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RAS 301 Engineering Mathematics III: B. Tech. (Third Semester)–2018-19
Assignement-1 (Unit-3) Numerical Techniques-1

[1]. Prove that (i) $\Delta = \frac{1}{2}\delta^2 + \delta\sqrt{1+\frac{\delta^2}{4}}$ (ii) $\frac{\Delta}{\nabla} - \frac{\nabla}{\Delta} = \Delta + \nabla$ (iii) $\mu\delta = \frac{1}{2}(\Delta + \nabla)$

[2]. Find the real root of $x^3 - x = 1$ between 1 and 2 by bisection method.

[3]. Find rate of convergence of Regula- Falsi method and root of equation $x\sin x + \cos x = 0$ using same method.

[4]. Find real root of the following equation correct to three decimal places using Newton –Raphson method $x\log_e x = 1.2$

[5]. Find a positive real root of equation $3x - \cos x - 1 = 0$ using the method of false positionProve that

(i) $\mu\delta = \frac{1}{2}(\Delta + \nabla)$ (ii) $e^x = \left(\frac{\Delta^2}{E}\right)e^x \frac{Ee^x}{\Delta^2 e^x}$. (iii) $\Delta = \frac{1}{2}\delta^2 + \delta\sqrt{1+\frac{\delta^2}{4}}$ (iv) $\frac{\Delta}{\nabla} - \frac{\nabla}{\Delta} = \Delta + \nabla$

[6]. Find the missing term in the following table.

(a)

x	1	1.5	2	2.5	3	3.5	4
f(x)	6	---	10	20	---	15	5

(b)

x	2	4	6	8	10	12	14
f(x)	8	64	216	---	1000	1728	2744

[7]. Given the table, estimate the number of students who obtained marks between 40 and 45.

Marks :	30 – 40	40 – 50	50 – 60	60 – 70	70 – 80
No. of students:	31	42	51	35	31

[8]. Estimate the value of f(22) and f(42) from the following table

x	20	25	30	35	40	45
f(x)	354	332	291	260	231	204

[9]. Fit a polynomial of degree 3 and hence determine y(3.5) for the following data, using forward interpolation

x	3	4	5	6
f(x)	6	24	60	120

[10]. Fit a cubic polynomial which takes the following values: y(0) = 1, y(1) = 0, y(2) = 1, y(3) =10, and also find the value of y(4).

[11]. By means of Lagrange's formula, prove that $y_1 = y_3 - 0.3(y_5 - y_{-3}) + 0.2(y_{-3} - y_{-5})$.

[12]. Using Lagrange's interpolation formula, find f(10) from the following table.

x	5	6	9	11
f(x)	12	13	14	16

[13]. Using Newton's divided difference interpolation formula, find a polynomial function satisfying the following data and also find the value of f(1).

x	− 4	− 1	0	2	5
f(x)	1245	33	5	9	1335