DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY,
LONERE - RAIGAD -402 103
Supplementary Winter Semester Examination - Dec. - 2019

Branch: Electrical and Electronics Engineering **Sem.:- IV**
Subject:- Numerical Methods and Programming (BTEEC404) **Marks: 60**
Date:- 02-12-2019 **Time:- 3 Hr.**

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Instructions to the Students

1. Each question carries 12 marks.
2. Attempt **any five** questions of the following.
3. Illustrate your answers with neat sketches, diagram etc., wherever necessary.
4. If some part or parameter is noticed to be missing, you may appropriately assume it and should mention it clearly.

(Marks)

Q.1. Answer the following **(12)**

a) What is MATLAB? Explain any six standard functions used in MATLAB.

b) Explain different array operations using MATLAB.

Q.2. Answer the following **(12)**

a) Illustrate different types of errors with suitable example.

b) Approximate the function $f(x)=\cos(x)$ at $x_{i-1}=\frac{\pi}{3}$ on the basis of the value of $f(x)$ and its derivatives at $x_i=\frac{\pi}{4}$. Use Taylors series expansion with n=0 to 6.

Q.3. Answer any TWO the following (6 Marks each) **(12)**

a) Find the value of $\cos(x)$ at $x=1.74$ from data given as:

x	1.7	1.74	1.78	1.82	1.86
$\sin(x)$	0.9916	0.9857	0.9781	0.9691	0.9584

b) Illustrate Trapezoidal rule and Simpsons One-Third rule for Numerical Integration.

c) Apply the Trapezoidal Rule to estimate the value of $\int_0^2 e^{x^2} dx$ taking the the number 10 intervals.

Q.4. Answer any TWO the following (6 Marks each) **(12)**

a) Apply Gauss Elimination method to solve the equations:

$$x+4y-z=-5$$
$$x+y-6z=-12$$
$$3x-y-z=4$$

b) Illustrate Iterative methods for solving Linear equations.

c) Use the Newton-Raphson method to estimate the root of $f(x)=e^{-x}-x$, employing the $x_0=0$.

Q.5. Answer any TWO the following (6 Marks each) **(12)**

a) Fit a straight line to the following set of data. Also plot the line.

x	1	2	3	4	5
y	3	4	5	6	7

b) Estimate the Lagrange interpolation polynomial to fit the following data

i	0	1	2	3
x_i	0	1	2	3
$e^{x_i}-1$	0	1.7183	6.3891	19.0855

Use the polynomial to estimate the value of $e^{1.5}$.

c) Explain the MATLAB function **`spline`** and **`pchip`** with suitable example.

Q.6. Answer the following **(12)**

a) Determine an approximate value of y corresponding to $x=1$, using Euler's metod. Given that $\frac{dy}{dx}=x+y$ and $y=1 when x=0$.

b) Apply Runge-Kutta fourth order method to solve $\frac{dy}{dx}=\frac{y^2-x^2}{y^2+x^2}$ with $y(o)=0$ at $x=0.2, 0.4$.

*****Paper End*****