Seat No.

F.Y. M.Tech. (Civil - Construction & Management) (Part - I) (Semester - I) Examination, December - 2019
COMPUTATIONAL METHODS AND OPTIMIZATION TECHNIQUES
Sub. Code : 72075

Day and Date : Monday, 02 - 12 - 2019   Total Marks : 70
Time : 10.00 a.m. to 12.30 p.m.

Instructions :
1) Attempt any two questions from Q. No. 1 to Q. No. 3. and any two questions from Q. No. 4 to Q. No. 6. Q. No. 3 & 6 is compulsory.
2) Figures to the right indicate full marks.
3) Use of non-programmable calculators is permitted.
4) Assume suitable data if necessary and mention it.

Q1) a) Fit a straight line to the following data   [9]

x :	1	2	3	4	5
f(x) :	9	12	15	19	23

b) Solve the following equations by Jacobi iteration method perform two iterations   [8]

$$5x_1 + x_2 + 14x_3 = 8, \quad 7x_1 - 3x_2 - x_3 = -10, \quad 13x_1 - 2x_2 + 12x_3 = -2$$

Q2) a) Solve the following equations by Gauss elimination method perform two iterations $6x_1 + 4x_2 - 6x_3 = 10$, $4x_1 + 6x_2 - 2x_3 = 12$, $2x_1 + 3x_2 + 6x_3 = 14$

[9]

b) Determine the solution of the differential equation using Runge-Kutta second order method $dy/dx = 2x^3 + 5y^3$ taking $x_0 = 2$ and $y_0 = 3$ at $x = 2.1$.   [8]

P.T.O.

Q3) a) Determine the roots of following simultaneous equations by using Newton Raphson method or Gauss Newton Method. Employ initial guess at x=6.5 and y=7, perform one iteration $x^2 - y = 28$, $x^2 - y^2 = 100$ **[9]**

b) Write short notes on any Three. **[9]**

   i) Explain the term 'Relative error'

   ii) What is linear regression and multiple linear regression.

   iii) Explain any one method of numerical integration

   iv) Explain the term 'correlation'

Q4) a) What are objectives of optimization models? Explain in brief optimization models used in civil engineering. **[9]**

b) A cement factory manager is considering the best way to transport cement from his three production centers P, Q, R to depots A, B, C, D, E. The weekly production and demand along with transportation cost per tone is given below. **[8]**

	A	B	C	D	E	supply
P	4	1	3	4	4	75
Q	2	3	2	2	3	55
R	3	5	2	4	4	40
Demand	20	90	20	10	30	170

What should be the distribution program? Use North-West corner method.

Q5) a) Solve the LPP by simplex method [9]

$\max z = 7x_1 + 5x_2$

subject to $x_1 + 2x_2 \le 6, \; 4x_1 + 3x_2 \le 12$

b) Explain Convex and Concave functions, [8]

Q6) a) Explain types of optimization models and objectives of optimization models. [9]

b) Write short notes on any Three. [9]

    i) Monto Carlo Method

    ii) Principle of optimality

    iii) Cutting Plane Algorithm

    iv) Dynamic Programming

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