* J B - 3 1 1 8 *

JB-3118

Second Year B. Sc. (Sem. III) Examination

March/April – 2013

CCM - 303 CS : Numerical Methods

Time : **3** Hours] [Total Marks : **70**

Instructions :

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :
☛ **S. Y. B. Sc. (Sem.-3)**

Name of the Subject :
☛ **CCM - 303 CS : Numerical Methods**

☛ Subject Code No. : **3 1 1 8** ☛ Section No. (1, 2,.....) : **Nil**

Seat No. :

Student's Signature

(2) All questions are compulsory.

(3) Figures to the right indicate full marks.

(4) Follow usual notations.

(5) Use of scientific non-programmable calculator is allowed.

1 Answer any **five** of the following questions : **10**

(1) Solve the difference equation :

$f(x+2)-8\,f(x+1)+15\,f(x)=0.$

(2) Find the order and degree of the difference equation :

$f^3(x)f^4(x+1)+3f(x)f(x+2)-7f^2(x+3)=(x+5)^6.$

(3) State when the function f is said to be analytic at point $x=x_0$.

(4) Solve : $2y_{k+2}-5y_{k+1}+2y_k=0$.

(5) State the general form of second order partial differential equation and state when it is of parabolic type.

(6) Show that the Laplace equation is of elliptic type.

2 (a) Solve any **one** of the following system of equations by Gauss elimination method : **7**

(i) $2x+y+z=10$, $3x+2y+3z=18$, $x+4y+9z=16$

(ii) $5x-2y+z=4$, $7x+y-5z=8$, $3x+7y+4z=10$.

(b) Solve any **one** of the following system of equations by Gauss-Seidel method : **8**

(i) $9x-2y+z=17$, $4x+5y-2z=-9$, $x-3y-5z=4$.

(ii) $27x+6y-z=85$, $6x+15y+2z=72$, $x+y+54z=110$.

3 (a) Find linearly independent solutions of the difference equation $y_{K+2}-6y_{+1}+8y_K=0$ and hence write the general solution. **5**

OR

3 (a) For any constant k, show that : **5**

$$(E-k)^n f(x)=k^{x+n}\Delta^n\left(\frac{f(x)}{k^x}\right).$$

(b) Solve any **two** of the following difference equations : **10**

(i) $u_{x+2}+u_{x+1}+u_x=0$.

(ii) $f(x+3)-3f(x+1)-2f(x)=0$.

(iii) $\Delta u_x+\Delta^2 u_x=0$.

4 (a) Solve any **one** of the following differential equations : **7**

(i) $(x^2-1)y''+xy'-xy=0$ in power of x.

(ii) $xy''+y'-2y=0$ in powers of $(x-1)$ with $y(1)=1$, $y'(1)=2$.

(b) Solve any **one** of the following differential equations at $x=0$: **8**

(i) $x(1-x)y''+(1-x)y'+y=0$

(ii) $9x(1-x)y''+12y'+4y=0$.

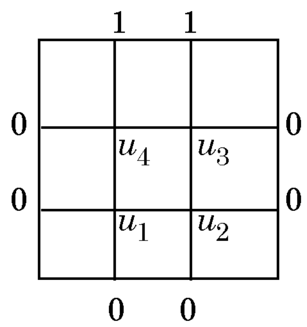
5 (a) Write down the finite-difference analogue of the equation $\frac{\partial u}{\partial y} = \frac{\partial^2 u}{\partial x^2}$. Given that u=1 when t=0 and u=0 at x=0 and x=1. Compute the solution of the above equation at x=0.1 using Jacobi's equation. **5**

OR

6 (a) State and prove the diagonal five point formula for the function $u(x, y)$. **5**

(b) Solve the equation $u_{xx} + u_{yy} = 0$ in the domain of any one of the following figures by Jacobi's method upto four iterations : **10**

(i)



(ii)