DAE/IIA-2016/08 FIRST YEAR

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. Find the value of x and y from the equation $(x, y)(1, 2) = (-1, 8)$
2. Reduce $\frac{\sqrt{-3}}{1-\sqrt{-7}}$ in the form $a + bi$.
3. Factorize $2x^2 + 5y^2$
4. Find the multiplicative of $(-3\ ,\ 4)$.
5. Express the complex number $3 - \sqrt{3}i$ in polar form.
6. Resolve into partial fractions $\frac{2x}{(x-2)(x+5)}$
7. Resolve into partial fractions $\frac{1}{x^2 - x}$
8. Write an identity equation of $\frac{6x^3 + 5x^2 - 7}{3x^2 - 2x - 1}$
9. Form of partial fractions of $\frac{2x^4 - 3x^2 - 4x}{(x+1)(x^2+2)^2}$
10. Convert binary number $(11111)_2$ to decimal number.
11. Convert octal numbers to decimal number $(100.24)_8$
12. Simplify by use of Boolean rules: $(X + Y)(X + \overline{Y})(\overline{X} + Z)$
13. Prove by truth table $\overline{X + Y} = \overline{X}.\overline{Y}$
14. Construct the logic diagram for expression $AB + CD$
15. Find the value of 'y' so that the distance between $(1, y)$ and $(-1, 4)$ is 2.
16. Find the point which is two third of the way from the point $(5\ ,\ 1)$ to the point $(-2\ ,\ 9)$.
17. If a line ℓ_1 contains points $(2\ ,\ 6)$ and $(0\ ,\ y)$. Find 'y' if ℓ_1 is parallel to ℓ_2 and the slope of $\ell_2 = \frac{3}{4}$.
18. Find the equation of a line through the points $(-1\ ,\ 2)$ and $(3\ ,\ 4)$.
19. Write an equation of line parallel to $2x - 7y = 8$ and containing the origin.
20. Find 'k' so that $x + y + 1 = 0\ , kx - y + 3 = 0\ ,\ 4x - 5y + k = 0$ will be concurrent.
21. Find the angle between the lines having slopes -3 and 2.
22. If the mid-point of a segment is $(6\ ,\ 3)$ and one end point is $(8\ ,\ -4)$, what are the coordinates of the other end point.
23. Find the distance from the point $(-2, 1)$ to the line $3x + 4y - 12 = 0$.
24. Find the equation of circle with center $(1, -3)$ and $r = 3$.
25. Find the center and radius of the circle $6x^2 + 6y^2 - 18y = 0$
26. Reduce the equation into standard form: $x^2 + y^2 - 10y = 0$
27. Find the equation of circle. Central at $(-3\ ,\ 2)$ and passes through the point $(2\ ,\ -4)$.

SECTION – II

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

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

(b) Reduce $\frac{(3+4i)(1-2i)}{1+i}$ into the form $a+bi$.

Q.3. Resolve into partial fractions. $\frac{1}{x^4(x+1)}$.

Q.4. **(a)** Convert the octal number $(217.436)_8$ to binary number.

(b) Prove by use of Boolean Rules: $AB + \overline{A}C + BC = AB + \overline{A}C$

Q.5. **(a)** Show that the points $(0, 6)$, $(9, -6)$ and $(-3, 0)$ are the vertices of a right triangle.

(b) Find the equation of the line passing through $(-1, 7)$ and perpendicular to the line through the points $(2, 3)$ and $(0, -4)$.

Q.6. Find the equation of circle passing through the points $(1, 2)$, $(0, -1)$ and $(-1, 1)$.

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