

# SUBJECTIVE TEST SERIES XI - 11

Max. Marks : 65

Time Allowed : 2.15 Hours

## SECTION - A

(This section contains 7 questions of **one mark** each.)

- Q01. If  $\tan \theta = \frac{1}{2}$  and  $\tan \phi = \frac{1}{3}$ , then write the value of  $(\theta + \phi)$ .
- Q02. For a complex number  $z$ , what is the value of  $\arg.z + \arg.\bar{z}$ ,  $z \neq 0$ ?
- Q03. Write the set builder form of  $\{-4, -3, -2, -1, 0, 1, 2, 3, 4, 5\}$ .
- Q04. Write the domain of  $f(x) = \sqrt{4 - x^2}$ .
- Q05. What is the radian equivalent of  $-25^\circ 30'$ .
- Q06. If  $z = 2 + \sqrt{3}i$ , then find the value of  $z.\bar{z}$ .
- Q07. Find  $r$ , if  ${}^5P_r = 2 {}^6P_{r-1}$ .

## SECTION - B

(This section contains 7 questions of **four marks** each.)

- Q08. Using properties of sets, show that :  $A \cup (A \cap B) = A$ .
- Q09. If  $\cos x = \frac{1}{7}$  and  $\cos y = \frac{13}{44}$ ;  $x, y$  being acute angles, prove that  $x - y = 60^\circ$ .
- OR** Solve :  $2 \cos^2 x + 3 \sin x = 0$ .
- Q10. Using the principle of mathematical induction, show that  $2^{3n} - 1$  is divisible by 7 for all  $n \in \mathbb{N}$ .
- Q11. Write  $z = -4 + i4\sqrt{3}$  in the polar form. **OR** Find the square root of  $-4 + i4\sqrt{3}$ .
- Q12. Solve  $3x - 7 > 2(x - 6)$  and  $6 - x > 11 - 2x$  and represent the solution on the number line.
- Q13. **(I)** 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?  
**(II)** How many words with two different vowels and two different consonants can be formed from all the English alphabets?
- Q14. Let  $A = \{1, 2, 3, 5\}$  and  $B = \{4, 6, 9\}$ . Define a relation  $R$  from  $A$  to  $B$  by  $R = \{(x, y) : \text{the difference between } x \text{ and } y \text{ is odd; } x \in A, y \in B\}$ . Write  $R$  in roster form. Also find the domain, co-domain and range of  $R$ . Hence depict the relation using an arrow diagram.

## SECTION - C

(This section contains 6 questions of **five marks** each.)

- Q15. Let  $f(x) = x^2$  and  $g(x) = \sqrt{x}$  be two functions defined over the set of non-negative real numbers. Find : (i)  $(f + g)(4)$  (ii)  $(f - g)(9)$  (iii)  $(f.g)(4)$  (iv)  $\left(\frac{f}{g}\right)(9)$ .
- Q16. Prove that :  $\frac{\sin 7x + \sin 5x + \sin 9x + \sin 3x}{\cos 7x + \cos 5x + \cos 9x + \cos 3x} = \tan 6x$ .
- Q17. Find the fourth term from the beginning and the fifth term from the end in the expansion of  $\left(\frac{x^3}{3} - \frac{3}{x^2}\right)^{10}$ .
- OR** If the coefficient of  $a^{r-1}$ ,  $a^r$  and  $a^{r+1}$  in the expansion of  $(1 + a)^n$  are in arithmetic progression then, prove that  $n^2 - n(4r + 1) + 4r^2 - 2 = 0$ .
- Q18. In a class of 25 students, 12 have taken mathematics, 8 have taken mathematics but not biology. Find the number of students who have taken both mathematics and biology and the number of those who have taken biology but not mathematics. It is given that each student has taken either mathematics or biology or both.
- Q19. Solve the system of inequations graphically :  $5x + y \geq 10$ ,  $2x + 2y \geq 12$ ,  $x + 4y \geq 12$ ,  $x \geq 0$ ,  $y \geq 0$ .
- OR** 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?
- Q20. How many words, with or without meaning, can be formed using all the letters of PRANAY such that vowels do not occur together? If all the words formed using all the letters of the word PRANAY are arranged as in dictionary in all possible ways, then what will be 182<sup>nd</sup> word?