MAHARAJA INSTITUTE OF TECHNOLOGY MYSORE
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DEPARTMENT OF MATHEMATICS

IV SEMESTER

1. Derive Cauchy-Riemann equation in Cartesian form.
2. Derive Cauchy-Riemann equation in polar form.
3. Show that $w = f(z) = z + e^z$ is analytic and hence find dw/dz
4. Find the analytic function $f(z)$ given $u - v = e^x(cosy - siny)$.
5. Construct the analytic function whose real part is $u = \log\sqrt{x^2 + y^2}$.
6. Fit a parabola $y = ax^2 + bx + c$ in the least square sense for the following data and hence find y at $x = 6$.

x	1	2	3	4	5
y	10	12	13	16	19

7. Fit a straight line by the method of least square for the following data

x	50	70	100	120
y	12	15	21	25

8. Fit a least square geometric curve $y = ax^b$ for the following data.

x	1	2	3	4	5
y	0.5	2	4.5	8	12.5

9. If θ is the acute angle between the lines of regression, then show that $tan\theta = \frac{\sigma_x\sigma_y}{\sigma_x^2+\sigma_y^2}\left(\frac{1-r^2}{r}\right)$.
10. Find the coefficient of correlation between the industrial production and export, using the following table:

Production (in Lakh tons)	55	56	58	59	60	60	60
Export (in Lakh tons)	35	38	38	39	44	43	45

11. With usual notation, compute $\bar{x}, \bar{y}\ and\ r$ from the following lines regression: $2x + 3y + 1 = 0\ and\ x + 6y - 4 = 0$.
12. Ten competitors in a quiz are ranked by two judges A and B in the following order:

Competitors	1	2	3	4	5	6	7	8	9	10
Judge A	1	6	5	3	10	2	4	9	7	8
Judge B	6	4	9	8	1	2	3	10	5	7