Question Bank

Subject: Numerical Methods

Set-II

Topic: Solution of Algebraic and Transcendental Equations

1. *If f(x) is continuous in [a,b] and f(a)f(b)<0, then there exist*
   a) *At least one real root*
   b) *At most one real root*
   c) *Exactly one real root*
   d) *Exactly one complex root*
2. *Which of the following does not always guarantee the convergence*
   a) *Secant method*
   b) *Bisection method*
   c) *Regula-falsi method*
   d) *Newton-Raphson Method*
3. *The Newton-Raphson method fails when*
   a) $f'(x)=1$
   b) $f'(x)=0$
   c) $f'(x)=-1$
   d) $f''(x)=0$
4. *Condition for convergence of Newton-Raphson method is*
   a) $|f(x)f'(x)|<\{f''(x)\}^2$
   b) $|f(x)f''(x)|<\{f'(x)\}^2$
   c) $|f(x)f'(x)|>\{f''(x)\}^2$
   d) $|f(x)f''(x)|>\{f'(x)\}^2$
5. *Regula falsi method used for finding the real roots of a numerical equation is-*
   a) *An analytical method*
   b) *Graphical method*
   c) *Iterative method*
   d) *None of these*
6. *Regula-Falsi method is*
   a) Conditionally divergent
   b) *Linearly convergent*
   c) *Divergent*
   d) *None of these*
7. *For Newton-Raphson method, the iterative formula is*
   a) $x_{n+1}=x_n +$
   b) $x_{n+1}=$
   c) $x_{n+1}=$
   d) $x_{n+1}=x_n -$
8. *One of the roots of the equation* $x^2+2x-2=0$ *lies in between*
   a) *1 and 2*
   b) *0 and 0.5*
   c) *0.5 and 1.0*
   d) *None of these*
9. *Newton-Raphson method is also known as method of*
   a) *Straight line*
   b) *Tangent*

c) *Normal*
d) *Cyclic*

10. *The order of convergence of Newton-Raphson method is*
    a) *3*
    b) *2*
    c) *1*
    d) *4*
11. *Under the condition that f(a), f(b) have opposites and a<b the first approximation of the one of the roots of f(x)=0 by Regula-Falsi method is given by*
    a)
    b)
    c)
    d)
12. *Newton-Raphson method formula for (Where N is a positive integer) is*
    a) $x_{n+1}=Nx_n$
    b) $x_{n+1}=x_n(2-Nx_n)$
    c) $x_{n+1}=x_n(2+Nx_n)$
    d) $x_{n+1}=Nx_{n-1}$
13. *Bisection method is _____ but _____*
    a) *Fast, fails*
    b) *Fast, sometimes fails*
    c) *Fast, never fails*
    d) *Slow, never fails*
14. *Newton-Raphson method formula for finding the square root of a real number R from the equation* $x^2-R=0$ *is*
    a) $x_{n+1}=$
    b) $\boldsymbol{x_{n+1}= (x_n+)}$
    c) $x_{n+1}= (x_n-)$
    d) *None of these*

15. *Find the root of the following equation by Newton-Raphson method correct up to 3 decimal places:* $x^3 -3x+1=0$
    Ans: 1.532

16. *Find the root of the following equation by Regula-Falsi method correct up to 3 decimal places:*
    $Xe^x-3=0$
    Ans: 1.060
17. *Find the root of the following equation by Bisection method correct up to 3 decimal places:*
    $x^3 -4x-9=0$
    Ans: 2.7065

Topic: Numerical Solution of Ordinary Differential Equations

1. *Runge-Kutta formula has a truncation error, which is order of-*
    a) h^2
    b) h^4
    c) h^5
    d) *None of these*

2. *The truncation error of Euler's method is order of*
   a) *h*
   b) h^2
   c) h^3
   d) *None of these*
3. *Milne's predictor-corrector method is a single step method*
   a) *False*
   b) *True*
4. *If and y(0)=2, the value of k_2 according to Runge-Kutta of 2^{nd} order is (h=0.2)*
   a) 0.1
   b) *0.01*
   c) *0.4*
   d) *0.04*
5. *For solving ordinary differential equation, the Euler's formula is*
   a)
   b)
   c)
   d)
6. *Runge-Kutta method of fourth order is used to solve*
   a) *A first order ordinary differential equation numerically*
   b) *A system of linear equations*
   c) *A first-order partial differential equations numerically*
   d) *None of these*
7. *Modified Euler's method has a truncation error of the order*
   a) *h*
   b) h^2
   c) h^4
   d) h^3
8. *Milne's predictor formula is-*
   a)
   b)
   c)
   d)
9. *Milne's corrector formula is-*
   a)
   b)
   c)
   d)
10. *Use Taylor series method to solve the differential equation given y(0)=1 and find y(0.03)*
    Ans: 0.97001
11. *Use Euler's method, find the approximate value of y corresponding to x=1 given that and y=1 when x=0*
    Ans: 3.18
12. *Using modified Euler's method, find an approximate value of y at x=0.3 given that and y(0)=1.*
    Ans: 1.3997
13. *Given that where y(0)=0. Use the fourth order Runge-Kutta method to find y(0.2)*
    Ans: 0.2027
14. *Compute y(2) by Milne's predictor-corrector method if given y(0)=2, y(0.5)=2.636, y(0.4)=0.4228 and y(0.6)=0.6841.*
    Ans: 6.8710, 6.8732

Topic: Numerical Solution of a System of Linear Equations

1. *When the Gauss elimination method is used to solve BX=A, B is transformed into*
   a) *A lower triangular matrix*
   b) *An upper triangular matrix*
   c) *Zero matrix*
   d) *None of these*
2. *Diagonal dominance is must for*
   a) *Gauss-Seidel method*
   b) *Gauss-Jordan method*
   c) *Gauss-elimination method*
   d) *None of these*
3. *Gauss elimination method does not fail even if one of the pivot element is equal to zero*
   a) *True*
   b) *False*
4. *When Gauss-Jordan method is used to solve the system of equations which can be written in the form AX=B, A must be a*
   a) *Singular matrix*
   b) *Non-singular matrix*
   c) *Diagonal matrix*
   d) *Orthogonal matrix*
5. *Solve the system of equations by Gauss-elimination method*
   x+4y+3z=1
   2x+y+4z=4
   x-3y-2z=5
   Ans: x=3, y=-2 , z=2
6. *Solve the system of equations by Gauss-Seidel method correct up to 3 decimal places*
   x+y+54z=110
   27x+6y-z=85
   6x+15y+2z=72