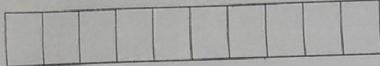


13MCA52



**Fifth Semester MCA Degree Examination, June/July 2016**  
**System Simulation & Modeling**

Max. Marks: 100

i.e: 3 hrs.

**Note: Answer any FIVE full questions.**

- a. What is simulation? When is simulation the appropriate tool? Mention any two areas of application. (10 Marks)
- b. Explain the steps in a simulation study. (10 Marks)
- a. What is discrete event simulation? Explain event scheduling / time advance algorithm. (10 Marks)
- b. Discuss the three most prevalent world views for manual simulation. (10 Marks)
- a. A production process manufactures computer chips on the average at 2% is non conforming. Every day, a random sample of size is 50 is taken from the process. If the sample contains more than two non conforming chips, the process will be stopped. Compute the probability that the process is stopped by the sampling scheme. (10 Marks)
- b. A medical examination is given in three stages by a physician. Each stage is exponentially distributed with a mean service time of 20 minutes. Find probability that the exam will take 50 min or less. Also compare the expected length of exam= (note mean  $\alpha = 0.543$ ) (10 Marks)
- a. Explain the queuing notations. (05 Marks)
- b. What is conservation equation? Explain. (08 Marks)
- c. Discuss queuing models for server utilization. (07 Marks)
- a. Elaborate on Kolmogorov-Smirnov test of uniformity. (10 Marks)
- b. Use linear congruential method to generate a sequence of random numbers with  $X_0 = 27$ ,  $a = 17$ ,  $c = 43$  and  $m = 100$ . How can maximal period be achieved by proper choice of  $a$ ,  $c$ ,  $m$  and  $X_0$ ? (10 Marks)
- a. Explain uniform distribution technique and Weibull distribution technique. (10 Marks)
- b. What are the steps to be taken during the development of a useful model of input data? What are the points to be considered in evaluating the linearity of a q - q plot? (10 Marks)
- a. What is verification? How is verification of simulation models done? (10 Marks)
- b. Discuss calibration and validation of models. (10 Marks)
- Write short notes on:
- a. Simulation software. (05 Marks)
- b. Difference between discrete and continuous systems. (05 Marks)
- c. Goodness-of-fit tests. (05 Marks)
- d. Write the components of the following systems : Banking, Production, Communications. (05 Marks)

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13MCA53

**Fifth Semester MCA Degree Examination, June/July 2016**  
**Programming using C# and •NET**

ie: 3 hrs.

Max. Marks: 100

**Note: Answer any FIVE full questions.**

- a. What are the functions of CTS? Display hierarchical representation of different data types. (08 Marks)
- b. What is an assembly manifest? What is the information stored in assembly manifest? (06 Marks)
- c. Explain windows workflow foundation architecture with a neat diagram. (06 Marks)
- a. Explain different types of formal parameters in C# with example. (12 Marks)
- b. Explain the following operators with simple examples :  
i) ?? (null coalescing)  
ii) :: (scope resolution)  
iii) is  
iv) as (08 Marks)
- a. What are properties in C#? Explain read only and static properties with examples. (10 Marks)  
b. With an example explain indexers. (06 Marks)  
c. What are anonymous types? (04 Marks)
- a. Explain encapsulation and its advantages. How encapsulation is achieved in C#? (10 Marks)  
b. How method overriding different from method overloading? (04 Marks)  
c. Write a C# program to overload '+' and '++' operators. (06 Marks)
- a. What are delegates? Explain creation and usage of delegates. (06 Marks)  
b. Write a short notes on :  
i) Events  
ii) Event sources  
iii) Event handlers  
iv) Event delegates. (08 Marks)
- c. What are the checked and unchecked statements? (06 Marks)
- a. List out any six properties and their purpose of TextBox. (06 Marks)  
b. What is the purpose of using GroupBox and panels? List out their properties. (06 Marks)  
c. Explain how to handle mouse events with example. (08 Marks)
- a. Explain the architecture of ADO.NET with a neat diagram. (12 Marks)  
b. Explain the following :  
i) Data adapters  
ii) Dataset  
iii) dataReader  
iv) ODBC DataSource. (08 Marks)
- a. Explain different ways of Session Tracking in ASP.Net with simple example. (12 Marks)  
b. Explain different validation controls in ASP.Net. (08 Marks)

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13MCA51

**Fifth Semester MCA Degree Examination, Dec.2015/Jan.2016**  
**Object Oriented Modeling and Design Pattern**

Time: 3 hrs.

