

GANPAT UNIVERSITY

B. Tech. Semester: 3rd Mechatronics Engineering

Regular Examination November – December 2014

2MC301 Numerical Analysis & Computer Programming

Total Marks: 70

Time: 3 Hours / As per Scheme

- Instruction: 1. All questions are compulsory.
2. Assume suitable data if necessary.

SECTION – I

- Q-1 (a) If P is the pull required to lift a load W by means of a pulley block, Find a linear law of the form $P = m\omega + C$ connecting P and W, Using the following data: [06]

P	12	15	21	25
W	50	70	100	120

Where P and W are taken in Kg-wt. Compute P when $W = 150$ kg.

- (b) Apply Gauss elimination method to solve the equations: $X+2Y+3Z-U=10$,
 $2X+3Y-3Z-U=1$, $2X-Y+2Z+3U=7$, $3X+2Y-4Z+3U=2$ [06]

OR

- Q-1 (a) Use Gauss Jordan elimination to solve the system of linear equations [06]
 $2X_2 + X_3 = -8$, $X_1 - 2X_2 - 3X_3 = 0$, $-X_1 + X_2 + 2X_3 = 3$
- (b) Use the Trapezoidal rule to estimate the integral $\int_0^2 e^{x^2} dx$ taking the number 10 intervals. [06]

Q-2 Attempt any Two

- (a) Derive Newton – Cotes Quadrature Formula. [06]
- (b) Solve by Jacobi's iteration method, the equations $10X+Y-Z = 11.19$;
 $X + 10Y+Z = 28.08$; $-X+Y+10Z = 35.61$, correct up to two decimal places. [06]
- (c) Use Simpson's 1/3rd rule to find $\int_0^{0.6} e^{-x^2} dx$ by taking seven sub interval (7 part). [06]

- Q-3 (a) Solve by Gauss elimination method, $8X+2Y-2Z = 8$, $2X+Y+9Z = 12$, $X-8Y+3Z = -4$ [05]
- (b) Evaluate $\int_0^6 \frac{dx}{1+x^2}$ by using Simpson's 3/8 rule. [04]
- (c) Explain difference between Gauss elimination and Gauss Jordan method. [02]

SECTION - II

Q - 4 (a) Find a positive real root of $x \log_{10} x = 1.2$ using the bisection method up to five approximation and up to three decimal point. [06]

(b) Use the method of false position to find the fourth root of 32 correct to three decimal places. [06]

OR

Q - 4 (a) Find the root of the equation $xe^x = \cos x$ using the secant method. [06]

(b) Find by Newton's method the real root of the equation $3x = \cos x + 1$ correct four decimal places. [06]

Q - 5 (a) Using Runge-Kutta method of 4th order, solve $\frac{dy}{dx} = \frac{y^2 - x^2}{y^2 + x^2}$ with $y(0) = 1$ at $x = 0.2, 0.4$. [06]

(b) Using Euler's method find an approximate value of y when $x=1$, given that $dy/dx = x + y$ take initial condition $y=1$ when $x=0$. [05]

OR

Q - 5 (a) Using modified Euler's method find an approximate value of y when $x=0.3$, given that $dy/dx = x + y$ when $x=0$. [06]

(b) Find the value of y for $x=0.1$ by picard's method for the following equation. [05]

$$\frac{dy}{dx} = \frac{y-x}{y+x}, y(0) = 1$$

Q - 6 Attempt any three [12]

(a) What is constructor and destructor in C++ language? Write syntax of them and give example of each.

(b) oriented programming? What is difference between C and C++?

(c) How class is difference than structure? Support your answer with example.

(d) Find by Taylor's method the values of y at $x=0.1$ and $x=0.2$ to five places of decimal from $dy/dx = x^2y - 1, y(0) = 1$.

(e) Derive the equations for the Muller's method.

End of Paper

All the Best

Page (02/02)