Roll No._____

# MATH.123 APPLIED MATHEMATICS-I
### COMMON WITH ELECTRICAL, INSTRUMENT, FOOD, COMPUTER, ELECTRONICS, COMPUTER INFORMATION, TELECOMMUNICATION, FOOD PROCESSING, PRESERVATION, CRITICAL HEALTH CARE & BIO-MEDICAL TECH.
## PAPER 'B' PART-B (Subjective)

Time: 2:30 Hours                                                                 Marks: 60

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

1.    Express complex number in the $x + iy$ from if $|z| = 2$ and arg $Z = \frac{\pi}{3}$

2.    Show that $Z^2 + \overline{Z}^2$ is a real number.

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

4.    Find conjugate and modulus of complex number $\frac{1+2i}{2-i}$

5.    Write complex number in the form $a + ib$        $Z = 4cis\ 240°$

6.    Resolve in to partial fraction $\frac{x^2+1}{(x+1)(x-1)}$

7.    Write an Identity equation $\frac{x^2+1}{x^4+x^2+1}$

8.    Write an identity equation of $\frac{x^2}{(1-x)(1+x^2)^2}$.

9.    Resolve in to partial fraction $\frac{2x+3}{(x-2)(x+5)}$.

10.    Convert $(243.67)_{10}$ to octal number.

11.    Convert $110011.11_2$ to decimal number.

12.    Express the Boolean function. $xy + yz + \overline{y}z = xy + z$

13.    Minimize the expression by use of Boolean rules. $X = ABC + \overline{A}B + AB\overline{C}$

14.    Convert the expression to product of sum form. $AB + ABC + A\overline{B}\ \overline{C} + A\overline{C}$

15.    Find the distance between A(2,-2)  B(2,7).

16.    Is the point (0,4) inside or out side the circle of radius 4 with centre (-3,1)

17.    Find the coordinates of the point P which divided the segment. $P_1(-2,5)$ $P_2(4,-1)$
       in the ratio    $\frac{r_1}{r_2} = \frac{6}{5}$

18.    Write an equation of the line parallel to $2x - 7y = 8$ and cantaining the origin.

19.    Show that that the points (2,6),(-8,1)and(-2,4) are collinear by using slope.

20. Find the angle from the line with slope $\frac{-7}{3}$ to the line with slope $\frac{5}{2}$

21. Show that the three lines. x-y +6 = 0, 2x+y-5=0, -x-2y+11=0 are concurrent.

22. Find distance to the line 3x-2y+12=0 from the point (-1,7)

23. Determine the real number k so that two lines $5x - 3y = 12$ and $kx - y = 2$ will be parallel.

24. Find the equation of the circle with the centre $(-\sqrt{2}, -2)$ r = 6

25. Find the equation of circle having (-3 ,7) and (2,1) as end point of its diameter.

26. Find equation of circle with centre (-1,3) and tangent to x-axis.

27. Reduce the equation in to standard form. $x^2 + y^2 - 4x + 6y - 12 = 0$

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

Q.2 (a) Reduce the complex number $\frac{(2+3i)(3+2i)}{4-3i}$ to the form $a + ib$.          (4)

(b) Prove that $\frac{1}{Cos\theta - iSin\theta} = Cos\ \theta + iSin\theta$          (4)

Q.3 Resolve in to Partial Fractions $\frac{x^2+3x+3}{(x^2-1)(x^2+4)}$          (8)

Q.4 (a) Convert the given expression to Sum of Product form $(A+B)(\bar{B}+C)(\bar{A}+C)$          (4)

(b) Prepare truth table for the Boolean expression $XYZ + \bar{X}\ \bar{Y}\ \bar{Z}$          (4)

Q.5. (a) Let P(0,4) Q(5,0) and R(x,y) are collinear with P between R and Q, and if $|RP|=10|PQ|$ find the coordinators of R.          (4)

(b) Find slope of the sides and altitude of the triangle whose vertices are the point (2,3), (0,-1) and (-2,1)          (4)

Q.6 Find the equation of circle passing through (2,-1) and (-2,0) with centre on 2x-y-1=0   (8)

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