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SEAT No. :

PF203

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APR-26/SE/Insem-249

S.E. (Electrical Engineering) (Insem)

NUMERICAL METHODS AND COMPUTER PROGRAMMING

(2019 Pattern) (Semester - IV) (203148)

Time : 1 Hour]

[Max. Marks : 30

Instructions to the candidates:

- 1) *Solve Q1 or Q2 and Q3 or Q4.*
- 2) *Figures to the right indicate full marks.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Assume suitable additional data, if necessary.*
- 5) *Use of non-programmable calculator is allowed.*

Q1) a) State Descartes's rule of sign. Show that the polynomial equation representing the behaviour of an electrical circuit $f(x) = x^6 - x^5 - 10x + 7 = 0$ has two positive & four imaginary roots. **[7]**

b) The measured length of bridge and river are 9999cm and 9 cm respectively but the true values are 10,000 cm and 10 cm respectively. Compute and comment on: **[8]**

- i) Absolute error
- ii) Percentage relative error

OR

Q2) a) State the Intermediate value theorem. Show its graphical representation & Apply the intermediate value theorem to find range of smallest positive roots: **[7]**

$$f(x) = x^3 - 5x + 3$$

b) Perform two iterations of Birge-Vieta method to find root of a polynomial equation representing the behaviour of an electrical circuit with initial approximation $P_0 = 0.5$. **[8]**

$$f(x) = x^3 - x^2 - x + 1$$

P.T.O.

Q3) a) Obtain the approximate value of $(17)^{\frac{1}{5}}$, correct to four decimal places using NR method with initial approximation $x_0 = 2$. [7]

b) The current in a particular circuit is given by $I^3 - 5I - 7 = 0$. Find the current value using Regula-Falsi method correct upto 4 decimal places. Take $I_0 = 2$ and $I_1 = 3$. [8]

OR

Q4) a) A series RC circuit is connected across a DC supply of 100V. Voltage across a capacitor is recorded at different instant of time. Fit the following data point second order degree curve using least square error method:[7]

t (in msec)	v_c (in Volts)
0	0
2	33
4	55
6	70
8	80
10	85

b) Perform five iterations of the bisection method to obtain a smallest positive root of the equation $f(x) = \cos(x) - xe^x = 0$. [8]

x x x