P.R.GOVERNMENT COLLEGE (AUTOMONOUS), KAKINADA
III B.SC MATHEMATICS – Semester VI (w.e.f. 2018-19)
Course (Elective-VII (B)): Numerical Analysis

Total Hrs. of Teaching-Learning: 45 @ 3 h / Week **Total Credits: 03**

Objective:

- To find the different types of errors in computation and then to reduce the errors
- To find the approximate Polynomial for the given data when the data is even or uneven by using interpolation, also we can find the differentiation even if the function is not known explicitly.
- To find the solution of Algebraic and Transcendental equations using Bisection, Falsi Position, Iteration and Newton Raphson methods.

Unit I: Errors in Numerical Computation **(6 hrs)**

Errors and their accuracy, Mathematical preliminaries, Errors and their analysis, Absolute, Relative and Percentage errors, A general error formula, Errors in a series approximation.

Unit II: Solutions of Algebraic and transcendental equations **(10 hrs)**

(a) Bisection Method (b) Iteration Method (c) Method of false position (d) Newton Raphson Method (e) Generalised Newton Raphson method (f) Muller's method

Unit III: Interpolation – I **(8 hrs)**

Errors in polynomial interpolation, Finite Differences, Forward, Backward and central difference operators, Shift and average difference operators, symbolic relation between the operators, Detection of errors by use of difference tables, differences of a polynomial.

Unit IV: Interpolation - II **(12 hrs)**

Interpolation for equal intervals: Newton's forward, backward, Gauss forward, Backward, Strilling's, Bessel's and Everette's formulae.

Unit V: Interpolation – III **(9 hrs)**

Interpolation for uneven intervals: Lagrange's interpolation formula, error in Lagrange's Interpolation, divided differences and their properties, relation between divided differences formula, Forward, Backward and central difference operators, Newton's divided differences, Inverse Interpolation.

Prescribed Text books:

Numerical Analysis by S. Ranganatham, MVSSN Prasad, Dr. V. Ramesh Babu.
S. Chand & Company

Reference books:

Numerical Analysis by S.S.Sastry Prentice Hall, NewDelhi

Numerical Analysis by Kamali Surya Narayana, Schand&co, NewDelhi
Numerical Analysis by Gupta &Malik, Krishna Prakashan media (P) Ltd Meerut"

BLUE PRINT FOR QUESTION PAPER PATTERN,
SEMESTER-VI
PAPER –VII, ELECTIVE VII (B)

UNIT	TOPIC	V.S.A.Q	S.A.Q (including choice)	E.Q (including choice)	Marks Allotted
I	Errors in Numerical Computations	01	02	01	19
II	Solutions of Algebraic and transcendental equations	02	03	02	33
III	Interpolation - I	02	02	01	20
IV	Interpolation - II	02	02	01	20
V	Interpolation - III	01	01	01	14
Total		08	10	06	106

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.Govt.College (Autonomous), Kakinada

III year B.Sc. Degree Examinations VI Semester Mathematics

Course (Elective VII (B)) : Numerical Analysis

Paper VII: MODEL PAPER (w.e.f.2018-19)

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Time: 3hours **Max Marks=70M**

PART-I

Answer all the questions. Each question carries 1 mark **8X1=8M**

1. Estimate 1/3 to three significant digits and find its absolute error.
2. Define algebraic equation.
3. Write the convergent condition for iterative method.
4. Prove that $\Delta=E-1$.
5. Define Shift operator.
6. Write the Gauss forward interpolation formula.
7. Write the Bessel's Formula for interpolation
8. Write the divided difference of $f(x) = x^2 - 5$ for the arguments 2 and 4.

.PART-II

Answer any three questions from each section. Each question carries 5 marks. 6X5=30M

SECTION A

9. Evaluate the sum S = $\sqrt{3}+\sqrt{5}+\sqrt{7}$ to four significant digits and find its absolute and relative errors.
10. Define absolute, relative and percentage errors and give an example.
11. Explain Bisection Method.
12. Solve the equation Sin x=5x-2 by iteration method.
13. Find a root of the equation $x^3-2x-5=0$ by using Newton- Raphson method.

SECTION B

14. Prove that 1) $E= e^{hD}$ 2) $\mu^2 =1+ \frac{1}{4}\delta^2$

15. Find the missing term in the following data given below

x	0	1	2	3	4
y	1	3	9	-	81

16. Derive Newton's forward interpolation formula

17. Apply Stirling folmula to find the value of f(1.22) from

X	0	0.5	1.0	1.5	2.0
f(x)	0	0.191	0.341	0.433	0.477

18. Using the inverse Lagrange's Interpolation Formula
if $y_1 = 4,\ \ y_3 = 12,\ y_4 = 19, y_x = 7$ then find the value of x

PART – III

Answer any four questions by choosing at least one question from each section. 4X8=32M

SECTION C

19. If $u=4x^2y^3/z^4$ and errors in x, y, z be 0.001, compute the relative maximum error in u, when x=y=z=1.

20. Find the real root of the equation $x^3-9x+1=0$ by using Regula Falsi Method.

21. Find the root of the equation $f(x) =e^x-3x$ by using Newton-Raphson method.

SECTION D

22. Prove that $(\frac{\Delta^2}{E})e^x.(\frac{Ee^x}{\Delta^2 e^x}) = e^x$, the interval of differencing being unit

23. Using Newton's Forward interpolation formula, find the value of f(x) when x=1.4

X	1.1	1.3	1.5	1.7	1.9
Y	0.21	0.69	1.25	1.89	2.61

24. By means of Newton's divided difference formula, find the value f(8) and f(15) from the following table :

x	4	5	7	10	11	13
f(x)	48	100	294	900	1210	2028

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