



UTTARAKHAND OPEN UNIVERSITY, HALDWANI (NAINITAL)

उत्तराखण्ड मुक्त विश्वविद्यालय, हल्द्वानी (नैनीताल)

M.A./M.Sc. Mathematics
ASSIGNMENT-Second YEAR

Last Date of Submission: 15 Mayजमा करने की अन्तिम तिथि: 15 मई

Course Title: Integral Transforms and Integral Equation

Course Code: M.A. /M.Sc. MAT 509

Year: 2013-14

Maximum Marks 40

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Section 'A'

भाग क

Section 'A' contains 08 short answer type questions of 5 marks each. Learners are required to answer 4 questions only.

1. If $L \{ F(t) \} = f(s)$

Then $L \{ F(at) \} = \frac{1}{a} f\left(\frac{s}{a}\right)$

2. Find the Laplace transform of $t^2 e^{-at}$

3. Find $L^{-1} \left\{ \frac{p}{(p+3)^{7/2}} \right\}$

4. Solve $(D^2+D)y=2$ when $y_0=3, y_1=1$. When $D \equiv \frac{d}{dx}$

5. Find the Fourier transform of

$$f(x) = \begin{cases} 1, & 1 < x < a \\ 0, & 1 > x > a \end{cases}$$

6. Find the Mellin Transformation of $\sin x$.

7. Form an integral equation corresponding to the differential equation

$$\frac{d^3y}{dx^3} + x \frac{d^2y}{dx^2} + (x^2 - x)y = x e^x + 1$$

with initial conditions $y(0)=1, y'(0)=0, y''(0)=0$

8. Prove that the Eigen values of a symmetric kernel are real.

Section 'B'

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• Section 'B' contains 04 long answer-type questions of 10 marks each. Learners are required to answers 02 questions only.

1. State and prove the convolution theorem for inverse Laplace.

2. Find $f(x)$ if its Cosine transform is $\frac{1}{1+s^2}$

3. Using Fredholm determinants find the resolvent kernel of the kernel

$$k(x, \xi) = (x, e^\xi); \quad a=0, b=1.$$

4. Using Hilbert-Schmidt theorem, Solve the symmetric integral equation

$$\varphi(x) = (x + 1)^2 + \int_{-1}^1 (x\xi + x^2\xi^2) \varphi(\xi) d\xi$$