



ARKA JAIN University, Jharkhand

3rd Semester Final Examination – 2018-19

Subject : Applied Mathematics

Time : 3 Hours

Course: Polytechnic(ME/CE/CSE)

Full Marks : 70

Pass Marks: 28

- Candidates are required to give their answers in their own words as far as practicable.
- Question Paper is divided into **Three Parts –A, B & C**
- **Part-A** is compulsory.
- **Part- B** contains **SIX** questions out of which **FOUR** questions are to be answered.
- **Part- C** contains **SIX** questions out of which **FOUR** questions are to be answered.

PART A

Q.1) All questions are compulsory:-

A] Objective Answer Type

(5x1=5)

- i) Errors may occur in performing numerical computation on the computer due to
- a) Rounding errors b) Power fluctuation c) Operator fatigue d) All of these
- ii) In Regula-falsi method, the first approximation is given by
- a) $x_1 = \frac{af(a)-bf(a)}{f(b)-f(a)}$ b) $x_1 = \frac{bf(b)-af(a)}{f(b)-f(a)}$ c) $x_1 = \frac{bf(a)-af(b)}{f(a)-f(b)}$ d) $x_1 = \frac{af(a)-bf(b)}{f(a)-f(b)}$
- iii) Which of the following alter name of method of false position?
- a) Method of chords b) Methods of tangents c) Method of bisection d) Regula falsi method
- iv) The number of significant digits in the number 204020050
- a) 5 b) 6 c) 8 d) 9
- v) Which relation is Correct?
- a) $E = 1 + \Delta$ b) $E = 1 - \Delta$ c) $E = 1 + \nabla$ d) $E = 1 - \nabla$

B] Define the following

(5x1=5)

- a) Absolute Error
- b) Relative Error
- c) Percentage Error
- d) Significant Figures
- e) Rounding Error

PART-B

Q2.) Answer any four:

(4x5=20)

- a) Evaluate $\sqrt{12}$ by applying Newton-Raphson method.
- b) Prove that $\Delta \log f(x) = \log \left[1 + \frac{\Delta f(x)}{f(x)} \right]$
- c) Solve $y_{x+2} - 5y_{x+1} + 6y_x = 5^x$.
- d) Prove that $\Delta^2 E^{-3}(x) = 0$.
- e) Solve by Picard's method $\frac{dy}{dx} = x + y^2$ where $y = 0$ when $x = 0$.
- f) Rounding off the numbers 865250 and 37.46235 to four significant figures and Compute E_a, E_b, E_r in each case.

PART-C

Answer any Four:

(4x10=40)

Q3.) Find a real root of the equation $x^3 - x - 1 = 0$ by using bisection method.

Q4.) Solve by Gauss Jordan method

$$\begin{aligned}x + 2y + z &= 8 \\2x + 3y + 4z &= 20 \\4x + 3y + 2z &= 16\end{aligned}$$

Q5.) Evaluate $\int_0^{\frac{\pi}{2}} \sqrt{\sin \theta} d\theta$ using Simpson's rule taking 6 equal intervals.

Q6.) Find the first and second derivative of the function tabulated below, at the point $x = 1.5$

x	1.5	2	2.5	3	3.5	4
$f(x)$	3.375	7.000	13.625	24.000	38.875	59.000

Q7.) By Gauss's Elimination method, solve

$$\begin{aligned}5x - y - 2z &= 142 \\x - 3y - z &= -30 \\2x - y - 3z &= 5\end{aligned}$$

Q8.) Use Runge-Kutta method to find $y(0.1)$ given that $\frac{dy}{dx} = \frac{1}{x+y}$, $y(0) = 1$.



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