Max. Marks:100

**Note: Answer any FIVE full questions.**

1. a. What is object oriented analysis and design? How it is different from normal analysis and design techniques? Explain with suitable example. (10 Marks)
- b. What do you mean by abstraction? Explain the different types of modeling techniques used for object oriented modeling and design. (10 Marks)
  
2. a. What is Abstract class? Explain the difference between Aggregation versus Composition with suitable example. (10 Marks)
- b. Define the following terms with example:
  - i) Multiplicity
  - ii) Association End Names
  - iii) Ordering
  - iv) Bags and Sequence
  - v) Association classes. (10 Marks)
  
3. a. What is the use of state diagram? Draw the state diagram for telephone line system. (10 Marks)
- b. What do you mean by event? Explain the signal event, change event and time event. (10 Marks)
  
4. a. Write short notes on the following :
  - i) Actor
  - ii) Use case
  - iii) Scenario
  - iv) Sequence Diagram. (08 Marks)
- b. Draw sequence diagram for online flight ticket booking system. (12 Marks)
  
5. a. Briefly describe the software development stages. (10 Marks)
- b. What do you mean by system conception? What are the ways to find new system conception? Explain in detail what a good system concept must answer? (10 Marks)
  
6. a. What do you mean by Domain State Model? Explain the steps performed in constructing a domain state model. (10 Marks)
- b. What is Application class model? Explain the steps to construct the application class models. (10 Marks)
  
7. a. What is software control strategy? Explain the different types of software control strategy. (10 Marks)
- b. Write short notes on following :
 

i) Recursive downward	ii) Design Optimization
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(10 Marks)
  
8. a. How design patterns solve design problem? How to select a design pattern? Describe the design pattern's three part scheme that underlies every pattern. (10 Marks)
- b. Explain the different pattern categories in detail. (10 Marks)

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**Fifth Semester MCA Degree Examination, Dec.2015/Jan.2016**  
**System Simulation & Modeling**

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions.

1. a. Define simulation. Explain the advantages and disadvantages of simulation. (10 Marks)  
 b. Explain the steps in a simulation study with a neat diagram. (10 Marks)
  
2. a. A production firm manufactures computer chips on the average at 2% nonconforming. A random sample of size 50 is taken from the process. If the sample contains more than two non conforming chips, the production process will be stopped. Compute the probability that the production process will not be stopped. (08 Marks)  
 b. Give the definitions for a discrete Random variable and a continuous random variable. (04 Marks)  
 c. Give one example each for a discrete distribution and a continuous distribution. (08 Marks)
  
3. a. Explain the linear congruential method of generating random numbers. (04 Marks)  
 b. Generate a sequence of 5 random numbers with the help of linear congruential method with the seed value  $X_0 = 28$ , the multiplier  $a = 17$ , the increment  $C = 43$  and modulus  $m = 100$ .  
 Random numbers between 0 and 1 can be generated by  $R_i = \frac{X_i}{m}$ ,  $i = 1, 2, \dots$  (10 Marks)  
 c. Explain how a chi-square test is used to test the random numbers. (06 Marks)
  
4. a. Explain the characteristics of queueing systems. (12 Marks)  
 b. Explain the queueing notation for parallel server system. (08 Marks)
  
5. a. The interarrival times and service times of customers in a single channel queueing systems are as follows:  

Customer	1	2	3	4	5	6	7	8	9	10
Inter Arrival Time (mins)	-	1	2	4	5	7	3	5	6	2
Service Time (mins)	4	2	3	1	3	4	5	2	2	4

 Calculate  
 i) Probability of idle server  
 ii) Average service time.  
 b. Explain the event scheduling algorithm and list processing operations. (08 Marks)  
 c. Explain a single server queue simulation in Java. (08 Marks)
  
