# - BACHELOR IN COMPUTER AFPLICATIONS <br> Term-End Examination <br> December, 2011 <br> <br> CS-71 : COMPUTER ORIENTED NUMERICAL <br> <br> CS-71 : COMPUTER ORIENTED NUMERICAL TECHNIQUES 

 TECHNIQUES}

Time : 3 hours
Maximum Marks : 75
Note: Question number 1 is compulsory. Attempt only three questions from the rest. In total, you have to answer four questions. Use of Calculator is permitted.

1. (a) Prove that $\delta=\sqrt{E}-1 / \sqrt{E}$ 5
(b) Prove that $\delta^{2}=4\left(\mu^{2}-1\right)$ 5
(c) The speed $v$ metres per second of a car $t$ seconds after it starts is shown in the following table:

| $\mathbf{t}:$ | 0 | 12 | 24 | 36 | 48 | 60 | 72 | 84 | 96 | 108 | 120 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\mathbf{v}:$ | 0 | 3.60 | 10.08 | 18.90 | 21.60 | 18.54 | 10.26 | 5.40 | 4.50 | 5.40 | 9.00 |

Using Simpson's one-third rule, find the distance travelled by the car in 2 minutes.
(d) Find a root of the equation $x^{3}-4 x-15=0 \quad 5$ correct to 3 decimal places using Bisection method.
(e) Find a root of the equation $x^{3}-5 x+3=0 \quad 5$ correct to 3 decimals using Newton Raphson's method.
(f) A civil engineer has measured the height of 5 a 10 floor building as 2950 cm and the working height of each beam as 35 cm while the true values are 2945 cm and 30 cm respectively. Compare their absolute and relative errors.
2. (a) Given :

$$
\begin{aligned}
\sin 45^{\circ} & =0.7071 \\
\sin 50^{\circ} & =0.7660 \\
\sin 55^{\circ} & =0.8192 \\
\sin 60^{\circ} & =0.8660
\end{aligned}
$$

find $\sin 52^{\circ}$, using Newton's forward interpolation formula.
(b) Find a root of the equation
$x \log _{10} x=1.2$ correct to three decimal places using Regula Falsi method.
(c) Compute the real root of the equation 5 $3 x^{3}-4 x^{2}+3 x-4=0$. Correct to three decimals using Secant method.
3. (a) Find the cube root of 47, using Newton5 Raphson's method.
(b) Apply Runge-Kutta method to find an approximate value of $y$ for $x=0.2$ in steps of 0.1 , if $\frac{d y}{d x}=x+y^{2}$, given that $y=1$, where $x=0$
(c) Use Lagrange's interpolation formula to find the value of $y$ when $x=10$, if the following table of $x$ and $y$ is given.

| $x:$ | 5 | 6 | 9 | 11 |
| :---: | :---: | :---: | :---: | :---: |
| $y:$ | 12 | 13 | 14 | 16 |

4. (a) Using Newton's divided difference formula, evaluate $f(8)$ and $f(15)$, given :

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

(b) Find a real root of the equation $3 x-6=x^{2}$ correct to three decimals using any iteration method.
(c) Solve the following equations.

$$
\begin{aligned}
5 x+2 y+z & =12 \\
x+4 y+2 z & =15 \\
x+2 y+5 z & =20
\end{aligned}
$$

by using Jacobi's iteration method.
5. (a) Solve the following equations.

$$
\begin{aligned}
& 20 x+y-2 z=17 \\
& 3 x+20 y-z=-18 \\
& 2 x-3 y+20 z=25
\end{aligned}
$$

by applying Gauss - Seidal iteration method.
(b) Solve the following equations.

$$
\begin{array}{r}
3 x+4 y-z=8 \\
-2 x+y+z=3 \\
x+2 y-z=2
\end{array}
$$

by applying Gauss - Elimination method.
(c) If $\mathrm{u}=\frac{4 x^{2} y^{3}}{z^{4}}$ and errors in $x, y$ and $z$ be 5
0.001. Compute the relative maximum error in $u$ when $x=y=z=1$.

