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A-3019

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

March / April – 2015

Mathematics : CCM-303 (CS)

(Numerical Methods)

Time : 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 :

☛ SECOND YEAR B. SC. (SEM. 3)

Name of the Subject :

☛ MATHEMATICS : CCM-303 (CS)

☛ Subject Code No. : 3 0 1 9 ☛ 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 to Scientific non-programmable calculator is allowed.

1 Answer the following questions : **10**

(1) Define point Jacobi method.

(2) Solve : $y_{k+3} - 4y_{k+2} + 5y_{k+1} - 2y_k = 0$

(3) Solve : $2y_{k+3} - 8y_{k+2} + 10y_{k+1} - 4y_k = 0$

(4) Consider the equation :

$$2x(x-2)^2 y'' + 3xy' + (x-2)y = 0$$

(5) What is pivot elements ? Explain in brief with example.

2 (a) Solve any one by Gauss Elimination method : **7**

(i) $3x + y + 2z = 3,\quad 2x - 3y - Z = -3,\quad x + 2y + z = 4$

(ii) $x + 2y + 3z = 18,\quad 2x + y - 4z = -30,\quad -5x + 8y + 17z = 96$

(b) Solve any one by Gauss Jordan method : 8

(i) $10x+2y+z=9,\ 2x+20y-2z=-44,\ -2x+3y+10z=22$

(ii) $x+y+z=9,\ 2x-3y+4z=13,\ 3x+4y+5z=40$

3 (a) Find the power series solution about $x=0$ of the equation. **5**

$y''+xy'+y=0,\quad y(0)=3,\quad y'(0)=-7$

OR

(a) Find power series solution of differential equation : **5**

$\left(2+x^2\right)y''+xy'-(1+x)y=0$

(b) Solve any **two** : **10**

(1) Solve : $4xy''+2(1-x)y'-y=0$

(2) Solve : $xy''+y'+x^2y=0$

(3) Solve : $xy''-(4+x)y'+2y=0$

(4) Solve : $xy''+2y'+xy=0$

4 (a) Solve : $9y_{k+2}-6y_{k+1}+y=0$ **5**

OR

(a) Solve : $y_{k+4}+2a^2\ y_{k+2}+a^4y_k=0$ **5**

(b) Solve any **two** : **10**

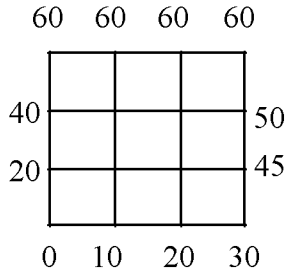
(1) Solve : $y_{k+2}+4y_k=0$

(2) Solve : $y_{k+1}-ay_k=b_k$

(3) Solve : $y_{k+3}+y_k=0$

(4) Solve : $y_{k+3}-3y_{k+2}+9y_{k+1}-27y_k=0$

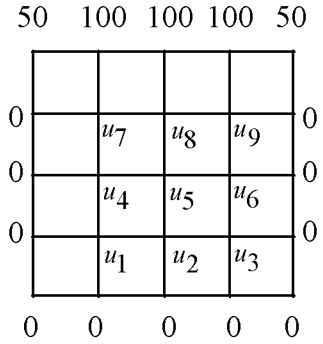
5 (a) Solve $u_{xx} + u_{yy} = 0$ in the domain of the figure. **5**



by Jacobi's method.

OR

(a) Solve Laplace's equation for following figure : **5**

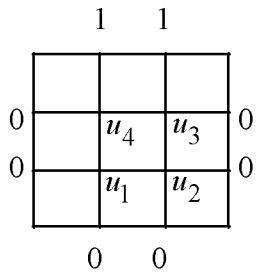


(b) Attempt any **two** : **10**

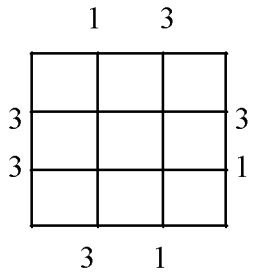
(1) Solve using Gauss Seidal method.

$9x - 2y + z = 10, \quad 3x + 2y + 3z = 18, \quad x + 4y + 9z = 16$

(2) Solve Laplace's equation in the domain of figure.



(3) Solve $u_{xx} + u_{yy} = 0$ in the domain of the figure, given below



(4) Solve using Gauss Seidal method :

$4x + 2y + z = 14$

$x + 5y - z = 10$

$x + 8z = 20$.