M.Tech.

ADVANCED MATHEMATICS FOR ENGINEERS

SUBJECT CODE : EC - 501

Paper ID : [E0561]

[Note : Please fill subject code and paper ID on OMR]

Time : 03 Hours   Maximum Marks : 100

Instruction to Candidates:

1) Attempt any **Five** questions.

2) **All** questions carry equal marks.

Q1) (a) Find the Fourier sine integral representation of

$$f(x) = \begin{cases} \cos x & \text{if} \quad 0 < x < \pi \\ 0 & \text{if} \quad x > \pi \end{cases}$$

(b) Find the Fourier cosine transform of e^{-ax}. Hence evaluate

$$\int_0^\infty \frac{\cos \lambda x}{x^2 + a^2} \, dx.$$

Q2) (a) Verify convolution theorem of Fourier transforms for:

$$f(x) = g(x) = e^{-x^2}.$$

(b) Using method of residues, evaluate $L^{-1}\left\{\dfrac{1}{(s-2)(s^2+1)}\right\}.$

Q3) (a) Find the z - transform of $2n + 5 \sin\left(\dfrac{n\pi}{4}\right) - 3a^4$.

(b) Find the z - transform of $a^n \cosh n\theta$.