

KL UNIVERISTY
FIRST SEMESTER 2010-11
Course Handout
Academic Division

Dated: 07-07-2010

Course No. : MATH C 202 / MATH C 204
Course Title : Computational Mathematics
Course Structure : 4-0-0
Course coordinator : P Hari Prasad
Instructors : Ch. Srinivas Kumar

1. Course Description:

This is a course covering Fourier series, Fourier transforms, Numerical Methods, Solution of algebraic and transcendental equations, Finite differences and Interpolation, Interpolation with unequal intervals, solution of ordinary differential equations, Linear programming.

2. Scope and Objective of the Course:

Fourier series is very powerful method to solve ordinary and partial differential equations particularly with periodic functions appearing as non-homogeneous terms. The complex form of Fourier series is useful in problems on electrical circuits having impressed periodic voltage. Fourier transform is useful in the study of frequency response of a filter, solution of PDE, discrete Fourier transform and fast Fourier transform in signal analysis. The limitations of analytical methods have lead the engineers and scientist to evolve graphical and numerical methods. As seen in the graphical methods give results to a lower degree of accuracy, Interplation is the art of the reading between the lines of a table. A problem is to be presented in a linear programming form which requires defining the variables involve, establishing relationships between them and formulating the objective function and the constraints.

At the end of the course, a student is expected to possess knowledge in:

Express the given continuous and periodic function in Fourier series form

Harmonic Analysis in Fourier series.

Fourier Integrals transforms.

Numerical differentiation and Numerical Integration.

Solving the given first order differential equations by using numerical methods.

Solving the ODE by using the Picard's method.

Linear programming methods

3. Books:

(i) Textbook:

1. "Higher Engineering Mathematics" Dr.B.S.Grewal, Khanna Publishers, 40th edition

(II) Reference Book:

1. "Higher Engineering Mathematics" B.V.Ramana, TMH

4. Syllabus:

UNIT-I: Fourier series: Introduction, Euler's formulae, Conditions for a Fourier expansion, Functions having points discontinuity, Change of interval, Odd and even functions, Expansions of periodic functions, Half-range series, Parseval's formula Complex form of Fourier series.

UNIT-II: Fourier Transforms: Introduction, Definition, Fourier Integrals, Fourier sine and cosine integrals, Complex forms of Fourier integral, Fourier transform, Fourier sine and cosine transforms, Properties Fourier transforms, Convolution theorem for Fourier transforms, Parseval's identity for Fourier transforms.

UNIT-III: Numerical Methods: Solution of algebraic and transcendental equations: Bisection method, Newton-Raphson's method, Solution of linear simultaneous equations: Jacobi and Gauss-Seidal iterative methods, Finite Differences and Interpolation: Finite differences, Factorial notation, Relations between the operators, Newton's interpolation formula, Gauss's interpolation formula, Sterling's formula, Bessel's formula.

UNIT-IV: Interpolation with unequal intervals: Lagrange's formula, Newton's divided difference formula, Inverse interpolation. Numerical differentiation and Integration: Trapezoidal rule, Simpson's 1/3rd rule, Simpson's 3/8th rule, Numerical solution of Ordinary differential equations: Introduction, Picard's method, Taylor's series method, Euler's method, Modified Euler's method, Runge - Kutta method (for first equations only).

UNIT-V: Introduction, Formulation of the problem, Graphical method, Some exceptional cases, General linear programming problem, Canonical and standard forms of LPP, Simplex method, Working procedure of the simplex method, Artificial variable techniques- M-method, Two phase method, Transportation problem, Working procedure for transportation problems, Assignment problem, working procedure to assignment problems.

5.Course Plan:

Lec No.	Learning Objective	Topics to be covered	Reference
1	Introduction	Euler's formulae	T.429
2	Euler's formulae	Condition for a Fourier expansion	T.435
3	Fourier series expansion	Change of interval	T 439
4	Fourier series expansion	Change of interval	T443
5	Half range series	Even and odd functions	T 447
6	Half range series	Even and odd functions	T448
7	Canonical form of Fourier series	Parsevals formula	T 455
8	Complex form of Fourier series	Canonical form of Fourier series	T457
9	Complex form of Fourier series	Practical harmonic analysis	T460
10	Introduction	Fourier integral, Fourier Sine and cosine integral	T 836
11	Fourier Transforms	Properties of Fourier Transforms	T-840
12	Fourier Transforms	Properties of Fourier Transforms	T-840
13	Fourier Transforms	Convolution theorem and problems	T-845
14	Fourier Transforms	Convolution theorem and problems	T-845
15	Fourier Transforms	Convolution theorem and problems	T846
16	Properties of Fourier Transforms	Problems	T-848
17	Properties of Fourier Transforms	Parsevels identity for Fourier Transforms	T-849

