Name:

Enrolment No:

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

Program Name: B.TECH-ADE **Semester : VII**
Course Name : Modeling and Simulation **Time : 03 hrs.**
Course Code : ADEG-436 **Max. Marks: 100**
Nos. of page(s) : 02
Instructions: Attempt All Questions. One question from section B and C have an internal Choice. Assume any Missing Data if required.

SECTION A

S. No.		Marks	CO
Q1	Identify the implications of the system concept.	**4**	**CO1**
Q2	Discuss 1.Component Integration Approach 2. Decision Process approach.	**4**	**CO2**
Q3	Why Lumped approximation used in complex thermal engineering problems.	**4**	**CO3**
Q4	State Kuhn-tucker Condition in optimization of multivariable problem having inequality constraints.	**4**	**CO4**
Q5	State advantages and disadvantages of simulation approach.	**4**	**CO5**

SECTION B

Q6	Experimental runs are performed on a compressor to determine the relationship between the volume flow rate Q and the pressure difference P. It is expected that Q will be proportional to P^b, where b is a constant. The measurements yield the mass flow rate Q for different pressure differences P as P(atm): 10, 15, 20, 25, 30, 35 Q(m^3/h): 7, 14, 16.8, 19.2, 22.3, 25.8 It is known that there is some error in the data. Will you use a best or an exact fit? Use the appropriate fit to these data and determine the coefficients. Is your equation a good fit?	**10**	**CO3**
Q7	Find the extreme points of the following function $f(x_1, x_2) = x_1^3 + x_2^3 + 3x_1^2 + 4x_2^2 + 16$	**10**	**CO4**
Q8	Summarize various steps to design or analyze a complex system by simulation with flow chart.	**10**	**CO5**

Q9	a) State your understanding about Positive and negative definite in Hessian Matrix. Discuss indefinite case also. b) Find the extreme points of the function given below and calculate Relative minimum and maximum with nature of Hessian determinant. $f(x1, x2) = 4x_1^3 + 6x_2^3 + 10x_1^2 + 4x_2^2 + 8$ OR A rectangular beam is to be cut from a circular log of radius r. Find the cross-sectional dimensions of the beam to (a) maximize the cross-sectional area of the beam, and (b) maximize the perimeter of the beam section.	**[5+5]** **[10]**	**CO4**
SECTION-C			
Q10	1) Find the dimensions of a cylindrical tin (with top and bottom) made up of sheet metal to maximize its volume such that the total surface are is equal to 36π. 2) Maximize $f = 2x_1 + x_2 + 15$ Subject to $g(x, y) = x_1 + 2x_2^2 = 3$ Find the solution using a. Method of Constrained Variation. b. Method of Lagrange Multiplier.	**[10]** **[10]**	**CO4**
Q11	Discuss following Simulations 1. Continuous 2. Combined Discrete-Continues 3. Monte Carlo 4. Spreadsheet **OR** Including following elements a) Problem Statement b) Program Organization and Logic c) Relevant Flow Charts d) Output and Discussion Simulate any Inventory System.	**20**	**CO5**