ST. JOSEPH'S COLLEGE (AUTONOMOUS), BANGALORE-27
MID-SEMESTER TEST - AUGUST-2016
M.Sc. MATHEMATICS – III SEMESTER
MT DE 9516 : NUMERICAL ANALYSIS

Time: 1 hour **Max Marks: 20**

Answer any FOUR questions. $4 \times 5 = 20$

1. Apply Runge-kutta fourth order method to find an approximate value of y when $x = 0.2$ in the steps of 0.1 given that $\frac{dy}{dx} = x + y$ and $y = 1$ when $x = 0$.
2. Solve $\frac{dy}{dx} = y - z;\ y(0) = 1$, $\frac{dy}{dx} = z - y;\ z(0) = 1$ choose $h = 0.05$ and obtain the solution at $x = 0.05$. Find the exact solution.
3. Solve $\frac{d^2y}{dx^2} + 5\frac{dy}{dx} + 6y = e^x;\ y(0) = 0, y'(0) = 1$. Use classical Runge-kutta method of 2nd order(explicit) and obtain the solution at $x = 0.05$.
4. Derive the general form of the Adam-Bashforth predictor method.
5. Solve $\frac{dy}{dx} = x + y^2;\ y(0) = 1,$ .obtain the solution at $x = 0.1$ by Adam's predictor-corrector method of 2nd order. Use Runge-kutta2nd order explicit method to find the require unknown values. $h = 0.05$
6. Solve $\frac{dy}{dx} = x - y^2;\ y(0) = 1$ to find $y(0.2)$ by Adam's method. Starting solutions required are to be obtained using Runge-kutta method of 4th order using the step value $h = 0.1$