

B.Tech. SEM -V Production 2014 Course (CBCS) : WINTER - 2018
SUBJECT : NUMERICAL METHODS

Day : Saturday
Date : 01/12/2018

W-2018-2429

Time : 02.30 PM TO 05.30 PM
Max. Marks : 60

N. B. :

- 1) All questions are compulsory.
- 2) Figures to the right indicate full marks.
- 3) Use of non-programmable calculator is allowed.
- 4) Assume suitable data, if necessary.

- Q. 1** a) What are different types of errors? Explain any one with example. **(05)**
- b) What are significant digits? Explain with example any two algebraic operations of floating point numbers. **(05)**

OR

- a) Current flow through a 10 ohm resistance that is accurate within 10%. The current is measured as 2.0 A within ± 0.1 Amps. What are absolute and relative errors in the compound voltage? Neglect round off errors. **(05)**
- b) Explain with example accuracy and precision of significant digits. **(05)**

- Q. 2** Using Bisection method, find the root of the equation : **(10)**
 $x^3 - 4x - 9 = 0$ at the end of 8th iteration.

OR

- Use Newton Raphson method to find root of the function **(10)**
 $x^4 + x^3 - 7x^2 - x + 5 = 0$ at the end of 6th iteration.

- Q. 3** Solve the following system of equations by Gauss elimination method: **(10)**
- $$\begin{aligned} 2x + 2y + z &= 10 \\ 3x + 2y + 3z &= 18 \\ x + 4y + 9z &= 16 \end{aligned}$$

OR

- Solve the following system of equations by Gauss Seidel method: **(10)**
- $$\begin{aligned} 10x - 2y - z - w &= 3 \\ -2x + 10y - z - w &= 15 \\ -x - y + 10z - 2w &= 27 \\ -x - y - 2z + 10w &= -9 \end{aligned}$$

- Q. 4** Apply Lagrange's interpolation formula to find interpolating polynomial for the following data and find y at $x = 5$: **(10)**

x	0	1	3	8
y	1	3	13	123

P. T. O.

OR

Using least square method to fit the curve $y = ax^2 + bx + c$ from the (10) following data:

x	-2	-1	0	1	2
y	15	1	1	3	19

Q. 5 The velocity v (km/min) of a moped which start from rest, is given at a fixed (10) interval of time t (min) as follows:

v (km/min)	2	4	6	8	10	12	14	16	18	20
t (min)	10	18	25	29	32	20	11	5	2	0

Estimate approximately the distance covered in 20 minutes by using Simpson's $3/8^{\text{th}}$ rule.

OR

Find first and second order derivative of the function $f(x)$ at $x = 1.2$ from the (10) following table:

x	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0
$f(x)$	0.5506	0.5771	0.6048	0.6343	0.6658	0.6997	0.7366	0.7767	0.8206

Q. 6 Given $\frac{dy}{dx} = \frac{y-x}{y+x}$ with the initial condition $y = 1$ when $x = 0$. Find y (10)

using Euler's method when $x = 0.1$. Take $h = 0.02$.

OR

Using Runge - Kutta's fourth order method find the approximate value of : (10)

$$\frac{dy}{dx} = x - y^2 \text{ at } x = 0.2, \text{ Given } y(0) = 1. \text{ Take } h = 0.1$$

* * * * *