



# Sanjay Ghodawat University, Kolhapur

Established as State Private University under Govt. of Maharashtra. Act No XL, 2017

2018-19

EXM/P/09/01

Year and Program: 2018-19

School of Technology

Department of FY M.Tech

Course Code: MMD504

Course Title: Design Optimization

Semester – I

Day and Date

End Semester Examination (ESE)

Time: Max Marks: 100

Wednesday 22<sup>nd</sup> May 2019

2:30 to 5:30 pm

Instructions:

- 1) Answer any five questions.
- 2) Assume suitable data wherever necessary.
- 3) Figures to the right indicate full marks.

1. Attempt the following.

- A) Enlist the unrestricted search methods and explain in brief, any two. (10)
- B) Find the saddle point of the function, (10)

$$f(x_1, x_2) = x_1^3 + x_2^3 + 2x_1^2 + 4x_2^2 + 6$$

2. Attempt the following.

- A) Solve the problem using Simplex Method as well as Graphical Method and comment on the results. (20)

A manufacturing firm produces two machine parts using lathes, milling machines, and grinding machines. The different machining times required for each part, the machining times available on different machines, and the profit on each machine part are given in the following table.

Type of Machine	Machining Time Required (min)		Maximum Time Available per Week (min)
	Machine Part I	Machine Part II	
Lathes	10	5	2500
Milling machines	4	10	2000
Grinding machines	1	1.5	450
Profit per unit	\$50	\$100	

Determine the number of parts I and II to be manufactured per week to maximize the profit.

3. Write short notes on any three of the following.

- A) Explain Integer Programming and its algorithm in detail. (10)
- B) Explain Classification of Optimization Problems in detail. (10)

4. Attempt the following.

- A) A turning operation produces components that have an average diameter of 10 mm with a standard deviation of 0.01 mm. If diameters of the components follow a normal distribution, find; (10)
  - i. Points of inflection.
  - ii. Probability that the diameter of a randomly chosen component falls between 9.98 mm and 10.02 mm
  - iii. Probability that the diameter of a randomly chosen component is less than 9.99 mm
  - iv. Probability that the diameter of a randomly chosen component is more than 10.03 mm
- B) Explain Genetic Algorithm in brief. (5)
- C) Explain Kuhn Tucker Conditions in brief. (5)

5. **Attempt the following.**
- A) A manufacturing process has a rejection rate of 2% at an average. If the process yields 100 components per hour, find the probability that, (10)
- i. There are more than 3 rejected components in a random hour
  - ii. There are no rejections in a random hour
- B) A machine has a breakdown rate of 3 times a week, at an average. Find the probability that in a random week, it breaks down, (10)
- i. Three times
  - ii. Five times
  - iii. More than 3 times
6. **Write short notes on any three of the following.**
- A) Explain in detail, the Saddle point of a Function and its significance. (10)
- B) Explain the algorithm of the Simplex Method. (10)
7. **Attempt the following.**
- A) Explain Stochastic Programming in detail. (10)
- B) Explain any two of the Normal, Binomial and Poisson Distributions in detail. (10)

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