18	To find the roots	Bisection method	T-1007
19	To find the roots	New Raphson method	T-1011
20	Solving equ.s	Jacobi iterative method	T-1026
21	Solving equ.s	Gauss seidal method	T-1028
22	Introduction	Finite differences, Forward and backward difference tables	T 1039
23	Introduction	Factorial notation, Relation between the operators	T-1042
24	To find Interpolation	Newton's forward and backward	T-1050
25	To find Interpolation	Gauss forward and backward	T-1056
26	Central difference interpolation	Stirlings formula	T-1058
27	Central difference interpolation	Bessel's formula	T-1062
28	To find interpolation for unequally spaced	Lagranges formula	T-1065
29	To find interpolation for unequally spaced	Newtons divided difference formula	T-1066
30	To find interpolation for unequally spaced	Newtons divided difference formula	T-1066
31	For given value of y find x	Inverse Interpolation	T-1068
32	To find derivative of a function	Derivatives using forward and backward difference formula	T-1070
33	Evaluate a definite integral from a set of values	Trapezoidal rule, Simpsons rule	T-1075
34	Evaluate a definite integral from a set of values	Trapezoidal rule, Simpsons rule	T-1075
35	To find the solutions of the first order and first degree equs	Picards method	T-1097
36	To find the solutions of the first order and first degree equs	Picards method	T-1097
37	To find the solutions of the first order and first degree equs	Tailor series method	T-1097
38	To find the solutions of the first order and first degree equs	Eulers Modified	T-1100
39	To find the solutions of the first order and first degree equs	RK methods	T-1104
40	Introduction	Formulation of the problem	T-1145
41	Optimization of linear function	Graphical method	T-1147
42	Optimization of linear function	Graphical method	T-1147

43	Maximizing the objective function	Canonical and standard forms of LPP	T-1155
44	Maximizing the objective function	Simplex method and Transportation problems	T-1157
45	Maximizing the objective function	Simplex method and Transportation problems	T-1157

6. Self learning material:

UNIT	TOPIC	SOURCE
I	Ex. 10.1 problems on Fourier series	HIGHER ENGINEERING MATHEMATICS BY B.S.GREWAL
I	Ex. 10.4 problems on change of interval.	Same Text book.
I	Ex.10.5 problems on Even and odd functions.	Same Text book
I	Ex10.6 problems on Half range series	Same Text book
II	Ex.22.1 problems on Fourier transform	Same Text book
II	Ex.22.1 problems on Parseval's identity	Same Text book
III	Ex.28.1 problems on Numerical methods.	Same Text book
III	Ex.29.3 problems on Newton's forward and backward.	Same Text book
III	Ex.29.4 problems on central difference Interpolation formulae.	Same Text book
III	Ex.29.8 problems on Numerical integration.	Same Text book
IV	Ex. 31.1&31.2&31.3 problems on Numerical solutions of ODE	Same Text book
V	Ex.33.4&33.5&33.9 problems on Linear programming.	Same Text book

7. Evaluation Scheme:

Component	Duration (minutes)	% Weightage	Marks	Date & Time	Venue
Test-1	50 Min	10	10	09-08-2010 9.30 to 10.20 A.M	CSE103,202, 209,309
Test-2	50 Min	10	10	13-09-2010 9.30 to 10.20 A.M	CSE103,202, 209,309
Assignment submission		5	5	Continuous	
Assignment Test	50 Min	5	5	25-10-2010	CSE103,202,

				9.00 to 10.20 A.M	209,309
Quiz	30 Min	5	5	25-10-2010 9.00 to 10.20 A.M	CSE103,202, 209,309
Regular Lab Evaluation	Continuous	0	0		
Comprehensive Lab Exam	3 Hrs	0	0		
Comprehensive Exam	3 Hrs	60	60		
Attendance for Theory & Tutorial		5	5	Continuous	
Attendance for Lab		0	0	Continuous	

8. Chamber consultation hour: Informed in the class in first week.

9. Notices: All notices regarding the course will be put in E-learning website.

Course Coordinator