| Seat No. | |
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# M.E. (Civil) (Construction & Management) (Part - II) (Semester - II) Examination, May - 2016

# COMPUTATIONAL METHODS AND OPTIMIZATION TECHNIQUES

## Sub. Code : 34327

**Day and Date : Tuesday, 03 - 05 - 2016** **Total Marks : 100**

**Time : 10.30 a.m. to 01.30 p.m.**

**Instructions : 1)** **Q.1 & Q.8 are compulsory.**

**2)** **Out of remaining attempt any two questions from each section.**

**3)** **Figures to right indicates full marks.**

## SECTION - I

*Q1)* a) Explain errors and approximations. **[6]**

b) Determine the approximate solution of following equation by using Newton Raphson method. Perform three iterations. Starting with $x_0 = 5$. $x^2 - 26 = 0$. **[8]**

c) What is regression analysis? Describe in brief with examples. **[6]**

*Q2)* a) Explain the least square method in curve fitting. **[4]**

b) Explain the multiple regression in regression analysis. **[4]**

c) Fit a straight line to the following data **[7]**

| x : | 2.5 | 3 | 3.5 | 4 | 4.5 |
|---|---|---|---|---|---|
| Y(x) : | 9.75 | 12.45 | 15.45 | 19.52 | 23.75 |

*Q3)* a) Solve the following equations by Gauss elimination method perform two iterations. **[10]**

$2x_1 + x_2 + 4x_3 = 8$, $x_1 - 3x_2 - x_3 = -10$, $3x_1 - 2x_2 + 2x_3 = -2$,

b) Describe in brief one iterative method to solve the simultaneous linear equations. **[5]**

*P.T.O.*

*Q4)* a) Determine the solution using Runge-Kutta second order method in the interval (1,1.1) if $dy/dx = x^3 + y^3$ with $y(1) = 5$. **[6]**

b) Compute the integral of f(x) between x = 1 to x = 1.7 by Trapezoidal rule for the following data **[9]**

| x : | 1 | 1.1 | 1.2 | 1.3 | 1.4 | 1.5 | 1.6 | 1.7 |
|---|---|---|---|---|---|---|---|---|
| f(x) : | 2 | 2.5 | 7.9 | 8 | 9.2 | 10 | 11.3 | 12 |

## SECTION - II

*Q5)* a) Explain in brief convex function and concave function. **[7]**

b) What is Dynamic programming? Write its applications in civil engineering. **[8]**

*Q6)* a) Solve the LPP by simplex method **[10]**

Maximize $Z = 6x_1 + 10x_2 + 2x_3$

Subject to $2x_1 + 4x_2 + 3x_3 \leq 40$

$x_1 + x_2 \leq 10$

$2x_2 + x_3 \leq 12$

$x_1, x_2, x_3 \geq 0$

b) Explain the Mathematical formulation of assignment problem. **[5]**

*Q7)* a) Find out the IBFS for the following transportation problem by Vogels approximation method and North West Corner method **[10]**

| | 1 | 2 | 3 | 4 | 5 | Supply |
|---|---|---|---|---|---|---|
| P | 7 | 6 | 4 | 5 | 9 | 40 |
| Q | 8 | 5 | 6 | 7 | 8 | 30 |
| R | 6 | 8 | 9 | 6 | 5 | 20 |
| S | 5 | 7 | 7 | 8 | 9 | 10 |
| Demand | 30 | 30 | 15 | 20 | 5 | |

b) For the function $y = 3x^5 - 5x^3$ determine the value of x for which attains a maxima. **[5]**

*Q8)* Write short notes on the following (any four) : [20]

a) Linear Programming.

b) Sensitivity analysis.

c) Procedure of Monte Carlo simulation.

d) Quadratic Programming.

e) Cutting Plane method in integer programming.

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