Reg.No : | | | | | | | | | | |

D.K.M. COLLEGE FOR WOMEN (AUTONOMOUS), VELLORE – 1

SEMESTER EXAMINATIONS

NOVEMBER – 2017 15CMA3B

ELECTIVE I : LAPLACE AND FOURIER TRANSFORMS

Time: 3 Hrs **Max. Marks: 75**

SECTION – A (10 X 2 =20)

Answer ALL the questions.

1. Define Laplace Transform.
2. Find $L[e^{-4t}]$.
3. Find $L[sinhat]$
4. Define Periodic function.
5. Find $L^{-1}\left[\frac{6}{(s+2)^4}\right]$.
6. Find $L^{-1}\left[\frac{1}{s^5}\right]$.
7. Define Fourier sine & cosine integral.
8. Define Fourier transform.
9. Define Convolution theorem.
10. Define parseval's identity.

SECTION – B (5 X 5 =25)

Answer any FIVE of the following questions.

11. State & Prove shifting property.
12. Find (i) $L[cos^3t]$ (ii)$L\left[\frac{e^{3t}-e^{-2t}}{t}\right]$.
13. Find $L^{-1}\left[\frac{s^2+9s+2}{(s-1)^2(s+2)}\right]$.
14. Using Laplace transform solve the equation.

    $\frac{d^2y}{dt^2}+4\frac{dy}{dt}+13y=2e^{-t}$ given $y(0)=0, y'(0)=-1$.
15. Find the Fourier transform of $f(x)=\begin{cases}1 & |x|<a\\ 0 & |x|>a\end{cases}$.
16. Find the Fourier sine transform of $f(x)=\begin{cases}sinx & 0<x<a\\ 0 & x>a\end{cases}$
17. Show that $\int_0^\infty \frac{cossx}{1+s^2}ds=e^{-x}$,$x\geq 0$.
18. Using Parseval's identity to show that

$$\int_0^\infty \frac{1}{(x^2+a^2)(x^2+b^2)}dx=\frac{\pi}{2ab(a+b)}$$

SECTION – C (3 X 10 =30)

Answer ALL the questions.

19. a) (i) Find $L[sin^2t\ cos^3t]$ (ii)$L[e^{7t}cos^2t]$

(Or)

b) find $L^{-1}\left[\frac{s^2}{(s^2+a^2)^2}\right]$.

20. a) Find $L^{-1}\left[\frac{7s^2+23s+30}{(s-2)(s^2+2s+5)}\right]$

(Or)

b) Using Laplace transform $\frac{dx}{dt}=2x-3y, \frac{dy}{dt}=y-2x$ given that $x(0)=8$, $y(0)=3$.

21. a)Find the Fourier transform of $f(x)=\begin{cases}1-x^2 & |x|\le 1\\ 0 & |x|>1\end{cases}$ and hence evaluate

$\int_0^\infty \left(\frac{xcosx - sinx}{x^3}\right) cos\frac{x}{2}dx$

(Or)

b) Find the Fourier transform of $f(x)=\begin{cases}1-|x| & |x|<1\\ 0 & |x|>1\end{cases}$ and hence evaluate

$$\int_0^\infty \left(\frac{sint}{t}\right)^4 dt.$$

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