Course code	Course Name	L-T-P - Credits	Year of Introduction
RLMCA268	Computational Science	3-1-0-4	2016

Course Objectives

- To impart theoretical and practical knowledge concerning numerical methods for scientific and engineering computations

Syllabus

Numerical Calculations- Numerical Solution Of Non Linear Equations- Gauss Elimination Method- Lagrange's Interpolation Polynomial- Mathematical Formulation Of Linear Programming problem- Standard Form of LPP- Transportation Problem-Network Scheduling

Expected Outcome

The students will be

i. Able to describe and interpret basic field problems and explain how they can be solved numerically.

ii. Able to compare and contrast different time stepping schemes for time dependent problems.

References

1. Erwin Kreyszig, Advanced Engineering Mathematics, New Age International (p) Limited
2. Froberg, Introduction to Numerical Analysis-Second Edition , Addition Wesley
3. Kanthi Swarup, P.K.Gupta,Man Mohan, "Operations research ," Sultan Chand & Sons. 5th Edition
4. R Panneerselvam – Operations research, 2nd edition, PHI
5. Sastry S.S., "Numerical Analysis, Prentice"-Hall India, 4th edition.

Course Plan

Module	Contents	Hours	Sem. Exam Marks
I	Errors In Numerical Calculations - Errors and their computation. Solution of algebraic and Transcendental Equations - Bisection Method -Regula Falsi Method - Iteration Method -Acceleration of convergence-Newton Raphson Method.	10	20%
II	Solution of linear systems – Introduction - Direct methods - Gauss Elimination Method -Gauss Jordan Method, Iterative Method -Jacobian Method - Gauss Seidel Method.	10	15%
	FIRST INTERNAL EXAMINATION		
III	Polynomial Interpolation-Introduction –Errors - Finite Difference - Difference Operators- Newtons Forward and Backward Difference Interpolation - Central Difference Interpolation Formulae - Gauss Interpolation Formulae. Interpolation with unevenly spaced points - Lagrange's Interpolation - Divided Differences - Newton's Divided Difference Interpolation	12	20%
IV	Mathematical Formulation Of Linear Programming problem- Formulation Of LPP-Graphical Solution Of LPP – Canonical And Standard Form of LPP- Simplex Method-Big M Method- Two Phase Method- Principle Of duality- Dual Simplex Method..	8	15%
V	Transportation type Problem- Initial Basic Feasible Solution- North West Corner Rule-Vogel's Approximation Method – Tests For Optimality- Unbalanced Transportation Problem- Assignment Problem.	8	15%

SECOND INTERNAL EXAMINATION			
VI	Travelling Salesman Problem-Network Scheduling-Rules of Network Construction – Critical Path Method-PERT.	8	15%
END SEMESTER EXAM			
QUESTION PAPER PATTERN			
There will be two parts in the Question paper - **Part A and Part B.** **Part A** will have 8 short answer questions of 3 marks each (8 X 3 M = 24 M). There will be no choice questions. **Part B** will have 6 essay questions one from each module of 6 marks each, with an alternative choice question from the same module (6 x 6M=36M). The maximum number of sub part questions in **Part B** to be limited to 2. The total marks assigned to questions in Part A (Short answer) and Part B (Essay) together from a single module will not exceed the marks assigned to that module specified in the course plan.