(i) Find the normal form and rank of the matrix

$$A = \begin{pmatrix} 4 & 2 & 2 \\ 2 & 0 & 1 \\ 2 & 1 & 1 \end{pmatrix}.$$

(ii) A linear transformation $T: \mathbb{R}^3 \to \mathbb{R}^2$ is defined by

$T(x, y, z) = (3x - 2y + z, x - 3y - 2z), (x, y, z) \in \mathbb{R}^3$

Find the matrix of T relative to the ordered bases of (1,0,0), (0,1,0), (0,0,1) of $\mathbb{R}^3$ and (1,0), (0,1) of $\mathbb{R}^2$.

[4+2+4]

OR

Mathematics (General)-DSE-T-1B

Complex Analysis, F.M.-10

State the necessary and sufficient conditions for a function to be analytic. Give an example of analytic function. Establish Cauchy-Reimann Equations in polar form.

Send answer sheet in the following mail id:
chinmay@nvc.ac.in

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1. Integrate: $\int \frac{dx}{(x-1)^2(x-2)}$ 5

2. If $I_n = \int_0^{\frac{\pi}{2}} x^n \sin x \, dx$ and n>1, show that

$$I_n + n(n-1)I_{n-2} = n\left(\frac{\pi}{2}\right)^{(n-1)}$$

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Send answer sheet in the following mail id:
prof.arunkrmandal@gmail.com