SWOT INSTITUTE
1st to 8 Chapters
XI-TEST

Time : 3 hr.

Q.No. 1 to 6 are 6 Marks

1. There are 200 individuals with a skin disorder, 120 had been exposed to the chemical C_1, 50 to chemical C_2, and 30 to both the chemicals C_1 and C_2. Find the number of individuals exposed to
   (i) Chemical C_1 but not chemical C_2
   (ii) Chemical C_2 but not chemical C_1
   (iii) Chemical C_1 and chemical C_2.
2. In a survey of 60 people, it was found that 25 people read newspaper H, 26 read newspaper T, 26 read newspaper I, 9 read both H and I, 11 read both H and T, 8 read both T and I, 3 read all three newspaper. Find :
   (i) The number of people who read at least one of the newspapers.
   (ii) The number of people who read exactly one newspaper.
3. In how many ways can the letters of the word PERMUTATIONS be arranged if the
   (i) words start with P and end with S,
   (ii) vowels are all together,
   (iii) there are always 4 letters between P and S ?
4. 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
   (iii) are face cards,
   (iv) two are red cards and two are black cards,
   (v) cards are of the same colour.
5. Find the term independent of x in the expansion of $\left(\frac{3}{2}x^2 - \frac{1}{3x}\right)^6$.
6. If α and β are different complex numbers with $|\beta| = 1$ then find $\left|\frac{\beta - \alpha}{1 - \bar{\alpha}\beta}\right|$

Q.No. 7 to 18 are 4 Marks

7. If $(x + iy)^3 = u + iv$, then show that $\frac{u}{x} + \frac{v}{y} = 4(x^2 - y^2)$
8. Find the 13^{th} term in the expansion of $\left(9x - \frac{1}{3\sqrt{x}}\right)^{18}$, $x \neq 0$.
9. Find the middle terms in the expansion of $\left(3 - \frac{x^3}{6}\right)^7$
10. In the expansion of $(1 + a)^{m+n}$, prove that coefficient of a^m and a^n are equal.
11. If $f(x) = x^2$, find $\frac{f(1.1) - f(1)}{(1.1 - 1)}$
12. Find the domain of the function $f(x) = \frac{x^2 + 2x + 1}{x^2 - 8x + 12}$.

13. A manufacturer has 600 litres of a 12% solution of acid. How many litres of a 30% acid solution must be added to it so that acid content in the resulting mixture will be more than 15% but less than 18% ?
14. IQ of a person is given by the formula

$$IQ = \frac{MA}{CA} \times 100,$$

where MA is mental age and CA is chronological age. If $80 \le IQ \le 140$ for a group of 12 years old children, find the range of their mental age.

15. $\frac{1}{2} + \frac{1}{4} + \frac{1}{8} + ... + \frac{1}{2^n} = 1 - \frac{1}{2^n}$.
16. A wheel makes 360 revolutions in one minute. Through how many radians does it turn in one second ?
17. Show that : $\tan 3x \tan 2x \tan x = \tan 3x - \tan 2x - \tan x$.
18. Solve $\sin 2x - \sin 4x + \sin 6x = 0$.

Q.No. 19 to 26 are 2 Marks

19. The minute hand of a watch is 1.5 cm long. How far does its tips move in 40 minutes ? (Use $\pi = 3.14$)
20. Prove that

$$3 \sin \frac{\pi}{6} \sec \frac{\pi}{3} - 4 \sin \frac{5\pi}{6} \cot \frac{\pi}{4} = 1$$

21. Prove that : $\frac{\cos 7x + \cos 5x}{\sin 7x - \sin 5x} = \cot x$.
22. Evaluate : If $\frac{1}{6!} + \frac{1}{7!} = \frac{x}{8!}$, find x.
23. If $\left(\frac{x}{3} + 1, y - \frac{2}{3}\right) = \left(\frac{5}{3}, \frac{1}{3}\right)$, find the value of x and y.
24. If A = {–1, 1}, find $A \times A \times A$.
25. Express the following expressions in the form of a + ib :

$$\frac{(3 + i\sqrt{5})(3 - i\sqrt{5})}{(\sqrt{3} + \sqrt{2}i) - (\sqrt{3} - i\sqrt{2})}$$

26. If $x + iy = \frac{a + ib}{a - ib}$, prove that $x^2 + y^2 = 1$.

Q.No. 27 to 30 are 1 Mark

27. Solve inequalities and represent the solution graphically on number line.

$5(2x - 7) - 3(2x + 3) \le 0$, $2x + 19 \le 6x + 47$.

28. A solution is to be kept between 68°F and 77°F. What is the range in temperature in degree Celsium (C) if the Celsius /Fahrenheit (F) conversion formula is given by

$$F = \frac{9}{5} C + 32 ?$$

29. Let A = {1, 2} and B = {3, 4}. Write $A \times B$. How many subsets will $A \times B$ have ? List them.
30. Let A = {1, 2, 3, …, 14}. Define a relation R from A to A by R = {(x, y) : $3x - y = 0$, where $x, y \in A$}. Write down is domain, codomain and range.