BS/Sem III/17

B Sc(Hons.) SEMESTER III, Examination 2016 – 17

COMPUTER SCIENCE

Paper: BCS-301: NUMERICAL COMPUTING

Time: 3 Hours **Full Marks: 70**

(WRITE YOUR ROLL NO AT THE TOP IMMEDIATELY ON THE RECEIPT OF THIS QUESTION PAPER)

NOTE: ANSWER FIVE QUESTIONS INCLUDING QUESTION NO 1, WHICH IS COMPULSORY. THE FIGURES IN THE RIGHT HAND MARGIN INDICATE MARKS. USE OF THE CALCULATOR IS ALLOWED. ALL UNDEFINED SYMBOLS HAVE THEIR USUAL MEANINGS.

1.

a) Explain different types of errors with an example. 4

b) If the first significant figure of a number is k and the number is correct to n significant figures, then prove that the relative error $< \frac{1}{kx10^{n-1}}$.

c) Prove that Newton-Raphson process has a second order convergence.

d) Given that the equation $x^{22}=69$ has a root between 5 and 8. Use the method of regula-falsi to determine it.

e) Define Finite differences. Explain Forward, Backward and Central differences with examples.

f) Evaluate $\Delta \tan^{-1} x$.

2. (a) Find a real root of the equation $x^3-2x-5=0$ using Bisection Method.

(b) From the following 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

3. (a) Apply Gauss Elimination method to solve the equation correct to three decimal places

P.T.O.

$x+4y-z=-5$

$x+y-6z=-12$

$3x-y-z=4$

(b) Apply Gauss Jordan method to solve the equation correct to three decimal places 6

$x+y+z=9$

$2x-3y+4z=13$

$3x+4y+5z=40$

4. The table gives the distance in nautical miles of the visible horizon for the given heights in feet about the earth surface. 2x6=12

x=Height:	100	150	200	250	300	350	400
y=Distance:	10.63	13.03	15.04	16.81	18.42	19.90	21.27

Find the values of y when

(a) x=218 ft (b) x=410 ft

5. Evaluate $\int_0^6 \frac{dx}{1+x^2}$ by using 3x4=12

(a) Trapezoidal rule

(b) Simpsons 1/3 rule

(c) Simpsons 3/8 rule

(d) Weddles rule and compare the results with its actual value.

6. Using Runge-Kutta method of fourth order, solve $\frac{dy}{dx} = \frac{y^2-x^2}{y^2+x^2}$ with y(0)=1 at x=0.2, 0.4. 2x6=12

7. (a) Apply Milnes method, to find a solution of the differential equation $y'=x-y^2$ in the range $0\leq x\leq 1$ for the boundary condition y=0 at x=0. 6

(b) Given that $\frac{dy}{dx} = x^2(1+y) and\ y(1) = 1, y(1.1) = 1.233, y(1.2) = 1.548,$ $y(1.3) = 1.979, evaluate\ y(1.4) by\ Adams - Basforth\ method.$ 6

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