CODE : 3805 SEM-III EXAMINATION, NOV 2014

M-303: Numerical Analysis

TIME : 2½ HOURS TOTAL MARKS:70

INSTRUCTIONS: (1) All questions are compulsory.
(2) Each question carries equal marks.

Q.1 A Find the Absolute error, Relative error , Percentage error of the following value [8]

(1) $V_t = \frac{10}{3}$ and $V_a = 3.3333$
(2) $V_t = 3.14$ and $V_a = 3.14159$
(3) $V_t = 2.73$ and $V_a = 2.7172$
(4) $V_t = \frac{2}{3}$ and $V_a = 0.6666$

B (1)Define Absolute error and Relative error [6]
(2) find the Relative error in computation of x-y , where x= 12.65 ,y= 10.32 and $\Delta x = 0.004, \Delta y = 0.002$

OR

Q.1 A If $y = 3x^4 - 5x + 2$ then find E_a, E_r, E_p in y at x=2 iff error in x is 0.06 [6]
B State and prove formula for estimation of errors [8]

Q.2 A Prove that $\mu\delta = \frac{1}{2}(\Delta + \nabla)$ [4]
B Express the following polynomials in factorial notation and get their Successive forward difference [10]
(1) $f(x) = 3x^4 - 4x^3 + 6x^2 + 2x + 1$
(2) $f(x) = x^3 - 2x^2 + x - 1$

OR

Q.2 A Find value of $\delta^7 y_6$ and $\Delta^8 y_{10}$ [8]
B Prove that $e^x\left(u_0 + x\Delta u_0 + \frac{x^2}{2!}\Delta^2 u_0 + \cdots\cdots\right) = u_0 + u_1 x + u_2\frac{x^2}{2!} + \cdots\cdots$ [6]

Q.3 A Derive Gauss forward interpolation formula [6]
B Prepare table of $y = x^3$ and compute the approximate value of y at x=3.7 [8]
for given data

x	0	1	2	3	4	5	6
y	0	1	8	27	64	125	316

By Gauss backward interpolation formula

OR

Q.3 A Derive Gauss backward interpolation formula [6]

B Find value of y at x= 0.1754 from the given data using Gauss forward interpolation formula [8]

x	0.12	0.14	0.16	0.18	0.20	0.22
y	1.231	1.632	2.143	2.625	3.246	3.899

Q.4 A Derive Bessel's formula [7]

B Compute y at x=0.6454 for the given equidistant value of y at respected x is [7]

x	0.61	0.62	0.63	0.64	0.65	0.66	0.67
y	1.8404	1.8589	1.8776	1.8964	1.9755	1.9348	1.9542

Using Stirling's formula

OR

Q.4 A Derive Laplace Everett's interpolation formula [7]

B Determine the value of y at x=10 by using Lagrange's interpolation formula from the given data: [7]

x	5	6	9	11
y	12	13	14	16

Q.5 A show that divided differences are symmetrical in all their arguments [8]

B If (0,-1),(1,2),(3,8),(4,15)are the values of (x,y) then find a cubic curve passing through above points hence y at x=6 [6]

OR

Q.5 A Prove Newton's divided difference formula [7]

B The following table gives values of x and y [7]

x	30	35	40	45	50
y	15.9	14.9	14.1	13.3	12.5

Find the value of x corresponding to y=13.6