Total No. of Questions : 6] SEAT No. :

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# TE/Insem/APR - 6
## T.E. (Mechanical/Automobile) (Semester - II)
## NUMERICAL METHODS AND OPTIMIZATION
## (2012 Pattern)

*Time : 1 Hour]* *[Max. Marks : 30*

***Instructions to the candidates :***

1) ***Answer Q 1 or Q 2, Q.3 or Q.4, Q.5 or Q.6.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of programmable calculator is not permitted.***
5) ***Assume suitable data, if necessary.***

***Q1)*** a) Find a real root of equation $3x + \sin(x) - e^x = 0$ by the method of false position, correct to 4 decimal places. **[6]**

b) Explain the following terms **[4]**

i) Significant digits

ii) Concept of convergence

OR

***Q2)*** a) If $u = 3v^7 - 6v$, find percentage error in u at v = 1 if the error in v is 0.04. **[6]**

b) Draw the graphical representation of successive approximation method to find the root of equation. **[4]**

***Q3)*** Solve the following system by Gauss elimination method : **[10]**

$x + 4y - z = -5$

$x + y - 6z = -12$

$3x - y - z = 4$



OR

***Q4)*** Draw the flow chart of Thomas Algorithm method for solving simultaneous equations. **[10]**

***Q5)*** a) Using Graphical method **[6]**

Maximize $z = 125x + 100y$

subjected to constraints :

$4x + 3y \le 25$

$x + 2y \le 10$

$x, y \ge 0$

b) Write short note on Simulated Annealing. **[4]**

OR

***Q6)*** Using Simplex method **[10]**

Maximize $Z = 2x + 4y$

Subjected to the constraints

$3x + y \le 22$

$2x + 3y \le 24$

$x, y \ge 0$

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