Numerical Analysis (Method) & Computer Application (Old)
(1020)

P. Pages : 3

Time : Three Hours   **Max. Marks : 100**

Instructions to Candidates :
1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with blue ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Figures to the right indicate full marks.
5. Use non-programmable calculator is allowed. Assume suitable data.

UNIT – I

1. a) Find the absolute error and relative error in $\sqrt{6}+\sqrt{7}+\sqrt{8}$ correct to 4 significant digits.   **5**

   b) Explain how integers and real numbers are stored in a computer.   **5**

2. Using the bisection method, find an approximate root of the equation $\sin x = \dfrac{1}{x}$, that lies between x = 1 and x = 1.5 (measured in radians) Carry out computations upto the 7th stage.   **10**

3. Solve the given equations by Gauss Seidel iteration method.   **10**
$$10x_1 - 2x_2 - x_3 - x_4 = 3$$
$$-2x_1 + 10x_2 - x_3 - x_4 = 15$$
$$-x_1 - x_2 + 10x_3 - 2x_4 = 27$$
$$-x_1 - x_2 - 2x_3 + 10x_4 = -9$$

UNIT – II

4. What is Linear Programming Problem? Explain steps involved to solve the given L.P.P. by using Graphical method with an example for maximisation.   **10**

5. Using simplex method maximise $Z = 5x_1 + 3x_2$ **10**
subject to $x_1 + x_2 \leq 2$, $5x_1 + 2x_2 \leq 10$, $3x_1 + 8x_2 \leq 12$
$x_1, x_2 \geq 0$

6. Use two phase simplex method to **10**
Minimise $Z = 7.5x_1 - 3x_2$
Subject to the constraints $3x_1 - x_2 - x_3 \geq 3$,
$x_1 - x_2 + x_3 \geq 2$,
$x_1, x_2, x_3 \geq 0$

UNIT – III

7. Write down Algorithm and Flowchart for Lagrange's Interpolation method. **10**

8. If 'P' is the pull required to lift a load 'W' by means by a pulley block, find a linear law of the form P = MW + C connecting 'P' and 'W' using the following data. **10**

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.

9. From the following table, estimate the number of students who obtained marks between 40 and 45. **10**

Marks	30-40	40-50	50-60	60-70	70-80
No. of students	31	42	51	35	31

UNIT – IV

10. What is numerical Integration? Explain Simpson's Rule of Numerical Integration and derive formula for the same. **10**

11. Given that : **10**

x	1.0	1.1	1.2	1.3	1.4	1.5	1.6
y	7.989	8.403	8.781	9.129	9.451	9.750	10.031

Find $\dfrac{dy}{dx}$ and $\dfrac{d^2y}{dx^2}$ at x = 1.1 & x = 1.6

12. Using two point and three point Gaussian quadrature formula, **10**
evaluate $\int_0^1 \dfrac{dx}{1+x}$.

UNIT – V

13 a) What is P.D.E.? State the two real life problem of Civil **5**
Engineering where P.D.E. are required to construct mathematical
model?

b) Write Algorithm for Euler's method. **5**

14 Given $\dfrac{dy}{dx} = x^2(1+y)$ and y(1) =1, **10**
$y(1.1) = 1.233, y(1.2) = 1.548, y(1.3) = 1.979$, evaluate y (1.4) by Adams
– Bashforth method.

15. Solve the Poisson equation $U_{xx} + U_{yy} = -81xy$ $0 < x < 1, 0 < y < 1$ **10**
given that u (0, y) = 0, u (x, 0) = 0, u (1, y) = 100, u (x, 1) = 100
and h = 1/3.

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