PART A

I.   Answer all the questions: 1 × 10 = 10

1. Given that the number of subsets of a set 'A' is 16. Find the number of element in 'A'.
2. If (x + 1, y – 2) = (3, 1) find the values of x and y.
3. Convert 175° into radian measures.
4. Express $\left(-5i\right)\left(\dfrac{1}{8}i\right)$ in the form of a + ib.
5. If $^{n}C_{8} = {}^{n}C_{2}$ find the value of 'n'
6. Write the first five terms of the sequence defined by $a_{n} = \dfrac{n}{n+1}$ where $n \in N$
7. Find x intercept the line 4x – 3y = 6.
8. Evaluate $\displaystyle\lim_{x\to0}\left[\dfrac{\cos x}{\pi - x}\right]$
9. Write the negation of the statement "$\sqrt{2}$ is not complex number".
10. Define simple event.

PART B

II.   Answer any 10 questions: 10 × 2 = 20

11. If U = {1,2,3,4,5,6,7,8,9}, A = {2,4,6,8} & B = {2,3,5,7} verify $\left(A \cap B\right)^{1} = A^{1} \cup B^{1}$
12. If X and Y are two sets such that $X \cup Y$ has 50 elements, X has 28 elements and Y has 32 elements. How many elements does $X \cap Y$ have?
13. If A × B = {(a, 1) (a, 2) (a, 3) (b, 1) (b, 2) (b, 3)} find A and B and hence find B × A.
14. The minute hand of clock is 1.5 cm long. How far does its tip move in 40 minute?
    (use π =3.142)
15. Prove that sin3x = 3sinx – 4sin³x
16. If $x + iy = \dfrac{p + iq}{p - iq}$. P.T x² +y² = 1
17. Solve the inequality (2x – 5) > (1 – 5x) and represent the solutions graphically on the number line.
18. Reduce the equation into intercept form.
19. Find the equation of line parallel to the line 3x – 4y + 2 = 0 and passing through the point (-2, 3).
20. Find the ratio in which the YZ plane divides the line segment formed by joining the points (-2, 4, 7) and (3, -5, 8).
21. Derivative of (x³ – 4x) (x² + 2)
22. Write the component statement of the following compound statement is true or false, 'zero is less than every positive integer and negative integer.
23. The mean and variance of heights XI students are 162.6 cm. 127.69 cm² resp. Find the C.V.
24. A card is selected from a pack of 52 parts calculate the probability that the card is (i) an ace (ii) a black card.

PART C

III.   Answer any 10 questions: 10 × 3 = 30

25. In a class of 35 students 24 like to play cricket and 16 like to play football also each student likes to play atleast one of the two games. How many students like to play both cricket and football?

26. If $f(x) = x^2$ and $g(x) = 2x + 1$ be two real functions find (i) $(f + g)(x)$ (ii) $f - g(x)$ (iii) $fg(x)$

27. Find the general solution of $\sec^2 2x = 1 - \tan 2x$

28. Express $\dfrac{1-i}{1+i}$ into polar form.

29. Solve $2x^2 + \sqrt{3}x - 1 = 0$

30. Fin the number of arrangement of the letters of the word INDEPENDENCE. In how many of these arrangements.
    1. Do the words start with 'P'
    2. Do all the vowels always occur together
    3. Do the vowels never occur together.

31. Find the coefficient of x^5 of $(x + 3)^8$.

32. How many terms of A.P. $-6, -11\big/2, -5 \ldots\ldots$ are needed to give the sum -25?

33. The sum of first three terms of a G.P is $\dfrac{13}{12}$ and their product is -1. Find the common ratio and terms.

34. Find the equation of parabola with vertex at the origin, axis along the x-axis and passing through the point (2, 3) also find its focus.

35. Differentiate sinx by 1st principle.

36. "$\sqrt{7}$ is irrational' verify that by the method of contradiction

37. A bag contains 9 discs of which 4. Arc red, 3 are blue and 2 are yellow. The discs are similar in shape and size. A disc is drawn at random from the bag. Calculate probability that it will be (i) red (ii) yellow (iii) blue.

38. If A and B are events S.t. P(A) = 0.42 P(B) = 0.48 and P(A &B) = 0.16. Determine
    1. P(not A)
    2. P(not B)
    3. P(A or B)

PART D

IV.   **Answer any 6 questions:**   **6 × 5 = 30**

39. Prove that $\lim\limits_{\theta \to 0} \dfrac{\sin \theta}{\theta} = 1$ (θ being radian) and hence show that $\lim\limits_{x \to 0} \left(\dfrac{\tan x}{x} \right) = 1$

40. Prove by mathematical induction $1^2 + 2^2 + 3^2 + \ldots\ldots + n^2 = \dfrac{n(n+1)(2n+1)}{6} \forall n \in N$

41. Define modulus function its domain and range also draw its graph.

42. In how many ways can one select a cricket team of eleven from 17 players in which only 5 players can bowl. If each cricket team of 11 players must include exactly 4 bowlers.

43. State and prove Binomial theorem for positive integral index 'n'.

44. Define ellipse and derive its equation in the form $\dfrac{x^2}{a^2} + \dfrac{y^2}{b^2} = 1 \ (a > b)$

45. Derive a formula for the perpendicular distance of a point $(x_1 \ y_1)$ from the line $Ax + By + C = 0$

46. Solve the system of inequalities graphically
    i) $x + y \geq 5, \quad x - y \leq 3$
    ii) $x + 2y \leq 8, \quad 2x + y \leq 8, \qquad x \geq 0, \ y \geq 0$

47. Derive a formula to find the angle between 2 lines with slopes m_1 and m_2. Hence find the angle between the lines $y = \sqrt{3}x + 5$ & $y = \dfrac{1}{\sqrt{3}}x - 2\sqrt{3}$.

48. Calculate the mean deviation about median age for the age distribution of 100 persons given below.

Age	16-20	21-25	26-30	31-35	36-40	41-45	46-50	51-55
Numbers	5	6	12	14	26	12	16	9

PART E

V. Answer any 1 question: **1 × 10 = 10**

49. a) P.T $\dfrac{\sin 9x}{\cos 9x} + \dfrac{\sin 7x + \sin 3x + \sin 5x}{\cos 7x + \cos 3x + \cos 5x} = \tan 6x$

   b) If $f(x) = \begin{cases} ax^2 - 3x + 4 & when \quad x < 1 \\ 3 & when \quad x = 1 \\ bx + 5 & when \quad x > 1 \end{cases}$ & if $\lim\limits_{x \to 1} f(x) = f(1)$ find the value of a & b.

50. a) P.T geometrically cos(x + y) = cosx . cosy – sinx . siny hence S.T $\cos^2 x = \cos^2 x - \sin^2 x$
   b) Find the sum of the sequence. 7, 77, 777, 7777,….. to n terms

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