KUMARAGURU
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Register Number:……….……

M.E DEGREE EXAMINATIONS: JUNE 2018

(Regulation 2015)

Second Semester

INDUSTRIAL ENGINEERING

P15IET202: System Modeling And Simulation

COURSE OUTCOMES

CO1: Illustrate the concept of simulation, types of simulation and types of models.

CO2: Generate random variates and random numbers using distributions.

CO3: Manipulate the tests on random numbers to check the uniformity

CO4: Model the system using GPSS.

CO5: Develop simulation models for queuing systems, production and inventory models

Time: Three Hours   **Maximum Marks: 100**

Answer all the Questions:-
PART A (10 x 1 = 10 Marks)

1. Assertion (A): Simulation enables the study of, and experimentation with, the internal interactions of a complex system.   CO1   [K_2]

   Reason (R): Simulation can be used to verify analytic solutions.

   a) Both A and R are Individually true and R is the correct explanation of A
   b) Both A and R are Individually true but R is not the correct explanation of A
   c) A is true but R is false
   d) A is false but R is true

2. _____ are those in which random variable changes continuously with time and would follow distributions like exponential, Weibull   CO2   [K_1]

   a) Continuous variates
   b) Discrete variates
   c) Utilization factors
   d) Random variates

3. _____ is a specific issue that addressed through simulation of manufacturing system.   CO5   [K_2]

   a) Competition in the market
   b) Location and size of inventory buffer
   c) Catching the market in new area
   d) Forecasting the demand

4. Match List I with List II   CO1 [K₂]

	List I	List II
	A. Discrete system	i. System operates with a fixed number of entities or items right from the starting time till finish
	B. Continuous system	ii. System operates with different number of entities from time to time
	C. Static system	iii. Arrival and departure of entities
	D. Dynamic system	iv. Head of water behind a dam

	A	B	C	D
a)	ii	i	iii	iv
b)	iii	iv	i	ii
c)	ii	iv	iii	i
d)	iii	i	ii	Iv

5. Assertion (A): Pseudo random number generator also known as Deterministic Random   CO2 [K₃]
Number Generator is an algorithm for generating a sequence of numbers.

Reason (R): Even it is of false randomness, It is used to check the simulation program, and we may use it for the purpose of simulation.

a) Both A and R are Individually true and R is the correct explanation of A

b) Both A and R are Individually true but R is not the correct explanation of A

c) A is true but R is false

d) A is false but R is true

6. System is collection of objects connected by _____   CO5 [K₂]

a) a) Boolean operators

b) Physical connections

c) Logical operators

d) Regular interaction and interdependence

7. Select the following simulation languages that employ a graphical model-building approach.   CO4 [K₂]

1.Arena

2.GPSS

3.SIMSCRIPT II.5

4.SLX

a) 1,3,4

b) 1,4

c) 1,2

d) 1,2,3

8. Inverse transform technique is used to generate random variates from _____ distributions.   CO3   [K₂]

   a) Continuous distributions   b) Gamma distribution

   c) Poisson distribution   d) Weibull distribution

9. _____ Block is used to take and record the simulation results in GPSS.   CO4   [K₁]

   a) MARK   b) ADVANCE

   c) Queue   d) SIEZE

10. Sequence the common structure of the commands in GPSS programming.   CO4   [K₂]

    1. Release

    2. Seize

    3. Queue

    4. Generate

    5.Terminate

    a) 2-3-4-1-5   b) 4-3-1-2-5

    c) 4-2-1-3-5   d) 4-3-2-1-5

PART B (10 x 2 = 20 Marks)

11.	Compare and list any two differences between mathematical and physical model.	CO1	[K₂]
12.	What is the necessity to ensure uniformity in random numbers?	CO2	[K₂]
13.	Differentiate random numbers from random variates.	CO2	[K₂]
14.	Discuss the objective of conducting runs test.	CO3	[K₂]
15.	Define Utilization factor of a service facility.	CO3	[K₁]
16.	List the major modeling issues in manufacturing simulations.	CO4	[K₁]
17.	Mention the limitations of programming for simulation.	CO4	[K₁]
18.	Name entities, attributes, activities, events, and state variable for the following systems: (i) Hospital, (ii) Airport.	CO1	[K₁]
19.	Identify the random variables associated with inventory system modeling.	CO5	[K₁]
20.	Write short notes on face value of the model.	CO5	[K₁]

PART C (10 x 5 = 50 Marks)

21.	What is system and system environment? Explain the components of a system with an Example.	CO1	[K₂]
22.	List the diverse types of simulation models with examples.	CO1	[K₃]
23.	Derive the expression for generating random variates from exponential distribution using inverse transform technique and list the applications of exponential distribution.	CO2	[K₂]

24. What is acceptance – rejection technique? Generate three Poisson variates with mean $\alpha = 0.2$.   CO2   [K$_2$]

25. Use linear congruential random number generator to generate random numbers with $X_0 = 27$, a = 17, c = 43, and m = 100.   CO2   [K$_2$]

26. Discuss in detail the basic concept of Poker test used in random number testing.   CO3   [K$_2$]

27. Explain in detail with neat sketches, the various blocks used in GPSS.   CO4   [K$_2$]

28. Model the single server queueing system using GPSS.   CO4   [K$_3$]

29. Discuss the execution of events in GPSS during simulation.   CO4   [K$_2$]

30. Discuss the applications of simulation in industrial engineering industries.   CO5   [K$_2$]

Answer any TWO Questions
PART D (2 x 10 = 20 Marks)

31. Using Kolmogrov Smirnov test find out whether the random numbers generated are uniformly distributed on the interval [0, 1] can be rejected. Assume $\alpha=0.05$, the random numbers are 0.54, 0.73, 0.98, 0.11, 0.68.   CO3   [K$_3$]

32. Explain in detail about the steps in a simulation study with a flow chart.   CO1   [K$_3$]

33. With a suitable example explain for simulation of a multi-server model.   CO5   [K$_3$]

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