

DAE/IIA-2020/SPECIAL (Covid-19) Exam:2020/10

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 × 2 = 36

1. Find z such that $|z| = \sqrt{2}$ and $\arg(z) = \frac{\pi}{4}$.
2. Find the value of 'x' and 'y' such that $(2x - 3y) + i(x - y)6 = 2 - i(2x - y + 3)$
3. Show that $\left| \frac{1 + 2i}{2 - i} \right| = 1$
4. Factorize $36a^2 + 100b^2$.
5. Show that $z^2 + \bar{z}^2$ is a real number.
6. What is partial fractions.
7. Resolve $\frac{1}{x^2 - 1}$ into partial fractions
8. Write an identity equation of $\frac{8x^2}{(1 - x^2)(1 + x^2)^2}$.
9. Add the binary numbers $(1101)_2 + (1011)_2$
10. Convert Binary number $(101101)_2$ to octal number.
11. Prove by Boolean Algebra rules: $X(X + Z) = X$
12. Prepare a truth table for $X(\bar{X} + Y) = X \cdot Y$
13. Define AND Gate.
14. Prove that: $AB + AC + ABC = AB + AC$
15. Find the coordinates of the mid-point of the segment $P_1(3, 7)$ and $P_2(-2, 3)$.
16. 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.
17. Find the equation of a line through the point $(3, -2)$ and slope is $\frac{3}{4}$.
18. Find the equation of a line whose perpendicular distance from the origin is 2 and inclination of the perpendicular is 225° .
19. Find the distance from the point $(-2, 1)$ to the line $3x + 4y - 12 = 0$.
20. Find the angle between the lines having slopes 3 and 2.
21. Show that the points $(1, 2)$, $(7, 6)$ and $(4, 4)$ are collinear.
22. Find the equation of the perpendicular bisector of the line segment joining the points $(2, 4)$ and $(6, 8)$.
23. Find the equation of circle with center $(-1, 2)$ and radius $r = \sqrt{2}$.
24. Find center and radius of the circle $x^2 + y^2 - 6x + 6y = 0$
25. What type of circle is represented by $x^2 + y^2 + 2x - 4y + 8 = 0$.
26. Find the equation of a circle with center at $(3, 0)$ and tangent to y-axis.
27. Find the equation of the circle having $(-3, 7)$ and $(2, -1)$ as the end points of its diameter.

SECTION - II

Note: Attempt any three (03) questions.

3 × 8 = 24

Q.2: Find the quotient of $1 + \sqrt{3}i$ and $1 + i$.

Q.3: Resolve into partial fractions $\frac{3x + 7}{(x^2 + x + 1)(x^2 - 4)}$

Q.4: Minimize the expression by use of Boolean Rules $AB + \bar{A}C + BC = AB + \bar{A}C$.

Q.5: Find the equation of two lines parallel to the line $x - 6y + 8 = 0$ and a distance of $\frac{18}{\sqrt{37}}$ units from it.

Q.6: Find the equation of the circle through $(2, -1)$ and $(-2, 0)$ with Centre on $2x - y - 1 = 0$.

