

Model Question Paper 3

ALGEBRA 3

11th Standard

Maths

Reg.No. :

--	--	--	--	--	--

Answer all the Questions

Time : 03:00:00 Hrs

Total Marks : 100

10 x 1 = 10

Part A

- 1) When $n=5$ and $r=2$, the value of $\frac{n!}{r!}$ is
(a) $(n-r)!$ (b) $3!$ (c) $5!$ (d) 60
- 2) The value of $\frac{10!}{5!5!}$
(a) $5!$ (b) $0!$ (c) 1 (d) 252
- 3) The value of $30 \times 12 \times 2$
(a) $5!$ (b) $30!$ (c) $24!$ (d) $6!$
- 4) Which of the following is true?
(a) $5(4!) = (5 \times 4)!$ (b) $(2+3)! = 2! + 3!$ (c) $3! = 3 \times 2!$ (d) $0! = 0$
- 5) The value of ${}_7P_5$ is
(a) $7 \times 6 \times 5 \times 4 \times 3$ (b) $\frac{7!}{5!}$ (c) $7!5!$ (d) $7! - 5!$
- 6) The value of ${}_{10}P_3$ is
(a) $10!$ (b) $\frac{10!}{7!}$ (c) $\frac{10!}{3!}$ (d) $10!3!$
- 7) If ${}_nC_7 = {}_nC_5$ then the value of n is
(a) 7 (b) 5 (c) 12 (d) 2
- 8) ${}_{15}C_{14}$ is
(a) ${}_{15}C_1$ (b) ${}_{15}C_0$ (c) $\frac{15!}{4!}$ (d) $\frac{15!}{1!}$
- 9) The value of ${}_{50}C_{47}$ is
(a) $50!$ (b) $\frac{50!}{3!}$ (c) 196000 (d) 1960
- 10) If ${}_nC_{10} = {}_nC_{12}$ then the value of n is
(a) 2 (b) 10 (c) 12 (d) 22

Part B

9 x 2 = 18

- 11) P.T. ${}_nC_r + {}_nC_{r-1} = {}_{n+1}C_r$
- 12) Out of 5 men and 2 women a committee of three is to be formed. In how many ways, can it be formed if at least one woman is to be included?
- 13) A polygon has 35 diagonals find the number of its sides.
- 14) Find the value of $(51)^4$
- 15) Find the 4th term in the expansion of $\left(\frac{x^3}{2} - \frac{2}{x^2}\right)^8$
- 16) Find the co-efficient of x^6 in the expansion of $\left(3x^2 - \frac{1}{3x}\right)^9$
- 17) Find the term independent of x in $\left(\frac{\sqrt{x}}{\sqrt{3}} + \frac{3}{2x^2}\right)^{10}$
- 18) Find the middle term(s) in the expansion of $\left(\frac{a}{3} + 2b\right)^8$
- 19) In how many different ways the letters of the word ALGEBRA can be arranged in a row if the 2 A's are not together?

Part C

9 x 3 = 27

- 20) A candidate is required to answer 7 questions out of 12 questions which are divided into two groups, each containing 6 questions. He is not permitted to attempt more than 5 questions from either group. In how many ways can he choose the 7 questions.
- 21) There are 10 points in a plane, no three of which are in the straight line excepting 4 points, which are collinear. Find the
(i) the number of straight lines obtained from the pairs of these points.
(ii) number of triangles that can be formed with the vertices as these points.
- 22) In how many ways can 21 identical books on Tamil and 19 identical books on English be placed in a row on a shelf so that two books on English may not be together?
- 23) From a class of 25 students, 10 are to be chosen for an excursion party. There are 3 students who decide that either all of them will join or none of them will join. In how many ways can they be chosen?
- 24) Let r and n be positive integers such that $1 \leq r \leq n$.
Then the number of all permutations of n distinct things taken r at a time is given by $n(n-1)(n-2) \dots (n-r+1)$
i.e $nPr = n(n-1)(n-2) \dots (n-r+1)$
- 25) Let r and n be positive integers such that $1 \leq r \leq n$. Then $nPr = \frac{n!}{(n-r)!}$
- 26) The number of all permutations of n distinct things, taken all at a time is $n!$
- 27) The number of all combinations of n distinct objects, taken r at a time is
given by $\frac{n!}{(n-r)!r!}$
- 28) For any natural number n
 $(x+a)^n = {}_nC_0 x^n a^0 + {}_nC_1 x^{n-1} a^1 + \dots + {}_nC_r x^{n-r} a^r + \dots + {}_nC_{n-1} x^1 a^{n-1} + {}_nC_n x^0 a^n$

Part D

9 x 5 = 45

29) Prove the following by the principle of Mathematical Induction

$$4 + 8 + 12 + \dots + 4n = 2n(n + 1)$$

30) Prove the following by the principle of Mathematical Induction

$$1^3 + 2^3 + 3^3 + \dots + n^3 = \frac{n^2(n+1)^2}{4}$$

31) Prove the following by the principle of Mathematical Induction

$$\frac{1}{2} + \frac{1}{2^2} + \frac{1}{2^3} + \dots + \frac{1}{2^n} = 1 - \frac{1}{2^n}$$

32) Find the sum of all the numbers that can be formed with the digits 2, 3, 4, 5 taken all at a time.

33) How many different words can be formed with letters of the word 'MISSISSIPPI'?

34) Prove the following by the principle of Mathematical Induction

In the arithmetic progression $a, a + d, a + 2d, \dots$ the n terms, prove that $S_n = \frac{n}{2}[2a + (n - 1)d]$

35) (i) How many different words can be formed with letters of the word 'HARYANA'?

(ii) How many of these begin with H and end with N?

36) Prove the following by the principle of Mathematical Induction

$5^{2n} - 1$ is divisible by 24 for all $n \in \mathbb{N}$

37) Prove the following by the principle of Mathematical Induction

$10^{2n-1} + 1$ is divisible by 11

