MATH.123 APPLIED MATHEMATICS-I
PAPER 'B' (Subjective)

Time: 2:30 Hours   Marks: 60

SECTION-I

Q. 1   Write short answers to any Eighteen (18) from the following questions.   18x2=36

1.   Write the conjugate and modulus of $-2 + i$

2.   Find the conjugate and modulus of $\dfrac{1+i}{1-i}$

3.   Show that $\left| \dfrac{1+2i}{2-i} \right| = 1$

4.   Factorize $9a^2 + 64b^2$

5.   Express $|Z| = 6$ and $\arg Z = \dfrac{3\pi}{4}$ in the form $x + iy$

6.   Define proper fraction and give example.

7.   Resolve $\dfrac{x^2 + 1}{(x+1)(x-1)}$ into partial fractions.

8.   Write an identity equation of $\dfrac{(x-1)(x-2)(x-3)}{(x-4)(x-5)(x-6)}$

9.   Form of partial fraction of $\dfrac{1}{(x^2+1)(x-2)}$ is _____.

10.   Convert binary number 10101_2 to decimal numbers.

11.   Multiply the binary numbers $111_2 \times 101_2$

12.   Define AND Gate and draw logic circuit diagram.

13.   Prove AB +AC + ABC= AB+AC by Boolean Algebra rules.

14.   Construct a logic diagram for expression $\overline{AB} = \overline{A} \cdot \overline{B}$

15.   Write distance formula between two points and give one example.

16.   Find the co-ordinates of the point P(x,y) which divide internally the segment through P₁ (-2,5) and P₂ (4, -1) in the ratio of $\dfrac{r_1}{r_2} = \dfrac{6}{5}$.

17.   If the mid-point of a segment is (6,3) and one end point is(8, -4), what are the co-ordinates of the other end point.

18.   Find the angle between the lines having slopes -3 and 2

19.   Find the equation of a line through the points $(-1, 2)$ and $(3, 4)$.

20.   Find an equation of the line with the following intercepts $a = 2$, $b = -5$

21.   Reduce the equation $3x + 4y - 2 = 0$ into intercept form.

22.   Find the equation of the line passing the point $(1, -2)$ and making an angle of 135° with the x-axis.

23.   Find the points of intersection of the lines $x + 2y - 3 = 0$, $2x - 3y + 8 = 0$

24.   Find the equation of circle with centre (-3, 4) and radius 4.

25.   Find the equation of the circle which is tangent to the positive x– axis and y – axis and radius 5 units.

26.   Find the equation of circle with centre (3, 0) and tangent to y – axis.

27.   Find the equation of circle with centre on origin and radius is $\dfrac{1}{2}$.

SECTION-II

Note: Attempt any three (03) questions. 3x8=24

Q. 2 (a) Simplify $\left(-\frac{1}{2}+\frac{\sqrt{3}}{2}i\right)^{-3}$

(b) Perform the indicated operation in $[3(Cos\ 22^\circ + i\ Sin\ 22^\circ]\ [2(Cos\ 8^\circ + i\ Sin\ 8^\circ]$ and express the results in the form $a + ib$.

Q. 3 (a) Resolve $\dfrac{9x^2 - 9x + 6}{(x-1)(2x-1)(x+2)}$ into partial fraction.

(b) Resolve $\dfrac{x^5}{x^4 - 1}$ into partial fraction.

Q. 4 (a) Convert 962.84 decimal number to binary equivalent.

(b) Prepare a truth table for $ABC + A\overline{B}\ \overline{C} + \overline{A}\ B\ \overline{C}$

Q. 5 (a) If one end of a line whose length is 13 Units is the point (4, 8) and the ordinate of the other end is 3. What is its abscissa?

(b) Find the point which is $\dfrac{7}{10}$ of the way from the point (4, 5) to the point (–6, 10).

Q. 6 (a) Show that the circles $x^2 + y^2 + 2x - 2y - 7 = 0$ and $x^2 + y^2 - 6x + 4y + 9 = 0$ touch externally.

(b) Find the equation of the circle having (–2, 5) and (3, 4) as the end points of its diameter. Find also its centre and radius.

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