Reg. No. : | | | | | | | | | | |

Question Paper Code: 34022

B.E. / B.Tech. DEGREE EXAMINATION, DEC 2020

Fourth Semester

Civil Engineering

01UMA422 - NUMERICAL METHODS

(Common to EEE, EIE and ICE)

(Regulation 2013)

Duration: One hour Maximum: 30 Marks

PART A - (6 x 1 = 6 Marks)

(Answer any six of the following questions)

1. Suppose a root of $f(x) = 0$ lies between 'a' and 'b'. Then by the method of false position, its first approximation x_1 is

   (a) $\frac{af(b)-bf(a)}{f(a)-f(b)}$ (b) $\frac{af(a)-bf(b)}{f(a)-f(b)}$

   (c) $\frac{af(b)-bf(a)}{f(b)-f(a)}$ (d) $\frac{af(a)-bf(b)}{f(b)-f(a)}$

2. The order of convergence of method of false position is

   (a) 1.618 (b) 1.816 (c) 1.168 (d) 1.186

3. In Gauss Seidel method, diagonally dominant condition of coefficient matrix is

   (a) necessary and sufficient (b) necessary but not sufficient

   (c) sufficient but not necessary (d) neither necessary nor sufficient

4. Power method is not applicable to the matrix whose Eigen vectors are

   (a) Linearly independent (b) Linearly dependent

   (c) Distinct (d) Not all non-zero

5. If $(x) = \frac{1}{x^2}$, then the divided difference $f(a, b)$ is

   (a) $\frac{a+b}{a^2b^2}$ (b) $\frac{a-b}{a^2b^2}$ (c) $-\frac{a-b}{a^2b^2}$ (d) $-\frac{a+b}{a^2b^2}$

6. I If $= \frac{x-x_0}{h}$, then the error in Newton's forward interpolation formula is

(a) $\frac{u(u-1)\ldots(u-n)}{(n)!}\mathrm{h}^{n+1}f^{n+1}(c)$ (b) $\frac{u(u-1)\ldots(u-n)}{(n-1)!}\mathrm{h}^{n+1}f^{n+1}(c)$

(c) $\frac{u(u-1)\ldots(u-n)}{(n+1)!}\mathrm{h}^{n+1}f^{n+1}(c)$ (d) $\frac{u(u-1)\ldots(u-n)}{(n+1)!}\mathrm{h}^{n}f^{n}(c)$

7. Condition for maxima point for the function is

(a) $y' = 0, y'' < 0$ (b) $y' = 0, y'' > 0$ (c) $y' < 0, y'' = 0$ (d) $y' > 0, y'' < 0$

8. Simpson's 3/8th rule is used only when the number of sub-intervals is

(a) odd (b) multiple of 3

(c) for all natural numbers (d) even

9. The method of group averages is based on the assumption that the sum of the residuals is

(a) 0 (b) 1 (c) 2 (d) 3

10. If $y = 2x + 5$ is the best fit for 8 pairs of values $(x, y)$by the method of least squares and $\sum Y = 120$,the $\sum X =$

(a) 35 (b) 40 (c) 45 (d) 30

PART – B (3 x 8= 24 Marks)

(Answer any three of the following questions)

11. Find the positive real root of $3x - cosx - 1 = 0$ using Newton-Rapshon method. (8)

12. Solve the following system of equation using Gaussian elimination method. $28x + 4y - z = 32,\ x + 3y + 10z = 24, 2x + 17y + 4z = 35.$ (8)

13. Using Newton's backward formula find *f (7.5)* from the following table: (8)

X	1	2	3	4	5	6	7	8
f (x)	1	8	27	64	125	216	343	512

14. Find the first two derivatives of $y = (x)^{1/3}$ at *x* = 50 & *x* = 56 given the table below.

x :	50	51	52	53	54	55	56
y :	3.6840	3.7084	3.7325	3.7563	3.7798	3.8030	3.8259

(8)

15. Find the equation of the best fitting straight line to the following data by method of group averages: (8)

x	0	5	10	15	20	25	30
y	10	14	19	25	31	36	39