3 engineers, 2 psychologists and 3 managers if at least 1 engineer must be included?
   (a) 30 (b) 15
   (c) 46 (d) 45

7. A box contains 3 pink caps, 2 purple caps and 4 orange caps. In how many ways they can be arranged so that the caps of the same colour come together. (Assume all caps of same colour are not identical)
   (a) 1724 (b) 1728
   (c) 1732 (d) 1764

8. The number of ways in which 8 examination paper be arranged so that the best and worst papers never come together.
   (a) 8! – 2 × 7! (b) 8! – 7!
   (c) 8! (d) 7!

9. Five balls of different colours are to be placed in three boxes of different sizes. Each box can hold all the five balls. In how many different ways can we place the balls so that no box remains empty?
   (a) 100 (b) 120
   (c) 150 (d) None of these

10. A boy has 3 library tickets and 8 books of his interest in the library of these 8, he does not want to borrow mathematics part II unless mathematics part-1 is also borrowed? In how many ways can he choose the three books to be borrowed?

(a) 41 (b) 51
(c) 61 (d) 71

11. In how many ways can a party of 4 men and 4 women be seated at a circular table, so that no two women are adjacent?

(a) 164 (b) 174
(c) 144 (d) 154

12. How many numbers of seven-digit numbers which can be formed from the digits 3, 4, 5, 6, 7, 8, 9 no digits being repeated are not divisible by 5?

(a) 4320 (b) 4690
(c) 3900 (d) 3890

13. How many total combinations can be formed of 8 different counters marked as 1, 2, 3, 4, 5, 6, 7 & 8, taking counters at a time and there being at least one odd and one even numbered counter in each combination?

(a) 66 (b) 68
(c) 64 (d) 62

14. In a class of 4 boys and 3 girls, they are required to sit in a row in such a way that no two girls can sit together. Compute in how many different ways they can sit together:

(a) 480 (b) 60
(c) 720 (d) 1,440

15. A selection is to be made for one post of Principal and two posts of Vice-principal. Amongst the six candidates called for the interview, only two are eligible for the post of Principal, while they all six are eligible for the post of Vice-principal. The number of possible combinations for the selection is:

(a) 12 (b) 4
(c) 18 (d) 20

16. If the p^{th} term of an A.P. is 'q' and the q^{th} term is 'p', then its r^{th} term is:

(a) p + q + r (b) p + q – r
(c) p – q – r (d) p + q

17. Sum of x terms of two AP's are in the ratio $(3x + 5): (5x + 3)$ then ratio of their 10^{th} term is

(a) 31:49 (b) 30:49
(c) 28:49 (d) none of these

18. If x, y and z are the terms in G.P, then the term $x^2 + y^2, xy + yz, y^2 + z^2$ are in

(a) AP (b) GP
(c) HP (d) none of the above

19. The ratio of sum of first n natural numbers to that of sum of cubes of first n natural numbers is

(a) 3: 16 (b) n(n+1)/2

(c) 2/n(n+1) (d) none of the above

20. If a, b, c are in AP and x, y, z are in GP, then the value of $x^{(b-c)}.x^{(c-a)}.x^{(a-b)}$ is

(a) 1 (b) 0

(c) b (c – a) (d) none

21. $\sum n^2$ defines:

(a) $\frac{n(n+1)(2n+1)}{6}$ (b) $\frac{n(n+1)}{2}$

(c) $\left[\frac{n(n+1)}{2}\right]^2$ (d) none of these

22. Find the sum of first twenty-five terms of A.P. series whose n^{th} term is $\left(\frac{n}{5}+2\right)$.

(a) 105 (b) 115

(c) 125 (d) 135

23. Find the sum of the series. $243 + 324 + 432 + \cdots \ldots \ldots \ldots \ldots \ldots \ldots$ to n terms

(a) $3^6\left(\frac{4^n}{3^n}-1\right)$ (b) $3^4\left(\frac{4^n}{3^n}-1\right)$

(c) $3^6\left(\frac{3^n}{4}-1\right)$ (d) None of these

24. The sum of progression (a+b), a, (a-b) ……. n term is

(a) $\frac{n}{2}[2a+(n-1)b]$ (b) $\frac{n}{2}[2a+(3-n)b]$

(c) $\frac{n}{2}[2a+(3-n)]$ (d) $\frac{n}{2}[2a+(n-1)]$

25. For what values of x, the number $-\frac{2}{7}, x, -\frac{7}{2}$ are in G.P.?

(a) ± 1 (b) ± 3

(c) ± 2 (d) none of these

26. Given that $\log_{10}\ x = m + n - 1$ and $\log_{10}\ y = m - n$ the value of $\log_{10}\left(\frac{100x}{y^2}\right)$ expressed in terms of m and n is:

(a) $1 - m + 3n$ (b) $m - 1 + 3n$

(c) $m + 3n + 1$ (d) $m^2 - n^2$

27. $\log\left(\frac{p^2}{qr}\right) + \log\left(\frac{q^2}{pr}\right) + \log\left(\frac{r^2}{pq}\right)$ is:

(a) pqr (b) 0

(c) 1 (d) None

28. Find the value of $\log(x^6)$, if $\log(x) + 2\log(x^2) + 3\log(x^3) = 14$,

(a) 3 (b) 4

(c) 5 (d) 6

29. The value of $\log_5\left(1+\frac{1}{5}\right)+\log_5\left(1+\frac{1}{6}\right)+---+\log_5\left(1+\frac{1}{624}\right)$

(a) 2 (b) 3

(c) 5 (d) 0

30. If $\log\left(\frac{x-y}{2}\right)=\frac{1}{2}(\log x+\log y)$, then the value of $x^2+y^2=$

(a) 2xy (b) 4xy

(c) $2x^2y^2$ (d) 6xy

31. If P + Q means P is the mother of Q, P ÷ Q means P is the father of Q, P - Q means P is the sister of Q then which of the following relationship shows that M is the daughter of R?

