GUJARAT TECHNOLOGICAL UNIVERSITY MCA - SEMESTER- II• EXAMINATION – SUMMER 2016

| | | Code: Comj Name: 6200 | - | riented | l Nume | rical M | lethods | Da | ate: 30-05-2(|)16 |
|---|-------------|---|---|--|---|--------------------|-------------|------------|------------------|-----|
| Tim | e: 10 |).30a.m. To | | m. | | | | Т | otal Marks: | 70 |
| Instr | 1. 2. | | assumpt | | | cessary. | | | | |
| Q.1 | (a) | 5. What 6. State 7. State | e Round e Trunca e Total N Descarte is a matr any three the condi | off error tion error lumerica 's rule of ix? types of tion for | rs. l errors sign. matrices multiplic | ation of 1 | two matric | ces. | | 07 |
| | (b) | Define error. | Explain | the types | of error | s with ex | amples. | | | 07 |
| Q.2 | (a) | Write an algorithm to solve a non-linear polynomial equation by Successive Approximation method. | | | | | | | | |
| | (b) | Solve the equ 1.9. | ution x ³ - | $4x^2 + 5x - 2$ | • | U | ta method | taking | initial guess as | 07 |
| | (b) | OR Solve the equation x^4 -x-10=10 by Newton Raphson method, taking initial guess 07 as 2.0. | | | | | | | | |
| Q.3 | (a) | Find y(10) from the data given below using Lagrange's interpolation. x 5 6 9 11 y 12 13 14 16 | | | | | | | 07 | |
| Time: Instruct Q.1 (a (1) Q.2 (a (1) Q.3 (a (1) Q.3 (a) | (b) | | | | | | | | | 07 |
| | | Age (x) Premium | 45 114.84 | 50 96 | .16 | 55 83.22 | 60 74. | 48 | 65 68.48 | |
| | | (y) | | | (|)R | | | | |
| Q.3 | (a) | Obtain cubic | spline eq | uation fo | | |] for the c | lata give | en in the table: | 07 |
| | | X | 0 | | 1 | | 2 | | 3 | |
| | | f(x) | 1 | | 2 | | 33 | | 244 | |
| | (b) | data accordin | g to least | square e | | - | | est fit to | the following | 07 |
| | | x 1.0 | 1.5 | 2.0 | 2.5 | 3.0 | 3.5 | - | | |
| | | y 0.01 | 0.405 | 0.693 | 0.916 | 1.098 | 1.252 | | | |

Q.4 (a) The table below gives the results of an observation, 'θ' is the observed temperature in degrees centigrade of a vessel of cooling water, 't' is the time in minutes from the beginning of observation.

| t | 1 | 3 | 5 | 7 | 9 | | | | |
|---|------|------|------|------|------|--|--|--|--|
| θ | 85.3 | 74.5 | 67.0 | 60.5 | 54.3 | | | | |
| Find the engenmiests note of expline at $t=2$ and $t=2.5$ | | | | | | | | | |

Find the appropriate rate of cooling at t=3 and t=3.5.

(b) Find the first two derivatives of ' $x^{1/3}$ ' at x=50 and x=56 from the table below:

| Х | 50 | 51 | 52 | 53 | 54 | 55 | 56 | | | |
|---------------|----------------------|--------|--------|--------|--------|--------|--------|--|--|--|
| $y = x^{1/2}$ | ^{/3} 3.6840 | 3.7084 | 3.7325 | 3.7563 | 3.7798 | 3.8030 | 3.8259 | | | |
| OR | | | | | | | | | | |

- Q.4 (a) A Curve passes through the points (1, 2), (1.5, 2.4), (2.0, 2,7), (2.5, 2.8), (3, 3), (3.5, 2.6) and (4.0, 2.1). Obtain the area bounded by the curve, the X-axis and x=1 and x=4.
 - (b) A river is 80 metres wide. The depth 'd' in metres at a distance 'x' metres from 07 one bank is given by the following table. Calculate the area of cross-section of the river using Simpson's 1/3 rule.

| x (distance in metres) | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 |
|------------------------|---|----|----|----|----|----|----|----|----|
| d (depth in metres) | 0 | 4 | 7 | 9 | 12 | 15 | 14 | 8 | 3 |

- Q.5 (a) Use Milne-Simpson's Predictor corrector formula to solve $y'=2y-y^2$, for x= 0.2 and x=0.25 if y(0) = 1 y(0.05) = 1.0499584 y(0.10) = 1.0996680
 - y(0.15) = 1.148850
 - (b) Solve the following system of linear equations using Gauss-Seidel method: 07 $2x_1 - 2x_2 + 5x_3 = 13$
 - $2x_1 + 3x_2 + 4x_3 = 20$
 - $3x_1 x_2 + 3x_3 = 10$

OR

- Q.5 (a) Solve the following ordinary differential equation using Taylor series method: 07 $y' = y^2 + x$; given that y(0) = 0, find y(0.2).
 - (b) Use Runge Kutta 4th order method to solve y(0.2) and y(0.4) when y' = $(2xy + e^x)/(x^2 + x.e^x)$; given that y(0) = 0 and h = 0.2.

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