6. a. Explain the four steps in the development of a useful model of input data. (10 Marks)  
 b. Explain the process of identifying the distribution of data using histograms. (10 Marks)
  
7. a. Define validation and calibration of a simulation model. Explain the iterative process of calibrating a model with a neat diagram. (08 Marks)  
 b. Explain the three step approach by Naylor and Finger for the validation process of a simulation model. (12 Marks)
  
8. a. Explain the point estimation and confidence interval estimation of a performance parameter. (10 Marks)  
 b. Explain briefly about the output analysis for steady state simulation. (10 Marks)

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**Fifth Semester MCA Degree Examination, Dec.2015/Jan.2016  
Programming using C# and •NET**

Time: 3 hrs.

Max. Marks: 100

**Note: Answer any FIVE full questions.**

- 1 a. Explain the architecture and components of •NET framework.  
b. Explain looping statements in C# with examples. (10 Marks)  
(10 Marks)
- 2 a. List and explain C# preprocessor directives.  
b. Explain the following with example :  
i) Value types and reference types  
ii) Boxing and unboxing. (10 Marks)  
(10 Marks)
- 3 a. Describe the different access specifiers in C#.  
b. Explain the following with example :  
i) Static constructor  
ii) System namespace. (10 Marks)  
(10 Marks)
- 4 a. Distinguish between compile time polymorphism and runtime polymorphism with suitable code example.  
b. Explain with example the method of implementing encapsulation using the general method and using class properties. (10 Marks)  
(10 Marks)
- 5 a. What are delegates? Explain with code example, the concept of multicasting with delegates.  
b. Explain the use of 'checked' and 'unchecked' C# keywords with relevant example.  
c. Explain exception handling with a sample program to handle multiple exceptions. (06 Marks)  
(04 Marks)  
(06 Marks)
- 6 a. Illustrate working with checkbox, RadioButton and GroupBox controls with a windows forms application example.  
b. Write a short note on the following :  
i) MDI windows  
ii) Event driven GUI. (10 Marks)  
(10 Marks)
- 7 a. List and explain any 5 ADO•NET Data providers.  
b. What is connection object? Explain the procedure of getting connected to a database and running the following queries with relevant example :  
i) Insert record to a table  
ii) Delete records from a table. (10 Marks)  
(10 Marks)
- 8 a. Explain in detail multitier application architecture.  
b. What are cookies? Explain session management in ASP•NET using cookies. (10 Marks)  
(10 Marks)

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10MCA51

**Fifth Semester MCA Degree Examination, June/July 2015**  
**Object Oriented Modeling and Design Patterns**

Time: 3 hrs.

Max. Marks:100

**Note: Answer any FIVE full questions.**

1. a. What are Object Oriented themes? (06 Marks)  
b. What are the purposes served by model? (04 Marks)
2. c. Define the following with an example for each :  
i) Class      ii) Bags & Sequences      iii) Association class      iv) Qualified associations. (10 Marks)
3. a. Define and differentiate between Association, Aggregation and Composition along with appropriate example. (10 Marks)  
b. With the necessary diagram, explain the behaviour of state diagram. (10 Marks)
4. a. Explain synchronization of concurrent activities, with an example. (08 Marks)  
b. Explain components of activity diagram along, with a neat diagram. (12 Marks)
5. a. Explain advanced use case relationships, with appropriate example. (10 Marks)  
b. How do you eliminate unnecessary and incorrect attributes while constructing domain class model? (10 Marks)
6. a. Explain briefly steps in constructing application model. (10 Marks)  
b. Write a note on :  
i) Batch Transformation      ii) Continuous Transformation. (10 Marks)
7. a. Briefly explain how you bridge gap from high level requirement to low – level services. (08 Marks)  
b. Why tuning of tuning of classes required? What are the different possibilities in doing the same? (08 Marks)  
c. Differentiate between reverse engineering and forward engineering. (04 Marks)
8. a. What is a Pattern? Explain properties of pattern for software architecture. (10 Marks)  
b. Explain structure and dynamics of command pattern. (10 Marks)
9. a. Explain structure and dynamics of Forwarder – Receiver design pattern. (10 Marks)  
b. What are Idioms? Explain counted pointer Idiom in detail. (10 Marks)

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10MCA52

**Fifth Semester MCA Degree Examination, June/July 2015**  
**System Simulation and Modeling**

Time: 3 hrs.