(a) R ÷ M + N (b) R + N ÷ M

(c) R - M ÷ N (d) None

32. Point out a Lady Sohil said she is the daughter of woman. Who is the mother of the husband of my mother. Who is the lady to Sohil?

(a) Sister (b) Aunt

(c) Daughter (d) Sister-in-Law

33. Vicky introduces John as the son of the only brother of his father's wife. How is Vicky related to John?

(a) Son (b) Cousin

(c) Uncle (d) Brother

34. A is the mother of D and sister of B.B has a daughter C who is married to F. G is the husband of A. how is G related to D?

(a) Uncle (b) Husband

(c) Son (d) Father

35. Ravi is son of Aman's father's sister. Ram is son of Divya. Who is the mother of Gaurav and grandmother of Aman. Ashok is father of Tanya and grandfather of Ravi. Divya is wife of Ashok. How is Ravi related to Divya?

(a) Nephew (b) Grandson

(c) Son (d) None

36. A, Q, Y and Z are different persons. Z is the father of Q. A is the daughter of Y and Y is the son of Z. If P is the son of Y and B is the brother of P, then

(a) B and Y are brothers (b) A is sister of B

(c) Z is the uncle of B (d) Q and Y are brothers

37. X is the husband of Y. W is the daughter of X. Z is husband of W. N is the daughter of Z. What is the relationship of N to Y?

(a) Cousin (b) Niece

(c) Daughter (d) Grand-daughter

38. If A $ B means A is father of B. A # B means A is daughter of B. A @ B means A is sister of B. Then how is K related to M H @ K $ L # M

(a) Husband (b) Uncle

(c) Father (d) Grandson

39. There are 6 persons A, B, C, D and E. A and B are married and A is a male member. D is the only son of C who is the brother of A. E is the sister of D. B is the daughter in law of F. Whose husband has died. Who is the mother of C?

(a) A (b) E

(c) D (d) F

40. A family has a man, his wife, their four sons and their wives. The family of every son also 3 sons and one daughter. Find out the total number of male members in the whole family?

(a) 4 (b) 8

(c) 12 (d) 17

41. $f(x) = \frac{x+1}{x}$ find $f^{-1}(x)$

(a) 1/(x-1) (b) 1 / (y - 1)

(c) $\frac{1}{y} - 1$ (d) x

42. A is {1,2,3,4} and B is {1,4,9,16,25} if a function f is defined from set A to B where $f(x) = x^2$ then the range of f is:

(a) {1,2,3,4} (b) {1,4,9,16}

(c) {1,4,9,16,25} (d) None of these

43. Let F: R-R be defined by

$$f(x) = \begin{cases} 2x \text{ for } x > 3 \\ x^2 \text{ for } 1 < x \leq 3 \\ 3x \text{ for } x \leq 1 \end{cases}$$

The value of $f(-1) + f(2) + f(4)$ is

(a) 9 (b) 14

(c) 5 (d) 6

44. In a survey of 300 companies, the number of companies using different media Newspapers (N), Radio (R) and Television (T) are as follows: $n(N) = 200, n(R) = 100, n(T) = 40, n(N \cap R) = 50, n(R \cap T) = 20, n(N \cap R) = 25, and\ n(N \cap R \cap T) = 5$, Find the numbers of companies using none of these media:

(a) 20 companies (b) 250 companies

(c) 30 companies (d) 50 companies

45. On the set of lines, being perpendicular is a _____ relation.

(a) Reflexive (b) Symmetric

(c) Transitive (d) None of these

46. If $A = (1,2,3,4,5), B = (2,4)\ and\ C = (1,3,5)$ then $(A - C) \times B$ is:
(a) {(2, 2)(2, 4)(4, 2)(4, 4)(5, 2) (5, 4)}
(b) {(1, 2) (1, 4) (3, 2) (3, 4) (5, 2) (5, 4)}
(c) {(2, 2) (4, 2) (4, 4) (4, 5)}
(d) {(2, 2) (2, 4) (4, 2) (4, 4)}

47. Town has a total population of 50,000. Out of it 28,000 read the newspaper X and 23,000 read Y while 4,000 read both the papers. The number of persons not reading X and Y both is
(a) 2,000 (b) 3,000
(c) 2,500 (d) none of these

48. Two finite sets respectively have x and y number of elements. The total number of subsets of the first is 56 more than the total number of subsets of the second. The value of x and y respectively.
(a) 6 and 3 (b) 4 and 2
(c) 2 and 4 (d) 3 and 6

49. Out of a group of 20 teachers in a School, 10 teach Mathematics, 9 teach Physics and 7 teach Chemistry. 4 teach Mathematics and Physics but none teach both Mathematics and Chemistry. How many teach Chemistry and Physics; how many teach only Physics?
(a) 2, 3 (b) 3, 2
(c) 4, 6 (d) 6, 0034

50. Given $A = \{2,3\}, B = \{4,5\}, C = \{5,6\}$ then $A \times (B \cap C)$ is:
(a) {(2,5), (3,5)} (b) {(5,2), (5,3)}
(c) {(2,3), (5,5)} (d) None of these

ALL THE BEST.....