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B.C.A. Ist Semester Examination, 2022

MATHEMATICS–I

Paper : BCA–103

Time : 3 Hours] [*M.M. : 70*

Note :– Answer any *five* questions. All questions carry equal marks.

1. (a) Find the rank of the matrix :

$$A = \begin{bmatrix} 1 & 2 & 3 & -4 \\ -2 & 3 & 7 & -1 \\ 1 & 9 & 16 & -13 \end{bmatrix}$$

(b) Find by elementary row transformation the inverse of the matrix :

$$A = \begin{bmatrix} 0 & 1 & 2 \\ 1 & 2 & 3 \\ 3 & 1 & 1 \end{bmatrix}$$

7,7

(b) If $u = \log\left(\frac{x^2+y^2}{x+y}\right)$,

prove that :

$$x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = 1$$ 7,7

6. (a) Expand $e^x \cos y$ near the point $\left(1, \frac{\pi}{4}\right)$ by Taylor's theorem.

(b) If $u = xyz$, $v = x^2 + y^2 + z^2$, $w = x + y + z$, find

$$J = \frac{\partial(x, y, z)}{(u, v, w)}.$$ 7,7

7. (a) The period T of a simple pendulum is :

$$T = 2\pi\sqrt{\frac{l}{g}}$$

Find the maximum error in T due to possible errors upto 1% in l and 2% in g.