MATH-123 APPLIED MATHEMATICS – I

**COMMON WITH BIO MEDICAL, COMPUTER,
COMPUTER INFORMATION, ELECTRICAL, ELECTRONICS, FOOD,
FOOD PROCESSING & PRESERVATION, INFORMATION & COMMUNICATION,
INSTRUMENT, INSTRUMENTATION, MECHATRONICS AND
TELECOMMUNICATION TECHNOLOGIES.**

PAPER 'B' (Subjective)

Time: 2:30 Hours   SECTION – I   Marks:60

Q.1: Write short answer to any Eighteen (18) questions: - $18 \times 2 = 36$

1. If $z = 2 + 3i$, prove that $z.\overline{z} = 13$

2. Find the multiplicative inverse of $-3 + 4i$.

3. Factorize: $2x^2 + 5y^2$

4. Express complex number $3 - \sqrt{3}i$ in polar form.

5. Find the values of $'x'$ and $'y'$ from the equation
$(2x - y - 1) - i(x - 3y) = (y - x) - i(2 - 2y)$

6. Define improper fraction and give one example.

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

8. Write an identity equation of $\dfrac{6x^3 + 5x^2 - 7}{3x^2 - 2x - 1}$

9. Write an identity equation of $\dfrac{2x^4 - 3x^2 - 4x}{(x + 1)(x^2 + 2)^2}$

10. Convert the Binary number $(110110.011)_2$ to octal number.

11. Add the Binary number $(110)_2 + (1011)_2$

12. Prove by truth table that $X(X + Y) = X$

13. Prove that by Boolean Algebra Rules. $XY + YZ + \overline{Y}Z = XY + Z$

14. Prove by truth table that $X(X + Y) = X$

15. Find distance between the points $(-3, 1)$ and $(3, -2)$.

16. Find the coordinates of the point P(x, y) which divide internally the segment through $P_1(-2, 5)$ and $P_2(4, -1)$ of the ratio of $\dfrac{r_1}{r_2} = \dfrac{6}{5}$.

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

18. If a line ℓ_1 contains (2, 6) and (0, y). Find $'y'$ if ℓ_1 is parallel to ℓ_2 and the slope of $\ell_2 = \dfrac{3}{4}$.

19. Find the distance to the line 3x − 2y + 12 = 0 from each of the following points $(1, 3)$.

20. Show that the point $(3, \sqrt{7})$ is on a circle with center is on the origin and radius 4.

21. Find an equation of the line with slope $-\dfrac{2}{3}$ and having Y-intercept is 3.

22. Find the slope and y-intercept of $ax + by = 0, b \neq 0$.

23. Find equation for the line through $(-1, -2)$ and parallel to y-axis.

24. Find the equation of circle with center $(1, -3)$ and radius is 3.

25. Find the equation of the circle concentric with the circle $x^2 + y^2 - 6x + 4y - 12 = 0$ with radius $'6'$ units.

26. Find which of the two circles $x^2 + y^2 - 3x + 4y = 0$ and $x^2 + y^2 - 6x - 8y = 0$ is greater.

27. Find the equation of the circle having $(-2, 5)$ and $(3, 4)$ as the end points of its diameter.

SECTION – II

Note: **Attempt any three (03) questions.** $3 \times 8 = 24$

Q.2: **(a)**   Extract the square root of the complex number $21 - 20i$.

Q.3: **(a)**   Resolve into partial fractions: $\dfrac{9x - 7}{(x + 3)(x^2 + 1)}$.

Q.4: **(a)**   Prepare the truth table for the Boolean expression $AB + \overline{A}\ \overline{B}$

    (b)   Minimize the expression by use of Boolean rule $X = ABC + \overline{A}B + AB\overline{C}$

Q.5: **(a)**   Find the point which is $\dfrac{7}{10}$ of the way from the point $(4, 5)$ to the point $(-6, 10)$.

    (b)   Find the equation of the perpendicular bisector of the line segment joining the points $(2, 4)$ & $(6, 8)$.

Q.6:   Find the equation of the circle passing through the points $(-2, 1)$, $(-4, -3)$ & $(3, 0)$.

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