

4 – Marks

- (1) A solution of **8%** boric acid is to be diluted by adding a **2%** boric acid solution to it . The resulting mixture is to be more than **4%** but less than **6%** boric acid. If we have **640** litres of the **8%** solution, how many litres of the **2%** solution will have to be added?
- (2) A man wants to cut three lengths from a single piece of board of length **91cm** .The second length is to be **3cm** longer than the shortest and the third length is to be twice as long as the shortest. What are the possible lengths of the shortest board if the third piece is to be at least **5cm** longer than the second ?
- (3) Solve the system of inequalities graphically : $x + 2y \leq 10$, $x - y \leq 0$, $x \geq 0$, $y \geq 0$
- (4) Solve the system of inequalities graphically : $x - 2y \leq 3$, $3x + 4y \geq 12$, $x \geq 0$, $y \geq 1$
- (5) Solve the system of inequalities graphically : $2x + y \geq 4$, $2x - 3y \leq 6$, $x \geq 0$, $y \geq 0$
- (6) A plumber can be paid under two schemes given as; **Scheme – I : Rs 600** and **Rs 50** per hour, **Scheme – II : Rs 170** per hour. If the job takes **n hours**, for what values of **n** does the **scheme I** gives the plumber better wages ?
- (7) Solve the inequation : $\frac{2x + 4}{x - 1} \geq 5$; $x \in \mathbf{R}$
- (8) 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 the excursion party be chosen?
- (9) Find the number of words with or without meaning which can be made using all the letters of the word **AGAIN**. If these words are written as in a dictionary, what will be the **50th** word?
- (10) What is the number of ways of choosing **4** cards from a pack of **52** playing cards? In how many of these
(i) four cards are of the same suit, (ii) four cards belong to four different suits.
- (11) How many natural number not exceeding **4321** can be formed with the digits **1, 2, 3,** and **4**, if the digits can repeat?
- (12) A committee of **7** has to be formed from **9** boys and **4** girls. In how many ways can this be done when the committee consists of (i) at least **3** girls ? (ii) at most **3** girls ?
- (13) If the coefficients of a^{r-1} , a^r and a^{r+1} in the expansion of $(1 + a)^n$ are in **A.P**, prove that $n^2 - n(4r + 1) + 4r^2 - 2 = 0$.
- (14) Find n, if the ratio of the fifth term from the beginning to the fifth term from the end in the expansion of $(2^{1/4} + 3^{-1/4} x)^n$ is $\sqrt{6} : 1$.
- (15) Show that the middle term in the expansion of $(1 + x)^{2n}$ is $\frac{1.3.5.7. \dots .(2n-1)2^n \cdot x^n}{n!}$; $n \in \mathbf{Z}_+$.
- (16) Find the term independent of ‘**x**’ in the expansion of $\left(\frac{3x^2}{2} - \frac{1}{3x}\right)^6$

6 – Marks

(17) Solve the system of inequalities graphically :

$$2x + 3y \geq 6, x - 2y \leq 2, 3x + 2y < 12, 2y - 3x \leq 3, x \geq 0, y \geq 0$$

(18) In how many ways can the letters of the word **PERMUTATIONS** be arranged if the

(i) vowels are all together,

(ii) there are always 4 letters between **P** and **S** ?

(19) Find the number of different 8-letter arrangements that can be made from the letters of the word **DAUGHTER** so that, (i) all vowels do not occur together.

(ii) Respective position of vowel and consonant remains unchanged.

(20) The first, second and third terms in the binomial expansion $(a + b)^n$ are **729**, **7290** and **30375** respectively. Find 'a', 'b' and 'n'.

(21) The coefficients of the $(r - 1)^{\text{th}}$, r^{th} and $(r + 1)^{\text{th}}$ terms in the expansion of $(x + 1)^n$ are in the ratio **1 : 3 : 5**. Find 'n' and 'r'.

(22) (i) If the coefficients of $(r - 5)^{\text{th}}$ and $(2r - 1)^{\text{th}}$ terms in the expansion of $(1 + x)^{34}$ are equal, find r .

(ii) If 'a' and 'b' are distinct integers, using binomial theorem prove that $(a - b)$ is a factor of $a^n - b^n$, whenever 'n' is a positive integer.
