

Name:

Enrolment No:



**UNIVERSITY OF PETROLEUM AND ENERGY STUDIES**  
**End Semester Examination, December 2019**

**Course: Optimization Methods & Its Application**  
**Programme: M. Tech (Structural Engineering)**

**Semester: I**  
**Time: 03 hrs.**

**Max. Marks: 100**

**Course Code: CIVL 7008**

**Instructions: Write your assumptions carefully and attempt all the questions**

**Set A**

**SECTION A**

S. No.		Marks	CO
Q1.	Define optimization and discuss the need for optimization methods in solving engineering problems.	4	CO1
Q2.	Explain the difference between decision variables and constraints with respect to objective function.	4	CO1
Q3.	Discuss the interval halving method and its application in optimization.	4	CO2
Q4.	What are multi-objective optimization models? Explain with an example.	4	CO3
Q5.	Differentiate between global optima and local optimum using relevant illustrations/graphs.	4	CO4

**SECTION B**

Q6.	Differentiate between optimization and decision-making in engineering projects. Explain the desired characteristics for MCDM.	10	CO1
Q7.	Discuss the steps involved in direct search method and its application in unconstrained optimization.	10	CO2
Q8.	Explain the application of KKT condition for the purpose of constrained optimization.	10	CO3
<b>OR</b>			
Q8.	What is mathematical programming? Write the general mathematical form, strategies and assumptions for the same.	10	CO4
Q9.	Maximize $Z = X_1 + X_2$ subject to: $X_1 - 2X_2 \geq 0$ $-X_1 + X_2 \geq 1$ $X_1, X_2 \geq 0$ Solve the formulation using graphical method, plot it and indicate the feasible solution region.	10	CO4

**SECTION C**

Q10.	Discuss unconstrained optimization and list the steps for formulating an algorithm to solve the same. List any five methods to solve unconstrained optimization.	<b>20</b>	<b>CO2</b>
	<b>OR</b>		
Q10.	What is the general mathematical formulation for the transportation problem? Explain the modified distribution method for solving transportation problems? Describe the steps of vogel approximation method. Is it possible to formulate a maximization problem for transportation problem? Discuss your answer in concept.	<b>20</b>	<b>CO3</b>
Q11.	There are two types of trucks available at a construction site, Type 1 and Type 2. They have a capacity of 11, and 4 ton respectively. Their fuel consumption is 3 liter/km and 5 liter/km respectively. The workers required for the two trucks are 5 and 2 workers respectively. The available fuel at site is only 15 liters, and there are only 10 workers available on site. How can the productivity of earthwork be maximized at the site?  (a) Formulate the optimization problem (b) Solve using graphical method (c) What alternative method can be used to solve this problem formulation?	<b>20</b>	<b>CO4</b>