

**B. TECH. SEM –III (ELECTRICAL ENGG.) 2014 COURSE)**

**(CBCS) : SUMMER - 2018**

**SUBJECT: DIGITAL COMPUTATIONAL TECHNIQUES**

Day: **Thursday**  
Date: **24/05/2018**

**S-2018-2243**

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)** Write short note on: **(06)**  
i) Inline function  
ii) Virtual function  
iii) Encapsulation

**b)** Explain any four Built in functions for handling arrays with example for each. **(04)**

**OR**

**Q.1 a)** Discuss the logical operators & conditional statements used in MATLAB with an example. **(06)**

**b)** Differentiate between Procedure Programming & Object Oriented Programming. **(04)**

**Q.2 a)** Add the following floating point numbers **(06)**  
i) 0.3879 E7 and 0.813 E7  
ii) 723.813 E14 and 89.73 E12  
iii) 100.312 E25 and 81.813 E27

**b)** State & explain Intermediate Value Theorem with example. **(04)**

**OR**

**Q.2 a)** Describe the errors in numerical computations with examples. **(06)**

**b)** State & explain Mean Value Theorem with example. **(04)**

**Q.3 a)** Perform five iterations of the Bisection method to obtain the smallest positive root of the equation. **(06)**  
 $F(x) = x^3 - 5x + 1 = 0$

**b)** Explain Regula – Falsi method based on first degree equation. **(04)**

**OR**

**Q.3 a)** Use the secant & Regula – Falsi methods to determine the roots of the equation **(06)**

$$\cos x - xe^x = 0 \text{ [Take suitable initial approximation]}$$

**b)** Derive an expression for Newton Raphson method for single variable equation. **(04)**

**Q.4 a)** From following table evaluate  $\sin(0.157)$  **(06)**

x	0.15	0.17	0.19	0.21	0.23
sin x	0.14944	0.16918	0.18886	0.20846	0.22798

**b)** Using Lagrange's interpolation formula , find  $f(x)$  given that **(04)**  
 $f(0) = 4, f(1) = 3, f(4) = 24 \text{ \& } f(5) = 39$

**OR**

- Q.4 a)** Using Bessel's formula evaluate  $\sin(0.35)$  given that  $\sin(0.1) = 0.0998$ ,  $\sin(0.2) = 0.1986$ ,  $\sin(0.3) = 0.2995$ ,  $\sin(0.4) = 0.3894$ ,  $\sin(0.5) = 0.4794$  (06)

- b)** The Area 'A' of a circle of diameter 'd' is given below for the following values. (04)

Diameter (d)	20	25	30	35
Area (A)	314.15	490.87	706.858	962.11

Calculate the area of circle when diameter is 32.

- Q.5 a)** With the help of following values compute  $\frac{dy}{dx}$  &  $\frac{d^2y}{dx^2}$  at  $x = 1$  (06)

x	1	2	3	4	5	6
y	1	8	27	64	125	216

- b)** Use trapezoidal rule to evaluate  $\int_0^1 x^4 dx$  Consider five sub intervals. (04)

**OR**

- Q.5 a)** Using modified Euler's method, find approximate value of y when  $x = 0.4$  of (06)

$$\frac{dy}{dx} = 1 - 2xy$$

Given that  $y(0) = 0$ , take  $h = 0.2$ .

- b)** Explain Taylor series method for the solution of ordinary differential equation. (04)

- Q.6 a)** Solve following system using Gauss Seidal method (06)

$$10x - 2y + 3z = 23$$

$$2x + 10y - 5z = -33$$

$$3x - 4y + 10z = 41$$

- b)** Explain Gauss Jacobi's method for solution of linear simultaneous equation. (04)

**OR**

- Q.6 a)** Solve following system of equations using Gauss Jordan method (05)

$$2x + y + 4z = 12$$

$$8x - 3y + 2z = 23$$

$$4x + 11y - z = 33$$

- b)** Solve the following equations by Gauss elimination method (05)

$$x_1 + 20x_2 + x_3 = 22$$

$$-x_1 - x_2 + 20x_3 = 18$$

$$20x_1 + x_2 - x_3 = 20$$

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