Max. Marks: 100

**Note: Answer any FIVE full questions.**

- 1 a. Briefly explain various steps involved in simulation process, with neat diagram. (10 Marks)  
 b. Students arrive at a single cashier book stall at random from 1 to 8 minutes apart. Each possible value of inter arrival time has same probability of occurrence. The service time has the following probability distribution:

Service time (min)	1	2	3	4	5
Probability	0.05	0.10	0.2	0.4	0.25

Simulate the stall for 10 students using the following random numbers for IAT and ST:

IAT: 465, 380, 150, 570, 975, 065, 640, 757, 268  
 ST: 17, 90, 04, 40, 62, 30, 80, 55, 10, 37

Find average waiting time, average time spent by a student in the stall. (10 Marks)

- 2 a. Explain advantages and disadvantages of simulation. (05 Marks)  
 b. One company uses 6 trucks to haul iron ore from mine to industry. There are two loaders to load each truck. After loading, a truck moves to the weighing scale to be weighed. After weighing the truck travels to the industry and returns back to the loader queue. The activity times are given below:

Loading time	10	5	5	10	15	10	10
Weighing time	12	12	12	16	12	16	
Travel time	60	100	40	40	80		

Prepare a simulation table using the event scheduling approach until the clock reaches time 40 minutes. Calculate total busy time of both loaders and the scale. Assume two trucks are at loaders, one at scale and three at loader queue at time 0. (10 Marks)

- c. Explain arrival event and departure events in single channel queue using flow charts. (05 Marks)
- a. Write the GPSS block diagram for the single-server queue simulation. (06 Marks)
- b. The number of hurricanes hitting the coast of Florida annually has a Poisson distribution with a mean of 0.8.
- i) What is the probability that no hurricane will hit the Florida coast in a year?
  - ii) What is the probability that more than two hurricanes will hit the Florida coast in a year?
  - iii) What is the probability that exactly three hurricanes will hit the Florida coast in a year? (07 Marks)
- c. Explain the characteristics of queuing systems. (07 Marks)

5<sup>th</sup> sem MCA Question papers

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- 4 a. Suppose that the interarrival times and service times in a shop have been shown exponentially distributed with averages 1/2 and 20 minutes. Find:

  - Server utilization
  - Probabilities for 0, 1, 2 or more customers in the shop
  - Average number of customers in the shop
  - Average time spent in the queue.

(08 M)

b. Explain the queuing notation A/B/C/N/K with example.

c. Mention the important considerations for methods of random number generation, explain linear congruential method of generating random number with an example.

(05 M) (07 M)

5 a. Explain Kolmogorov-Smirnov test to compare the distribution of the set of random numbers generated to the uniform distribution perform the test for uniformity for the numbers 0.44, 0.81, 0.14, 0.05, 0.93 the level of significance  $\alpha = 0.05$ . (critical value of D for  $\alpha = 0.05$ , N = 5 is 0.565).

(10 M)

b. Generate Poisson variates with  $\lambda = 0.25$ . The random numbers to be used are 0.4737, 0.8225, 0.5614, 0.4107, 0.0731, 0.6179, 0.9669, 0.4285, 0.8745, 0.7810, 0.023

(10 M)

6 a. Explain the four steps in the development of a useful model of input data.

b. The number of vehicles arriving at a circle in a 5-minute period is as shown in the following table. (monitored for 100 days):

Number of Vehicles	Frequency
0	10
1	20
2	30
3	25
4	15
5	10
6	5
7	2
8	1

(06 M)

Arrivals per period	Frequency	Arrivals per period	Frequency
0	12	6	7
1	10	7	5
2	19	8	5
3	17	9	3
4	10	10	3
5	8	11	1

Apply Chi-square Goodness-of-fit test to test the hypothesis that the random variable (number of vehicles) is Poisson distributed ( $\chi^2_{0.05}$  value = 11.1). (10)

