**P.V.K.N. GOVT. COLLEGE (AUTONOMOUS), CHITTOOR**

**II B.Sc., MATHEMATICS SYLLABUS (w.e.f. 2023-24)**

**SEMESTER-IV**

**COURSE 11: INTEGRAL TRANSFORMS WITH APPLICATIONS**

Theory Credits: 4 5 hrs/week

**Learning Outcomes**

Students after successful completion of the course will be able to

* 1. understand the application of Laplace transforms to solve ODEs
  2. understand the application of Laplace transforms to solve Simultaneous DEs
  3. understand the application of Laplace transforms to Integral equations
  4. basic knowledge of Fourier-Transformations
  5. Comprehend the properties of Fourier transforms and

solve problems related to finite Fourier transforms.

**Course Content**

**Unit – 1**

**Application of Laplace Transform to solutions of Differential Equations**

Solutions of ordinary Differential Equations - Solutions of Differential Equations with constants coefficients - Solutions of Differential Equations with Variable coefficients.

**Unit – 2**

**Application of Laplace Transform to solutions of Differential Equations**

Solutions of Simultaneous Ordinary Differential equations - Solutions of Partial Differential Equations**.**

**Unit – 3**

**Application of Laplace Transforms to Integral Equations**

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

**Unit – 4 Fourier Transforms - I**

Definition of Fourier Transform - Fourier sine 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 – 5 Fourier Transforms – II**

Definition of Convolution - 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**.**

**Activities**

Seminar/ Quiz/ Assignments/Applications of Integral Transforms in real life problems

/Problem Solving Sessions.

**Text Book**

B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44th Edition, 2017.

**Reference Book**

**PVKN. Govt. College(A), Chittoor**

Name of the Programme : II B.Sc.

Name of the Specific Programme : II B.SCc MATHEMATICS HONOURS

(Group)

Semester : IV

Name of the Course : Integral Transforms with Applications

Course Code : 24-MAT-4C11

Course Outcomes : The course will enable the students to

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|  |  |  |  |
| --- | --- | --- | --- |
| **Si.No** | **On completing the course, the student will be able to:** | **PSOs addressed** | Cognitive Level |
| CO1 | Know about Application of Laplace transform to solutions of Differential equations , Fourier Transform, inverse Fourier Transform and it's properties. | PSO 6 | Knowledge |
| CO2 | Understand Solutions of Simultaneous ordinary Differential equations and Partial Differential Equations . | PSO 6 | Understand |
| CO3 | Discuss Application of Laplace Transforms to Integral Equations . | PSO 6 | creativity |
| CO4 | Apply the Concepts of Modulation theorem, parseval's identities. Fourier sine transform, Fourier cosine transform and its inverse transforms. | PSO 6 | Analyze |
| CO5 | Use the Convolution Theorem in Fourier Transforms Fourier Sin Transform and Fourier Cosine Transforms . | PSO 6 | Apply |
| CO6 | Evaluate Fourier transform,Finite fourier sine and cosine Transforms of the given function. | PSO 6 | Analyze |

**CO-PO Mapping:**

**[‘1’: Slight (Low); ‘2’: Moderate (Medium); ‘3’: Substantial [High], '-’: (No Correlation)]**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 |
| CO1 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | - | - | - | 1 | 3 |
| CO2 | 3 | 2 | 2 | 1 | - | 1 | 2 | 1 | - | 1 | - | 2 | 3 |
| CO3 | 3 | 2 | 3 | 1 | - | 1 | 2 | 2 | - | 1 | - | - | 3 |
| CO4 | 3 | 2 | 3 | 2 | 1 | 1 | 1 | - | - | - | 1 | 2 | 3 |
| CO5 | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | - | - | 1 | 1 | 3 |
| CO6 | 3 | 1 | 2 | 2 | 2 | 1 | 2 | 2 | - | 1 | 1 | 2 | 3 |
| Avg. | 3 | 1.83 | 2.33 | 1.5 | 1 | 1.16 | 1.66 | 1.16 | - | 0.5 | 0.5 | 1.33 | 3 |

**Programme Outcomes:**

|  |  |
| --- | --- |
| **S. No** | **On completing B.Sc Mathematics Hons., the student will be able to:** |
| **PO 1** | Develop skills in Mathematics, Physics and Computer, which have applications in various other fields. |
| **PO 2** | Prepare for further studies and research. |
| **PO 3** | Understand both in concrete and abstract problems |
| **PO 4** | Apply the knowledge of Mathematics to the solution of complex real-world problems |
| **PO 5** | Understand interdisciplinary applications |
| **PO 6** | Develops critical thinking and analytical thinking. |
| **PO 7** | Enables the students to get employment |

**Program Specific Outcomes (PSO's):**

|  |  |
| --- | --- |
| **S. No** | **On completing B.Sc. Mathematics Hons., the student will be able to:** |
| **PSO 1** | The students learn basic Mathematical skills of solving differential equations and Special Functions which help in generating mathematical models in various fields. |
| **PSO 2** | The concepts of '3-dimensional geometry' , Complex Analysis which has applications in Space Science and GPS. |
| **PSO 3** | Students learn basic Mathematical concepts of Abstract algebra , Ring Theory and Numerical Methods which plays a vital role in developing various logical tools for computer science & electronics, |
| **PSO 4** | Students learn Real analysis which develops logical & analytical thinking ability |
| **PSO 5** | Students learn Linear Algebra with Matrix theory which helps in solving system of equations and use the same for solving various real-life problems and in image processing. |
| **PSO 6** | Also, students learn Vector calculus , Laplace Transforms and Integral transforms, which has lot of applications in Science and technology. |

