

GUJARAT TECHNOLOGICAL UNIVERSITY
ME - SEMESTER-1 (NEW) EXAMINATION – WINTER 2018

Subject Code: 3710310

Date: 01/01/2019

Subject Name: Optimization Techniques for Engineers

Time: 02:30 PM To 05:00 PM

Total Marks: 70

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full mark

- Q.1** Discuss the Genetic algorithm in detail with suitable example **14**
- Q.2** (a) Use Newton Rapson method to minimize the following function **07**
 $f(x) = x^2 + \frac{54}{x}$; Interval is (0-5); Do at least two iteration.
- (b) Use bisection section search method to minimize the following function **07**
 $f(x) = x^2 + \frac{54}{x}$; Interval is (0-5); Do at least two iteration.
- OR**
- (b) Use interval halving search method to minimize the following function **07**
 $f(x) = x^2 + \frac{54}{x}$; Interval is (0-5); Do at least two iteration.
- Q.3** Use Hooke and jeeves method to minimize the following function **14**
 $f(x_1, x_2) = x_1 - x_2 + 2x_1^2 + 2x_1x_2 + x_2^2$; $X_1 = \{0 \ 0\}$ and $\Delta X_1 = \{0.8 \ 0.8\}$
Do at least three iteration.
- OR**
- Q.3** Use Newton's method to minimize the following function **14**
 $f(x_1, x_2) = x_1 - x_2 + 2x_1^2 + 2x_1x_2 + x_2^2$; $X_1 = \{0 \ 0\}$
Do at least three iteration.
- Q.4** Use Rosen brock's method to minimize the following function. **14**
 $f(x_1, x_2) = x_1 - x_2 + 2x_1^2 + 2x_1x_2 + x_2^2$; $X_1 = \{0 \ 0\}$; $\alpha=3; \beta=0.5;$
 $\lambda_1 = \lambda_2 = 0.8$
Do at least three iteration.
- OR**
- Q.4** Use Generalized Gradient method to minimize the following function. **14**
 $f(x) = (x_1^2 + x_2 - 11)^2 + (x_1 + x_2^2 - 7)^2$
Such that, $g_1(x) = 26 - (x_1 - 5)^2 - x_2^2 \geq 0$
 $g_2(x) = 20 - 4x_1 - x_2 \geq 0$
 $x_1, x_2 \geq 0$
Do at least three iteration.
- Q.5** Maximize $f = x_1 + 2x_2 + x_3$, subject to the constraints **14**
 $2x_1 + x_2 - x_3 \leq 2$
 $-2x_1 + x_2 - 5x_3 \geq -6$
 $4x_1 + x_2 + x_3 \leq 6$; $(x_1, x_2, x_3) \geq 0$
Use simplex method to solve above LPP.
- OR**
- Q.5** Maximize $z = 5x_1 - 4x_2 + 3x_3$ **14**
Subject to $2x_1 + x_2 - 6x_3 = 20$;
 $6x_1 + 5x_2 + 10x_3 \leq 76$;
 $8x_1 - 3x_2 + 6x_3 \leq 50$;
 $x_1, x_2, x_3 \geq 0$
