



UTTARAKHAND OPEN UNIVERSITY, HALDWANI (NAINITAL)
उत्तराखण्ड मुक्त विश्वविद्यालय, हल्द्वानी (नैनीताल)

M.Sc. Mathematics
ASSIGNMENT-SECOND YEAR

Last Date of Submission: 15 May 2015

जमा करने की अन्तिम तिथि: 15 May 2015

Course Title: Integral Transform and Integral Equations

Course Code: MAT 509

Year: 2014-15

Maximum Marks : 40

Section 'A'

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

1- Evaluate:

$$L [t^3 e^{2t} \sin 4t].$$

2- Verify the initial value theorem for $(3 - 2 \cos t)$.

3- Use complex inversion formula to evaluate

$$L^{-1} \left[\frac{p}{(p+1)^3(p-1)^2} \right].$$

4- Solve:

$$(D^2+1) y = t, \text{ With } y'(0)=1, y(\pi)=0.$$

5- Find Mellin transforms of $\sin x$.

6- Using the Fredholm, find the resolvent kernel of the kernel $(2x-t)$.

7- Find the Eigen values of the integral equation:

$$g(x) = \lambda \int_{-1}^1 (1+t+3xt) g(t) dt.$$

8- Solve the integral equation:

$$g(x) = 1 - \int_0^x (x-t) g(t) dt.$$

Section- B

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

- 1- Define resolvent kernel and find the resolvent kernel of the kernel $K(x,t) = 1-3xt$ in $(0,1)$.
- 2- Solve the following symmetric integral equation with the help of Hilbert-Schmidth theorem

$$g(x) = \cos 3x + \lambda \int_0^{\pi} \cos(x+t) g(t) dt .$$

- 3- Find the Laplace Transform of $te^{-3t} E_i(t)$.

- 4- Prove that $e^{-\frac{t^2}{2}}$ is a self reciprocal function under the Fourier cosine transform. Hence obtain the Fourier sine transform for $te^{-\frac{t^2}{2}}$.