Total number of printed pages: **DIPLOMA/2ND SEM(BACK)/DMA204**

2022

MATHEMATICS-II

Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions.*

1. a) Find the polar coordinates whose Cartesian coordinates are **3+3=6**
   (i) $(\sqrt{2}, \sqrt{2})$ (ii) $(-1, \sqrt{3})$

   b) Show that the triangle having vertices $A(a, 0), B(-a, 0)$ and $C(0, a\sqrt{3})$ is equilateral. 5

   c) Find the coordinates of the point which divides the line segment joining the points $P(-4, 7)$ and $Q(5, -9)$ in the ratio $2:3$ internally. 6

   d) Show that the points $A(0,2), B(3,7)$ and $C(6, 12)$ are collinear. 3

2. a) Find the equation of the straight line which cuts the Y-axis at the point $(0, -2)$ making an angle $30°$ with $\overrightarrow{OX}$. 5

   b) Find the equation of the straight line passing through the point of intersection of the lines $5x + 3y - 7 = 0$ and $6x - 5y - 17 = 0$ and perpendicular to the line $3x - 4y + 5 = 0$ 6

   c) Find the equation of the straight line passing through the point $(-1,2)$ and parallel to $3x - 4y + 1 = 0$. 5

   d) Find the equation of the circle whose radius is 4 and which is concentric with the circle $x^2 + y^2 + 2x - 6y = 0$. 4

3. a) Find the Mean deviation of the following: 5

X:	2	4	1	6	5
F:	3	1	5	4	2

b) Find the Median and mode from the following: 5+5=10

Class Interval :	0-10	10-20	20-30	30-40	40-50
Frequency:	3	5	20	30	15

c) A factory has 100 workers, 60 of which work in the morning section and 40 in the evening section. The mean wage of all the workers is Rs. 38. The mean wage of the workers in the morning section is Rs. 40. What is the mean wage of the workers in the evening section? 5

4. a) Find the Quartile Deviation from the following: 10

Class Interval :	0-5	5-10	10-15	15-20	20-25
Frequency:	6	2	10	3	4

b) Calculate covariance and correlation co-efficient between the marks in Physics and Chemistry obtained by 7 students: 5+5=10

Marks in Physics:	25	17	21	23	12	18	22
Marks in Chemistry :	22	20	24	25	17	11	18

5. a) Evaluate (any two) $\frac{dy}{dx}$ if 4+4=8

(i) $y = 4logxe^{2x}$

(ii) $y = \frac{d\sqrt{2x+3}}{dx}$

(iii) $y = y^x$

b) Using definition, find the derivatives of the following functions 3+3=6

(i) $f(x) = \log x$

(ii) $f(x) = \cos x$

c) Consider the function $f(x) = |x|$, 2+4

Examine the continuity and differentiability of the function f at $x = 0$.

6 a) Evaluate (any 3) 15

(i) $\int 4(7x-2)^6\,dx$ (ii) $\int \frac{sinx+2cosx}{2sinx+cosx}dx$

(iii) $\int cos^2x\,dx$ (iv) $\int \frac{1}{x^2+4x-1}dx$

(v) $\int x^m log x dx$ (vi) $\int sin2x\, dx$

b) Evaluate (any one) 5

(i) $\int_1^2 \frac{\sqrt{3-x}}{\sqrt{x}+\sqrt{3-x}} dx$ (ii) $\int_1^2 x log x\, dx$