Seat No: _____ **Enrollment No: _____**

PARUL UNIVERSITY

FACULTY OF ENGINEERING & TECHNOLOGY

M. Tech. Winter 2019 - 20 Examination

Semester: 3 **Date: 26/11/2019**
Subject Code: 203206231 **Time: 10:30 am to 1 pm**
Subject Name: Computation Method for Automobile Engineering **Total Marks: 60**

Instructions:
1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

Q.1 A) What is Error? What are the different types of Error occurs in numerical methods? **(05)**

B) Write short note on following MATLAB operation. **(05)**

I. Function File II. Script File

C) Find root of equation $x^3 - 2x - 5 = 0$ by Regula- falsi method, correct to three decimal places. **(05)**

Q.2 Answer the following questions. (Attempt any three) **(15)**

A) If $\frac{dy}{dx} = x + yz$ and $\frac{dz}{dx} = x^2 - y^2$ use Runge - Kutta 4th order method under boundary condition *y(1)* =1 and *z=0.5* find *y* and *z* at 1.2 take *h* =0.1

B) If $\frac{dy}{dx} = 1 + y$ given *y(0)=0* using Milne's predictor –corrector method find *y* at *x=0.5* with step *h*=0.1 using following data

x	0	0.1	0.2	0.3
y	0	0.1051	0.2214	0.3498

C) Give brief review of steps involved in pre-processor of finite element method.

D) Develop the mathematical model for forced damped vibration.

Q.3 A) Discuss about the stability analysis of Multi step method. **(07)**

B) Solve the differential equation $\frac{dy}{dx} = \sqrt{x + y}$ using Modified Euler's method under the boundary y(0)=0.36 find y(0.2) up to accuracy 0.0001 **(08)**

OR

B) Solve $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$ for the following condition using Crank Nicholson method. At *x=0, and x=3, u=0* for all values of '*t* '. At *t=0* , $u=x^2$ for *0< x<3*. Take increment in '*x'* as '1'and increment in '*t'* as '0.1*'* find all values of '*u*' at *t=0 to t=0.3* **(08)**

Q.4 A) A steel plate of $750 \times 750mm$ has its two adjacent sides maintained at 100^0 C, while two other sides maintained at 0^0 C , what will be steady state temperature at interior points assuming a grid size of 250mm. **(07)**

OR

A) solve the wave equation $\frac{\partial^2 u}{\partial x^2} - \frac{\partial^2 u}{\partial t^2} = 0; \quad 0 \le x \le 1, \ t \ge 0$ Subject to the following condition $u = x^2 + xt^2$, along the initial line $t = 0$ by using the method of characteristics, find the solution between the grid points $x = 0.1 \ and \ x = 0.2$ **(07)**

B) Find the largest eigen value in modulus and the corresponding eigenvector of the matrix **(08)**

$$A = \begin{bmatrix} -15 & 4 & 3 \\ 10 & -12 & 6 \\ 20 & -4 & 2 \end{bmatrix}$$