A–0718

Total Pages : 3 **Roll No. .....**

MT-604

MA/MSC Mathematics (MAMT/MSCMT)

(Integral Transforms)

Examination, June 2025

Time : 2:00 Hrs. Max. Marks : 70

Note* :–** This paper is of Seventy (70) marks divided into Two (02) Sections 'A' and 'B'. Attempt the questions contained in these Sections according to the detailed instructions given therein. ***Candidates should limit their answers to the questions on the given answer sheet. No additional (B) answer sheet will be issued.

Section–A

(Long Answer Type Questions) 2×19=38

***Note* :–** Section 'A' contains Five (05) Long-answer type questions of Nineteen (19) marks each. Learners are required to answer any *two* (02) questions only.

1. Solve $(D^2 - D - 2)x = 20 \sin 2t$, with $x = -1$, $Dy = 2$ when $t = 0$.

2. Use convolution theorem to evaluate :

$$L^{-1}\left\{\frac{s}{(s+a)(s+b)}\right\}$$

3. Find the Fourier cosine transform of $exp(-x^2)$.

4. Discuss the Henkel transform of derivative.

5. What do you understand by Convolution. Discuss some applications of this concept ?

Section–B

(Short Answer Type Questions) 4×8=32

***Note* :–** Section 'B' contains Eight (08) Short-answer type questions of Eight (08) marks each. Learners are required to answer any *four* (04) questions only.

1. Evaluate :

$$L^{-1}\left\{\frac{e^{at} - 1}{a}\right\}$$

2. Evaluate :

$$L\{t \sin t\}$$

3. Find the finite Fourier Sine transform of $f(x) = x$, where $0 < x < \pi$.

4. State and prove the Shifting theorem of Fourier transform.

5. Find the first order Henkel transform of $f(r) = e^{-ar}$.

6. Discuss two applications of Mellin transform.

7. For Mellin transform, if $M\{f(x); p\} = F(p)$, then prove that $M\{f(ax); p\} = a^{-p}F(p)$.

8. What do you understand by Scaling in Laplace transform.

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