UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, April/May 2018

Course: modeling and simulation of digital systems **Semester: II**
Program: M.Tech CSE
Time: 03 hrs. **Max. Marks: 100**

Instructions: Attempt all Questions. There are no choices in this question paper.

SECTION A

S. No.		Marks	CO
1	Define a system. Take appropriate examples to state and describe various components of a system.	4	CO1
2	What is the significance of micro and macro approaches in a system study?	4	CO1
3	State the steps of mid-square method for random number generation. For a seed 3456 generate two U(0,1) random numbers. What are the major drawbacks of Mid Square method?	4	CO2, CO5
4	For a given Multiplicative Congruential Generator, Identify whether it will have full period or not. a) Z0=28, a=35, m=7 b) Z0=33, a=21, m=7	4	CO2
5	Draw a causal loop of a 2nd order negative Feedback system explaining its pattern of behavior.	4	CO2, CO3

SECTION B

6	Why is pseudo random numbers important in simulations? Generate first three random numbers using combined linear congruential method. Take following two multiplicative generators. a) Z0=28, a=35, m=7 b) Z0=33, a=21, m=13 What will be the maximum possible period of this generator?	8	CO2,CO3
7	Explain the steps of event step and time step simulation via a flowchart. What do you mean by Future Event Lists? What is their significance in Simulation?	8	CO2
8	A given climate system has two random variables, X (days) and Y(temperature). The scientific readings recorded earlier gave following sets for the above variables.	8	CO2,CO3,CO4

X	50	59	57	65	68	55	56	59	61
Y	11	15	11.5	14	19	20	21	18	12

	A model developed is represented as Z(comfort)=X*Y/30. Use empirical continuous distribution to perform inverse transform and generate 2 variates for X and Y. Take U(0,1) random numbers as 0.356, 0.548.		
9	Explain in detail various queuing disciplines and queuing models stating appropriate examples. What are the factors determining the characteristics of a queue? What are various measures of performance in queuing systems?	**8**	**CO2,CO3,CO4**
10	a) A random variable X follows weibull pattern (α=0.8, β=4). Using Inverse transform method, Generate variates for R=(0.12 and 0.56). b) A random variable X follows exponential pattern (λ=9). Using Inverse transform method, Generate variates for R=(0.72 and .46). c) A random variable X follows uniform pattern (a=100, b=400). Using Inverse transform method, Generate variates for R=(0.12 and .56).	**8**	**CO2,CO3**
SECTION-C			
	Long answer Questions. Detailed discussion is required.		
11	Explain the process of modelling via 'structuring' and supplying data. Make mathematical model of 'Quality of friendships in a social networking". Use all the steps of modelling with proper description arriving to a mathematical model. Explain how this model will be used in simulation.	**20**	**CO2,CO3,CO4**
12	Explain in detail the following: a. Steps in Input Modelling b. Model verification and validation. c. Discrete event simulation.	**20**	**CO2,CO3,CO4**