BACHELOR OF TECHNOLOGY (CBCS - 2023)
B. Tech. Sem-I Computer Science & Engineering AI & ML : WINTER: 2025
SUBJECT: ENGINEERING MATHEMATICS-I

Day : Monday
Date : 08/12/2025

W-27614-2025

Time : 10:00 AM-01:00 PM
Max. Marks : 60

N.B.
1) All questions are **COMPULSORY.**
2) Figures to the **RIGHT** indicate **FULL** marks.
3) Assume suitable data **WHEREVER** necessary.
4) Draw neat diagrams **WHEREVER** necessary.

Q.1 Reduce the following matrix to normal form and find the rank **(10)**

$$A=\begin{bmatrix}1 & 2 & -1 & 3\\ -1 & 4 & 0 & 1\\ 3 & 0 & -2 & 4\end{bmatrix}$$

OR

Q.1 Examine for consistency and solve, if consistent **(10)**

$$x+y+z=1$$
$$x+2y+4z=2$$
$$x+4y+10z=4$$

Q.2 Find the continued product of the roots of $\left(1+i\sqrt{3}\right)^{1/4}$ **(10)**

OR

Q.2 If $\tan(x+iy)=i$ where x and y are real then show that x is indeterminate and y is infinite. **(10)**

Q.3 Find the nth derivative of $y=\dfrac{1}{x^2+a^2}$ **(10)**

OR

Q.3 Obtain the expansion of $e^x \sin x$ upto the term in x^4 **(10)**

Q.4 Evaluate: $\lim\limits_{x\to\frac{\pi}{2}}(1-\sin x)\tan x$ **(10)**

OR

Q.4 Test the convergence of the series $\sum\limits_{n=1}^{\infty}\dfrac{n!}{n^n}$ **(10)**

Q.5 If $u=\sin^{-1}\left[\dfrac{\sqrt{x}-\sqrt{y}}{x^{1/3}+y^{1/3}}\right]$ then find the value of $x^2\dfrac{\partial^2 u}{\partial x^2}+2xy\dfrac{\partial^2 u}{\partial x\partial y}+y^2\dfrac{\partial^2 u}{\partial y^2}$ **(10)**

OR

Q.5 If $u=x^z+z^x$ then find $\dfrac{\partial^2 u}{\partial x\,\partial z}$ **(10)**

Q.6 Examine $u=x+y-z,\ v=x-y+z,\ w=x^2+y^2+z^2-2yz$ for functional dependence and if dependent, find the relation. **(10)**

OR

Q.6 Find $\dfrac{\partial(u,v,w)}{\partial(x,y,z)}$ when $ux=yz, vy=zx, wz=xy$ **(10)**

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