DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE – RAIGAD -402 103

End Semester Examination – May - 2019

Branch: Electrical and Electronics Engineering **Sem.:- IV**

Subject with Subject Code:- Numerical Methods and Programming (BTEEC404)

Date:- 22-05-2019 **Marks: 60** **Time:- 3 Hr.**

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. Answers the following. **(12)**

a) Define variable and what are the rules for giving name to variable in MATLAB?

b) Define FOR loop, write syntax and explain with example?

Q.2. Solve the following. (4 marks each) **(12)**

a) Round off the following numbers correct to four significant figures and compute Absolute error, Relative error and Percentage error?

(i) 3.26435 (ii) 865830

b) Use the series $\log_e\left(\frac{1+x}{1-x}\right) = 2(x + \frac{x^3}{3} + \frac{x^5}{5} + \cdots)$ to compute the value of $log(1.2)$ correct to four decimal places.

c) Find the approximate value of $Sin\ 25°$ correct to four significant digits using sine series.

Q.3. Solve <u>any two</u> of the following (6 marks each) **(12)**

a) Evaluate $\int_0^6 \frac{dx}{1+x^2} dx$ correct to 3 decimal places by Simpson's 3/8 th Rule.

b) What are MATLAB functions for Numerical integration, explain any one with example?

c) Given

x	0	0.1	0.2	0.3	0.4	0.5	0.6
y	30.13	31.62	32.87	33.64	33.95	33.81	33.24

Find $\frac{dy}{dx}$ at $x = 0$,

Q.4. Solve the following . **(12)**

a) Solve the following simultaneous linear equations using Gauss elimination method.

$2x_1 + x_2 + 2x_3 + x_4 = 6;\ \ 4x_1 + 3x_2 + 3x_3 - 3x_4 = -1;$

$6x_1 - 6x_2 + 6x_3 + 12x_4 = 36;\ \ 2x_1 + 2x_2 - x_3 + x_4 = 10.$

b) Find the roots of the equation Newton-Raphson Method $4x^2 - 3 = 0.$

Q.5. Solve <u>any two</u> of the following (6 marks each) **(12)**

a) Use nonlinear regression to fit a parabola to the following data.

x	0.2	0.5	0.8	1.2	1.7	2	2.3
y	500	700	1000	1200	2200	2650	3750

b) An experiment to measure the intensity of light as a function of the distance from the source of the light produced the following data. Find the best fit exponential function $= e^{ax+b}$, by least squares approximation.

X(distance)	30	35	40	45	50	55	60	65	70
Y (intcnsity)	0.85	0.67	0.52	0.42	0.34	0.28	0.24	0.21	0.18

c) Explain with example, the following MATLAB functions, (i) pchip, (ii) lsqnonlin .

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

a) Solve the following ordinary differential equation by forth order Runge-Kutta Method.

$\frac{dy}{dx} = \frac{y^2+x^2}{2xy}$, $y(1) = 2$. Find the $y(1.4)$

b) Solve the following ordinary differential equation by Euler's Explicit Method.

$\frac{dy}{dx} = \frac{x-y}{x+y}$, $x_0 = 0, y_0 = 1.$ Find the solution at $x = 0.2$ with step-size $h = 0.1$

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