

P.R.GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA
III B.Sc. MATHEMATICS Syllabus for VI Semester, Paper IV(B)
Course (Elective II) INTEGRAL TRANSFORMS-II
Total Hours of Teaching-Learning : 45 @ 3h/week Total credits:02

Objectives:

- To be able to apply Laplace transform and inverse laplacetransform to find the solution of Ordinary Linear Differential Equations and Integral Equations.
- To understand the concepts of Infinite and Finite Fourier Transforms.
- To be able to find the Fourier transform of some functions.

UNIT – 1 Application of Laplace Transform to solutions of Differential Equations : (11hrs)

Solutions of Differential Equations with constants co-efficient
Solutions of Differential Equations with Variable co-efficient

UNIT – 2 Application of Laplace Transforms to Integral Equations :- (11hrs)

Definitions : Integral Equations-Abel's, Integral Equation-Integral Equation of Convolution Type, Integro Differential Equations -Application of L.T. to Integral Equations.

UNIT – 3 Fourier Transforms-I :- (11hrs)

Definition of Fourier Transform – Fourier's inverse Transform – Fourier cosine Transform – Linear Property of Fourier Transform – Change of Scale Property for Fourier Transform – sine Transform and cosine transform shifting property – modulation theorem.

UNIT – 4 Fourier Transform-II :- (12 hrs)

Convolution Definition – Convolution Theorem for Fourier transform – parseval's Identity – Relationship between Fourier and Laplace transforms – problems related to Integral Equations.

Finite Fourier Transforms :-

Finite Fourier Sine Transform – Finite Fourier Cosine Transform – Inversion formula for sine and cosine Transforms only statement and related problems.

Prescribed Text book:

Integral Transforms by A.R.Vasishta and R.K. Gupta, Krishnaprakasan media Pvt. Ltd. Meerat.
Sections: 3.1, 3.2, 4.1., 4.2, 6.4 to 6.14, 7.1 to 7.4

Reference Books:

Integral Transforms by Dr.J.K.Goyal and K.P.Gupta, PragatiPrakashan.
M.D.Raisinghanian Integral Transform, S.Chand& Co., New Delhi.

QUESTION PAPER PATTERN, SEMESTER-VI, Elective II

Module	TOPIC	V.S.A.Q	S.A.Q (including choice)	E.Q (including choice)	Marks Allotted
Module-I	Application of Laplace Transform to solutions of Differential Equations	02	03	02	33
	Application of Laplace Transforms to Integral Equations	02	02	01	20
Module-II	Fourier Transforms-I	02	03	02	33
	Fourier Transform-II	02	02	01	20
Total		08	10	06	

V.S.A.Q. = Very Short answer questions (1mark)
S.A.Q.= Short answer questions (5 marks)
E.Q.= Essay questions (8 marks)

Very Short answer questions : 8x1M =08
Short answer questions : 6x5M = 30
Essay questions : 4x8M = 32

Total Marks : 70

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P.R.GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA
III Year B.Sc. Degree Examinations VI Semester MATHEMATICS IV

Course (Elective II) INTEGRAL TRANSFORMS - II

MODEL PAPER (W.E.F. 2016-17)

Time: 3 hours

Max marks : 70M

PART - I

Answer all the Questions. Each question carries 1 mark.

8x1=8M

1. Write the formula of $L\{y^{11}\}$
2. Write the Laplace Transform of the Differential Equation $(D^2-3D+2)y=e^{2t}$.
3. Write the Integral equation of convolution type.
4. Write the Abel's Integral Equation.
5. Write the Fourier Sine Transform of $F(x)$.
6. Write the shifting property of Fourier Transform.
7. Find the cosine transform of $2e^{-5x}$
8. Write the Formula for finite Fourier Sine Transforms.

PART - II

Answer any Three questions from each section. Each question carries 5 marks.

6 x5=30M

SECTION - A

9. Solve $\frac{d^2y}{dx^2} + y = 0$ under the conditions that $y = 1, \frac{dy}{dx} = 0$ when $t = 0$.
10. Solve $(D^2 + 2D + 1)y = 3te^{-t}, t > 0$, subject to the conditions $y = 4, Dy = 2$ when $t = 0$.
11. Solve $ty^{11} + y^1 + 4ty = 0$ if $y(0) = 3, y^1(0) = 0$
12. Solve the integral equation $F(t) = e^{-t} - 2 \int_0^t \cos(t-u) F(u) du$
13. Solve the integral equation $\int_0^t F(u) F(t-u) du = 16 \sin 4t$.

SECTION - B

14. If $\tilde{f}(p)$ and $\tilde{g}(p)$ are Fourier Transforms of $f(x)$ and $g(x)$ respectively, then prove that

$$F\{af(x) + bg(x)\} = a\tilde{f}(p) + b\tilde{g}(p)$$
15. Find the Fourier Transform of $F(x) = \begin{cases} 1-x^2, & |x| \leq 1 \\ 0, & |x| > 1 \end{cases}$
16. Find the cosine transform of the function $f(x)$, if

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

17. Solve the integral equation $\int_0^\infty f(x) \cos \lambda x \, dx = e^{-\lambda}$

18. Find the finite cosine transform of $(1 - \frac{x}{\pi})^2$.

PART - III

Answer any four questions by choosing atleast One from each section.

4x8=32

SECTION - C

19. Solve $(D + 1)^2 y = t$ give that $y = -3$, when $t = 0$ and $y = -1$, when $t = 1$.

20. Solve $(D^2 + 1)y = \sin t \sin 2t$, $t > 0$ if $y = 1$, $Dy = 0$ when $t = 0$

21. Solve the integral equation $\int_0^1 \frac{F(u) du}{(t-u)^{\frac{1}{3}}} = t(1+t)$

SECTION - D

22. Find the Fourier Cosine Transform of e^{-x^2}

23. State and Prove Parsvel's identity for Fourier Transforms.

24. Find the finite cosine transform of $f(x)$ if $f(x) = \frac{\cos k(\pi-x)}{k \sin k\pi}$.