**MATHLAB-IV Masters Final 2017-18**

**Part-B: Fortran Programming**

**08. Find real root of the equation using Bisection method**

**Solution:**

**----------------------------------------------------------------**

**f(x) = x\*x\*x – 2.0\*x -5.0**

**print\*,"Enter the value of a and b : "**

**10 read(5,\*) a,b**

**f1 = f(a)**

**r = f(b)**

**if( r\*f1 .GE. 0.0) goto 10**

**print\*," N A B"**

**n = 1**

**q = 0.1e-4**

**20 c = (a+b)/2**

**g = f(c)**

**if( g .EQ. 0.0) then**

**b = c**

**else**

**a = c**

**f1 = g**

**end if**

**if(abs(b-a) .LT. q) goto 35**

**write(6,30) n,a,b**

**30 format(3x , i2 , 2x , 2f15.6)**

**n = n+1**

**goto 20**

**35 c=(a+b)/2**

**write(6,50) c**

**50 format(3x, "The root is x =" , f15.6)**

**end**

**----------------------------------------------------------------Sample Input: 2 3**

**----------------------------------------------------------------**

**10. Find the value of using Trapezoidal rules**

**Solution:**

**---------------------------------------------------------------**

**integer i**

**real h, sum , x , f , a , b**

**print\*,"Enter the value of a and b"**

**read\*, a , b**

**n = 60**

**h = (b-a)/real(n)**

**sum = 0.5\*(f(a)+f(b))**

**do i = 1 , n-1**

**x = a+i\*h**

**sum = sum + f(x)**

**enddo**

**sum = h\*sum**

**print\*,"Value of the Integration = ", sum**

**end**

**function f(x)**

**f = exp(x/2.0)**

**return**

**end function**

**----------------------------------------------------------------Sample Input: 1 2**

**----------------------------------------------------------------**

**12. Integration using simpson 3/8 rules**

**Solution:**

**---------------------------------------------------------------**

**real function f(x)**

**real x**

**f = 1.0 - exp(-x/2.0)**

**return**

**end function**

**real y(7)**

**real a,b,sum,n,init**

**print\*,"Enter lower and upper limit: "**

**read\*,a,b**

**init = a**

**n = 6.0**

**h = (b-a)/n**

**do i=1,7**

**y(i) = f(init)**

**init = init + h**

**enddo**

**sum = h/3.0\*((y(1)+y(7)) + 4\*(y(2)+y(4)+y(6)) + 2\*(y(3)+y(5)))**

**print\*,"Value of the Integration = ",sum**

**end**

**----------------------------------------------------------------Sample Input: 1 2**

**----------------------------------------------------------------**

**15. Determining binomial coefficient nCr using function sub program**

**Solution:**

**---------------------------------------------------------------**

**integer n,r**

**22 print\*,"Enter the value of n and r"**

**read\*,n,r**

**if(n .LE. r) then**

**print\*,"n must be greater than r"**

**goto 22**

**endif**

**nr = n-r**

**ib = ifact(n)/(ifact(r)\*ifact(nr))**

**print\*,"value of nCr = ",ib**

**end**

**function ifact(k)**

**isum = 1;**

**do i = 1,k**

**isum = isum \* i**

**enddo**

**ifact = isum**

**return**

**end**

**----------------------------------------------------------------Sample Input: 5 2**

**----------------------------------------------------------------**

**16. Matrix Multiplication C=AB Where order of A = 3x4 and B = 4x5**

**Solution:**

**---------------------------------------------------------------**

**integer p**

**parameter(m=3,n=4,p=5)**

**dimension a(m,n), b(n,p) , c(m,p)**

**print\*,"Enter the Matrix A: "**

**read\*, ((a(i,j), j=1,n), i=1,m)**

**print\*,"Enter the Matrix B: "**

**read\*, ((b(i,j), j=1,p), i=1,n)**

**do i=1,m**

**do j=1,p**

**sum = 0.0**

**do k=1,n**

**sum = sum + a(i,k)\*b(k,j)**

**c(i,j) = sum**

**enddo**

**enddo**

**enddo**

**print\*," Product of A and B Matrix"**

**print 30, ((c(i,j),j=1,p),i=1,m)**

**30 format(2x3(2x,F8.2))**

**end**

**----------------------------------------------------------------Sample Input: Matrix A: 1 2 3 2 1 3 5 3 1 4 2 3**

**Matrix B: 2 1 3 5 8 6 5 4 2 1 4 5 6 7 3 4 5 6 3 4**

**----------------------------------------------------------------**