

SIF - sem-III - old - electrical

05/6/15

N.T

QP Code : 4559

(OLD COURSE)

(3 Hours)

Total Marks : 100

- N.B.** (1) Question No. 1 is compulsory.
(2) Attempt any four out of remaining six questions.
(3) Make suitable assumptions if required and justify the same.
1. (a) Find absolute, relative and percentage error in following numbers. Determine number of significant digits.
i) $a = 123.41769543$ $\bar{a} = 123.41$ 5
ii) $b = 0.0053102500$ $\bar{b} = 0.0051$
iii) $c = 450550$ $\bar{c} = 450552$
- (b) Define the operators $\Delta, \nabla, \delta, \mu$ & E . Prove that 5
i) $2\mu\delta = \Delta + \nabla$ ii) $E = 1 + \Delta$
- (c) Using Picard's method solve 5
 $\frac{dy}{dx} = 1 + xy$ such that $y = 0$ when $x = 0$.
- (d) Derive the equation for Regula - falsi method using geometrical interpretation. 5
2. (a) List the bracketing methods and open methods and find the real root of the equation $x^3 - 4x - 9 = 0$ using Newton Raphson method correct to three decimal places. 10
- (b) Solve the following equations by Gauss - Seidel method.
 $27x + 6y - z = 85$, $6x + 15y + 2z = 72$, $x + y + 54z = 110$. 10
3. (a) From the following table find the number of students who obtained marks less than 45. 10

Marks	30-40	40-50	50-60	60-70
No. of students	31	42	51	35

- (b) Using Newton's divided difference formula, find the value of $f(9)$ from the following table. 10

x	5	7	11	13	17
$f(x)$	150	392	1452	2366	5202

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4. (a) Write a program for Lagrange's interpolation method and using this formula, find the value of y when $x = 10$ from the following table. 10

x	5	6	9	11
y	12	13	14	16

- (b) The result of measurement of electric resistance R of a copper bar at various temperatures $t^{\circ}C$ are listed below:

t	19	25	30	36	40	45	50
R	76	77	79	80	82	83	85

Find a relation $R = a + bt$

5. (a) The velocity of the train which starts from rest is given by the following table, the time being reckoned in minutes from the start and speed in km/hour. 10

Time	3	6	9	12	15	18
Velocity	22	29	31	20	4	0

Estimate approximately the distance covered in 18 minutes by Simpson's $3/8^{\text{th}}$ rule.

- (b) Solve $\frac{dy}{dx} = x + y^2$ with $x_0 = 0, y_0 = 1$ by Euler's modified formula find the value of y when $x = 0.5$ taking $h = 0.25$. 10
6. (a) Solve $\frac{dy}{dx} = x + y$ with initial conditions $y(1) = 2$ and find y at $x = 1.2, x = 1.4$ by Runge - Kutta Method of Fourth Order taking $h = 0.2$. 10
- (b) Solve the following set of equations using Gauss Elimination method. 10

$$2x + y + z = 10, \quad 3x + 2y + 3z = 18, \quad x + 4y + 9z = 16.$$

7. (a) Explain the propagation of errors. 5
- (b) Using Adams - Bashforth method, obtain the solution of $\frac{dy}{dx} = x - y^2$ 10
at $y(0.8)$, given values

x	0	0.2	0.4	0.6
y	0	0.0200	0.0795	0.1762

- (c) Write a short note on Golden section search. 5