I D NO.	

PRESIDENCY UNIVERSITY, BENGALURU

SCHOOL OF ENGINEERING

Weightage: 40 % Max Marks: 80 Max Time: 2 hrs. 08 May Tuesday 2018

ENDTERM FINAL EXAMINATION MAY 2018

Even Semester 2017-18 Course: **MAT 104 Engineering Mathematics-IV** IV Sem. All Branches

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Instructions:

(i) *Read the question properly and answer accordingly.*

(ii) *Question paper consists of 3 parts.*

(iii) Scientific and Non-programmable calculators are permitted

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Part A

Answer ALL questions (3 Q x 8 M = 24 Marks)

1. Using Taylor's series method compute $y(0.2)$ given that $\frac{dy}{dx} = 2y + 3e^x,\ y(0) = 0$ taking $h = 0.2$.

2. Given that $\frac{dy}{dx} = x + y,\ y(0) = 1,$ find an approximate value of y at $x = 0.1$ and $x = 0.2$ using modified Euler's method.

3. Solve $u_{xx} = u_t,\ 0 < x < 1,\ t > 0,$ given $u(x,0) = 0$, $u(0,t) = 0$ and $u(1,t) = t$ for one time step using Crank - Nicholson method taking $h = \frac{1}{4}$ and $k = \frac{1}{16}$.

Part B

Answer ALL questions (2 Q x 12 M = 24 Marks)

4. Find $y(0.1)$ using Runge-Kutta method of fourth order given that $y' = x^2 - y$, $y(0) = 1$.

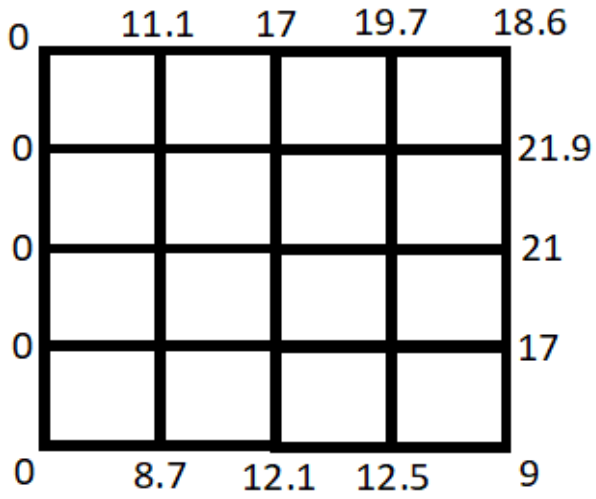
5. Using finite difference method, solve the boundary value problem $\frac{d^2y}{dx^2} + y = x$, $y(0) = 0$ and $y(1) = 2$ taking $h = \frac{1}{4}$.

Part C

Answer any TWO questions (2Q x 16 M = 32 Marks)

6. Using Runge-Kutta method of fourth order solve the simultaneous differential equations $\frac{dy}{dx} = 1 + xz$, $\frac{dz}{dx} = -xy$, $y(0) = 0$, $z(0) = 1$ at $x = 0.3$ with $h = 0.3$.

7. Solve the Laplace equation $u_{xx} + u_{yy} = 0$ over the square region given below.



Carry out 2 iterations using Gauss-Seidel iterative method.

8. Solve $16u_{xx} = u_{tt}$, $0 < x < 5, t > 0$, subject to the conditions $u(0,t) = 0$, $u(5,t) = 0$, $u(x,0) = x^2(5 - x)$ and $u_t(x,0) = 0$ for 4 time steps using explicit finite difference method with $h = 1$ and $k = \frac{1}{4}$.

ID NO:	

PRESIDENCY UNIVERSITY, BENGALURU

SCHOOL OF ENGINEERING

Weightage: 20% Max. Marks: 40 Max Time: 1 hour 29 March Thursday 2018

TEST – 2 **SET A**

Even Semester 2017-18 Course: **MAT 104 Engineering Mathematics – IV** IV Semester All Branches

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Instructions:

(i) *Read the questions properly and answer accordingly.*
(ii) *Question paper consists of 3 parts.*
(iii) *Scientific and Non-programmable calculators are permitted*.

Part A (2Q x 8M = 16 Marks)

1. Use Newton's forward interpolation formula to estimate the value of $y(79)$ given that

x	75	80	85	90
y	246	202	118	40

2. Use Lagrange's interpolation formula to find the value of $y(2)$ from the following data:

x	0	1	3	4
Y	– 12	0	6	12

Part B (1Q x 10M = 10 Marks)

3. Using Newton's divided difference formula evaluate $f(10)$ given that

x	4	7	9	12
$f(x)$	– 43	83	327	1053

Part C (1Q x 14M = 14 Marks)

4. Compute $f'(4)$ and $f''(4)$ numerically from the following data

x	0	2	5	1
$f(x)$	0	8	125	1

OR

5. Evaluate $\int_0^6 \frac{1}{1+x}\,dx$, by dividing the interval of integration into 6 equal parts, using (i) trapezoidal rule (ii) Simpson's $1/3$ rule and (iii) Simpson's $3/8$ rule.

ID NO.:	

PRESIDENCY UNIVERSITY, BENGALURU

SCHOOL OF ENGINEERING

Weightage: 20 % Max Marks: 40 Max Time: 1 hr. 19 Feb Monday 2018

TEST – 1

Even Semester 2017-18 Course: **MAT 104 Engineering Mathematics – IV** IV Sem. All Branches

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Instructions:

(i) *Read the question properly and answer accordingly.*
(ii) *Question paper consists of 3 parts.*
(iii) *Scientific and Non-programmable calculators are permitted*.

Part A

(2Q x 8M = 16 Marks)

1. Using Newton-Raphson method find a positive root between 1 and 2 of the equation $x^4-x-10=0$ correct up to three decimal places.

2. Find the dominant eigenvalue and the corresponding eigenvector of the matrix $\begin{bmatrix} 1 & 6 & 1 \\ 1 & 2 & 0 \\ 0 & 0 & 3 \end{bmatrix}$ using power method.

Part B

(1Q x 10M = 10 Marks)

3. Solve the system of linear equations $10x+2y+z=9$, $x+10y-z=-22$ and $-2x+3y+10z=22$ by means of Gauss-Seidel iterative method.

Part C

(1Q x 14M = 14 Marks)

4. Solve the simultaneous linear equations $x+y+z=1$, $4x+3y-z=6$ and $3x+5y+3z=4$ using LU decomposition method.

OR

5a. Find a positive root between 0 and 1 of the equation $xe^x-1=0$, correct up to two decimal places, using bisection method. (7 marks)

5b. Use fixed point iterative method to find a real root between 0 and 1 of the equation $3x=\cos x+1$, correct up to three decimal places. (7 marks)