**P.V.K.N. GOVT. COLLEGE(AUTONOMOUS), CHITTOOR**

**II B.Sc , IV Semester Examinations**

**PART – II, MATHEMATICS HONOURS**

**INTEGRAL TRANSFORMS WITH APPLICATIONS 24-MAT-4C11**

**Time : 3 hrs** **Max marks : 75**

**BLUE PRINT FOR MODEL PAPER**

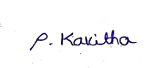
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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S.No** | **Question**  **Type** | **Questions to be set** | | | **Questions to be answered** | | | | |
| **No. of**  **questions** | **Marks**  **allotted**  **to each**  **question** | **Total**  **Marks** | **No.of**  **question** | **Marks**  **allotted**  **to each**  **question** | | **Total marks** | |
| **1** | **Section-A**  **Very Short answer questions** | **5** | **2** | **10** | **5**  **(No Choice)** | | **2 marks** | | **10** |
| **2** | **Section- B**  **Short questions** | **8** | **5** | **40** | **5**  **(open choice)** | | **5 marks** | | **25** |
| **3** | **Section-C**  **Essay questions** | **6** | **10** | **60** | **4**  **(Any four)** | | **10 marks** | | **40** |
|  |  | **19** |  | **150** |  | | **Total marks 75** | | |

**BLUE PRINT FOR THE QUESTION PAPER SETTING**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **UNITS** | **Very Short answer questions**  **2 marks** | **Short questions**  **5 marks** | **Essay questions**  **10 marks** | **Marks allotted to each unit** |
| **I** | **1** | **2** | **1** | **22** |
| **II** | **1** | **1** | **1** | **17** |
| **III** | **1** | **2** | **1** | **22** |
| **IV** | **1** | **1** | **2** | **27** |
| **V** | **1** | **2** | **1** | **22** |
| **Total No. of**  **Questions** | **5** | **8** | **6** | **110** |



**Signatures of Members Signature of the BOS Chairman**

**1.**

**2.**

**P.V.K.N. GOVT. COLLEGE(AUTONOMOUS), CHITTOOR**

**II B.Sc , IV Semester Examinations**

**PART – II, MATHEMATICS HONOURS**

**INTEGRAL TRANSFORMS WITH APPLICATIONS 24-MAT-4C11**

**Time : 3 hrs** **Max marks : 75**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Unit** | **TOPIC** | **V.S.Q(No Choice)** | **S.A.Q(open choice)** | **E.Q(Any four)** | **Total Maks** |
| I | Application of Laplace Transform to solutions of Differential Equations - I | **1** | **2** | **1** | **22** |
| II | Application of Laplace Transform to Differential Equations-II | **1** | **1** | **1** | **17** |
| III | Application of Laplace Transform to Integral Equations | **1** | **2** | **1** | **22** |
| IV | FourierTransform - I | **1** | **1** | **2** | **27** |
| V | Fourier Transforms-II | **1** | **2** | **1** | **22** |
| Total | | **5** | **8** | **6** | **110** |

**V.S.Q =** Very Short answer question (2 marks )

**S.A.Q =** Short answer questions (5 marks)

**E.Q =** Essay questions (10marks)

Very Short answer questions : 5 X 2 M = 10 M

Short answer questions : 5M= 25M

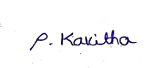
Essay questions:4 X 10 M = 40M

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Total Marks = 75M



**Signatures of Members Signature of the BOS Chairman**

**1.**

**2.**

**PVKN Govt. College(A), Chittoor 24-MAT-4C11**

**II B.Sc., SEMESTER – IV : MATHEMATICS , Course – XI**

**Title of the Course : INTEGRAL TRANSFORMS WITH APPLICATIONS**

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

**SECTION - A**

**Answer ALL questions. Each question carries TWO marks 5 X 2 M=10 M**

1. Write the formula of L { y(t)}.
2. Write the formula of .
3. Write Abel’ Integral Equation.

4.. Write the formula of Fourier sine Transform

5. State Parseval’s Identity for Fourier Transforms.

**SECTION - B**

**Answer any FIVE questions. Each question carries FIVE marks 5 X 5 M=25 M**

6.Solve the equation y(t) – 2y'(t) + 2y = 0,when y = y' = 1 ,when t = 0.

7. Solve + y = 1, given y = 2 when t = 0.

8. Solve - = 1 - , 0 < x < 1, t > 0, given that y(x, 0) = x

9. Solve the integral equation 2F (t) = 2 -t

10. Solve the integral equation

11. State and Prove Modulation Theorem

12. Find the finite Fourier Sine and Cosine Transform of f(x) = x2 , 0 < x < 4.

13. Relation between Fourier and Laplace Transform.

**SECTION - C**

**Answer FOUR the questions. Each question carries TEN marks. 4 X 10 M = 40 M**

14. **Solve the equation t + (1-2t ) -2y = 0 , y(0) =1 , y'(0) = 2.**

15. **Solve = ;y(x,0) = 3 sin2x , y(0,t) = 0 = y(1,t).**

16. **Solve the integral equation F(t) = t + 2**

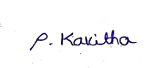
17. Find the Fourier Transform of f(x) = and hence evaluate

18. Find the Fourier Cosine Transform of

19. State and Prove convolution Theorem in Fourier Transform**.**



**Signatures of Members Signature of the BOS Chairman**

**1.**

**2.**