BACHELOR OF TECHNOLOGY (CBCS - 2023)
B. Tech. Sem-I INFORMATION TECHNOLOGY : SUMMER : 2025
SUBJECT: ENGINEERING MATHEMATICS-I

Day : Tuesday
Date : 13/05/2025

S-27656-2025

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) Use of non-programmable calculator is allowed.

Q.1 Find the eigen values and eigen vectors of $A=\begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$. **(10)**

OR

Q.1 Solve **(10)**

$$x+y+2z=6$$
$$x+2y+4z=10.$$
$$x+4y+8z=18$$

Q.2 Find all the values of $(1-i)^{1/4}$. **(10)**

OR

Q.2 Find the real and imaginary part of $i^{\log(1+i)}$. **(10)**

Q.3 Find the n^{th} derivative of $\frac{x}{x^2+a^2}$. **(10)**

OR

Q.3 Expand $\sqrt{\frac{1+e^x}{2e^x}}$ up to the term containing x^2. **(10)**

Q.4 Evaluate: $\lim_{x\to 0} (\cot x)^{\sin x}$. **(10)**

OR

Q.4 Test the convergence of the series $\sum_{n=1}^{\infty} \frac{1}{\sqrt{n}+\sqrt{n+1}}$. **(10)**

Q.5 If $u=\log\left(x^3+y^3+z^3-3xyz\right)$ then show that **(10)**

$$\left(\frac{\partial}{\partial x}+\frac{\partial}{\partial y}+\frac{\partial}{\partial z}\right)^2 u=\frac{-9}{(x+y+z)^2}.$$

OR

Q.5 If $u=\cot^{-1}\left[\frac{x-y}{x^3+y^3}\right]$ then find $x^2\frac{\partial^2 u}{\partial x^2}+2xy\frac{\partial^2 u}{\partial x\partial y}+y^2\frac{\partial^2 u}{\partial y^2}$. **(10)**

Q.6 If $x+y+z=u$, $y+z=uv$, $z=uvw$ **(10)**
Find $\frac{\partial(u,v,w)}{\partial(x,y,z)}$.

OR

Q.6 Examine $u=\frac{x-y}{x+y}$, $v=\frac{x+y}{x}$ for functional dependence. **(10)**

* * * *