DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE – RAIGAD -402 103

Semester Examination – May - 2019

Branch: B. Tech. (Computer Engineering) **Sem: IV**

Subject with Subject Code: Numerical Methods [BTCOE405A] **Marks:60**

Date:- 24/05/2019 **Time: 3 Hrs**

Instructions to the Students:

1. All Questions are Compulsory
2. Use of Non-programmable calculator is allowed
3. Figures to right indicates full marks
4. Assume suitable data wherever necessary and mention it clearly

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		Marks
Q.1	**Solve any Three.**	
(A)	Find a root of $x^3 - 4x - 9 = 0$ using bisection method in four stages.	04
(B)	Find the root of $2x - log_{10}x = 7$ which lies between 3.5 and 4 by false postion method.	04
(C)	Find the real root of $x^3 - 2x - 5 = 0$ correct to three decimal places using Newton-Raphson method.	04
(D)	Derive a formula to compute $\sqrt[3]{N}$ where N is a positive number and hence estimate $\sqrt[3]{11}$	04
Q. 2	**Solve any Two.**	
(A)	Solve the following system of equations by Gauss elimination method.	06

$$x + 4y - z = -5,$$
$$x + y - 6z = -12,$$
$$3x - y - z = 4$$

(B)	Using Gauss-Jordan method solve	06

$$x + 2y + 6z = 22,$$
$$3x + 4y + z = 26,$$
$$6x - y - z = 19$$

(C)	Apply Gauss-Seidal iteration method to solve the equations	06

$$20x + y - 2z = 17,$$
$$3x + 20y - z = -18,$$
$$2x - 3y + 20z = 25$$

Q.3 Solve any Three.

(A) Given $u_0 = 2$, $u_1 = 10$, $u_2 = 81$, $u_3 = 200$, $u_4 = 100$, $u_5 = 6$, **04**

Find $\Delta^5 u_0$

(B) The table gives the distances in nautical miles of the visible horizon for the given heights in feet above the earth's surface : **04**

x = height :	100	150	200	250	300	350	400
y = distance :	10.63	13.03	15.04	16.81	18.42	19.90	21.27

Use Newton's backward interpolation formula to find the value of y when x = 410.

(C) Use Newton's forward difference formula to find the number of persons getting wages less than Rs. 15 **04**

Wages in Rs.	0-10	10-20	20-30	30-40
No. of Persons:	9	30	35	42

(D) Use Stirling's Central Interpolation to find the value of y for x=35 from the following table **04**

x:	20	30	40	50
$f(x)$:	512	439	346	243

Q.4 Solve any Three

(A) Evaluate $\int_0^1 \left(\sqrt{sinx + cosx}\right) dx$ by trapezoidal rule by using the following data **04**

x:	0	0.2	0.4	0.6	0.8	1
y:	1	1.0857	1.1448	1.1790	1.1891	1.1755

(B) A rocket is launched from the ground. Its acceleration is registered during first 80 seconds and given in the following table. 04

$t(sec)$:	0	10	20	30	40	50	60	70	80
$a(m/s^2)$:	30	31.63	33.34	35.47	37.75	40.33	43.25	46.69	50.67

Using Simpson's one-third rule, find the velocity at t = 80.

(C) Evaluate $\int_0^6 \frac{dx}{1+x^2}$ by using Simpson's 3/8 th rule. 04

(D) Use Simpson's one third rule to find $\int_0^{0.6} e^{-x^2} dx$ by taking seven ordinates. 04

Q.5 Solve any Two

(A) Using Runge-Kutta method of order four, find the approximate value of y at x = 0.2 and x = 0.4 , taking h = 0.2. Given $\frac{dy}{dx} = \frac{y^2-x^2}{y^2+x^2}$ and $y(0) = 1$ 06

(B) Using picard method find the value of y when x = 0.1 06

$\frac{dy}{dx} = x - y^2$, and y = 1 at x = 0.

(C) Using Talyor's Series method obtain the solution of the following differential equation (correct upto four places of decimals). 06

$\frac{dy}{dx} = 3x + y^2$ with $x_0 = 0, y_0 = 1$ at $x = 0.1$

**********End of Paper**********