KUMARAGURU
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Register Number:………….

B.E / B.TECH DEGREE EXAMINATIONS: NOV/DEC 2014

(Regulation 2013)

Third Semester

U13MAT301: NUMERICAL METHODS

(Common to AERO/AUE/CSE/ECE/EIE/MCT/IT)

Time: Three Hours **Maximum Marks: 100**

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. In Gauss elimination the given system of simultaneous equations is transformed into
   a) Lower triangular matrix b) Unit matrix
   c) Transpose matrix d) Upper triangular matrix
2. The Newton-Raphson's method fails when……….
3. Interpolation formulae are based on the fundamental assumption that the data can be expressed as
   a) A linear function b) A Non Linear function
   c) A polynomial function d) A quadratic function
4. ………. gives unique set values to the constants in the equation of the fitting curve.
5. The method is used to find the derivate of unequal intervals is
   a) Newton's forward b) Newton's backward
   c) Newton's divided difference d) Trapezoidal
6. Simpson's 1/3rd rule is used only when n is ………..
7. Which of the following method is called step by step method
   a) Taylor's method b) Runge Kutta method
   c) Milne's method d) Newton's method
8. The curve is approximated as a ………. in the Euler's algorithm.
9. In one dimensional heat equation $\frac{\partial u}{\partial t} = \alpha^2 \frac{\partial^2 u}{\partial x^2}$,the value of α^2 is
   a) $\frac{k}{\rho^2 c^2}$ b) $\frac{k^2}{\rho^2 c^2}$
   c) $\frac{k}{\rho c^2}$ d) $\frac{k}{\rho c}$
10. Laplace equation in two dimensions is of ………. type.

PART B (10 x 2 = 20 Marks)

(Not more than 40 words)

11. Give the order and condition for convergence of a fixed point iterative process.
12. Solve 11x + 3 y = 17, 2x + 7 y = 16 by Gauss Jordon method.
13. What is meant by curve fitting? Which method is most useful for this?
14. Show that f (a, b, c) = $\frac{1}{abc}$ when f(x) 1/x using divided differences.
15. Find $f'(1)$ from

x	1	2
f(x)	1	5

16. Compare Trapezoidal rule and Simpson's one-third rule for evaluating numerical integration.
17. State the disadvantage of Taylor series method.
18. What will you do, if there is a considerable difference between predicted value and corrected value, in predictor corrector methods?
19. If u satisfies Laplace equation and u=100 on the boundary of a square what will be the value of u at an interior grid point.
20. Why Crank Nicholson's scheme is called an implicit scheme?

PART C (5 x 14 = 70 Marks)

(Not more than 40 words)

Q. No. 21 is compulsory

21. Find y (0.4) given $\frac{dy}{dx} = \frac{xy}{x^2 + y^2}$, y (0) = 1 using Adam-Bash forth method. Obtain y (0.1) by Euler's method, y(0.2) by modified Euler's method and y(0.3) by Runge-kutta method.

22. a) (i) Using False position method find a positive root for tan x + tanhx = 0

(ii) Solve 15x + 3y - 2z = 85, 2x + 10y + z = 51, x - 2y + 8z = 5, by Gauss Seidel method.

(OR)

b) (i) Find by Newton's method, the real root of the equation 3x = cos x +1

(ii) Apply Gauss elimination method to solve 3x + 4y + 5z = 18, 2 x - y + 8 z = 13, 5x – 2y + 7 z = 20.

23. a) (i) The train resistance R (lbs/ ton) is measured for the following values of its velocity V (km/hr).

V :	20	40	60	80	100
R :	4	9	15	26	38

If R is related to V by the formula $R = a + b V^2$, find a and b.

(ii) Form the divided difference table for the following data:

x :	-2	0	3	5	7	8
y :	-792	108	-72	48	-144	-252

(OR)

b) (i) For the data given below, find the equation to the best fitting exponential curve of the form $y = a e^{bx}$.

x :	1	3	5	7	9
y :	100	81	73	54	43

(ii) The following data are taken from the stream table.

Temp. $^\circ$C :	140	150	160	170	180
Pressure kgf/cm^2 :	3.685	4.854	6.302	8.076	10.225

Find the pressure at temperature $t = 175^\circ$.

24. a) (i) Find the first derivative of the function tabulated below at the point x = 1.1

x :	1.0	1.2	1.4	1.6	1.8	2.0
y :	0	0.128	0.544	1.296	2.432	4.00

(ii) By dividing the range into ten equal parts evaluate $\int_0^\pi \sin x \, dx$ by Simpson's 1/3 rule.

(OR)

b) Evaluate $\int_0^1 \int_1^2 \frac{2xy\,dx\,dy}{(1+x^2)(1+y^2)}$ by Simpson's rule with h = k = 0.25.

25. a) Solve $u_{xx} + u_{yy} = 0$ over the square mesh of side 4 units; satisfying the following boundary conditions:

i) $u(0, y) = 0$ for $0 \le y \le 4$

ii) $u(4, y) = 12 + y$ for $0 \le y \le 4$

iii) u (x, 0) = 3 x for $0 \le x \le 4$

iv) u (x, 4) = x^2 for $0 \le x \le 4$.

(OR)

b) Find the solution of the initial boundary value problem: $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$, $0 \le x \le 1$, subject to the initial conditions u (x, 0) = sin π x, $0 \le x \le 1$, $\left(\frac{\partial u}{\partial t}\right)_{(x=0)} = 0$, $0 \le x \le 1$and the boundary conditions u (0, t) = 0, u (1, t) = 0, t > 1, by using explicit scheme.

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