- c. How to select input models without data? (04)

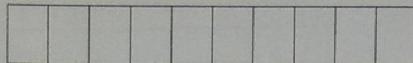
7 a. Explain point estimation and confidence interval estimation with example. (08) 6  
b. Explain the output analysis for steady state simulation. (08)  
c. From 25 replications of a manufacturing simulation, a 90% confidence interval for the average WIP is  $218 \pm 32$ . What is the 85<sup>th</sup> percentile of daily average WIP? (Use  $t_{0.05} = 1.71$ ,  $Z_{0.85} = 1.04$ ). (04) 7

8 a. Explain the three-step approach formulated by Naylor and Finger that has been followed as an aid in the validation process. (10) b.  
b. Why is optimization via simulation difficult? (04)  
c. What is the purpose of model verification? Explain how verification of models is done. (04)

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10MCA51

**Fifth Semester MCA Degree Examination, Dec.2014/Jan.2015**  
**Object Oriented Modeling and Design Patterns**

Time: 3 hrs.

Max. Marks: 100

**Note: Answer any FIVE full questions.**

- 1 a. What is a model? Explain the various concepts of class modeling, with example. (12 Marks)  
b. Draw the elaborated ATM class model diagrams. (08 Marks)
- 2 a. What is multiple inheritance? Discuss about the various concepts or kinds of multiple inheritance in advanced class modeling, with example. (12 Marks)  
b. Draw the state diagram for a telephone line. (08 Marks)
- 3 a. What is use-case diagram? What are the guidelines of use – case models? Draw the use-case diagram for a vending machine. (10 Marks)  
b. Discuss about activity models with guidelines and draw the activity diagram for stock trade processing. (10 Marks)
- 4 a. Explain the stages of software development. (08 Marks)  
b. What are the steps to construct a domain class model? Explain any four steps with example. (12 Marks)
- 5 a. What are the steps to construct application interaction model? Explain any four steps with example. (10 Marks)  
b. Discuss about the architectural styles that are common in existing system. (10 Marks)
- 6 a. Write short notes on : (with reference to class design)  
i) Designing algorithm  
ii) Design optimization. (10 Marks)  
b. What is implementation? Explain any three steps to implement modeling with example. (10 Marks)
- 7 a. What is a pattern? Discuss about various pattern description template. (08 Marks)  
b. Discuss about structure and dynamics of forwarder – receiver with a neat diagram. (12 Marks)
- 8 a. Explain the structure and implementation of command processor, with diagram. (12 Marks)  
b. Write a program in C++ or Java to implement publisher subscriber pattern with a class diagram. (08 Marks)

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10MCA52

**Fifth Semester MCA Degree Examination, Dec.2014/Jan.2015**  
**System Simulation and Modeling**

Time: 3 hrs.

Max. Marks:100

**Note: Answer any FIVE full questions.**

- 1 a. When simulation is the appropriate tool and not appropriate tool, what are the advantages and disadvantages of simulation? (10 Marks)  
 b. Students arrive at the university library counter with inter arrival times distributed as :

Time between arrival (minutes)	5	6	7
Probability	0.2	0.7	0.1

The time for a service (transaction) at the counter is distributed as

Service time minutes	2	3	4	5
Probability	0.15	0.6	0.15	0.1

Simulate the operation for 10 new students. The "students" using the following random number for inter arrival time and service time IAT's (95, 76, 35, 21, 46, 87, 18, 65, 58) and ST's (85, 55, 78, 65, 45, 36, 28, 19, 65, 9). Find the average of IAT, waiting time (WT), spend in system time (SST) and probability of idle time. (10 Marks)

- 2 a. Explain the steps used in simulation study with a neat flow chart. (10 Marks)  
 b. Using event scheduling/ time advance algorithm, given the following data, simulate the process till the clock read 30 minutes and find server busy time (B), maximum queue length ( $M_Q$ ), given end time of system 60 minutes.

Inter arrival time (minutes)	1	1	6	3	7	5	2	4	1
Service time (minutes)	4	2	5	4	1	5	4	1	4

(10 Marks)

- 3 a. The life time, in years of a satellite placed in orbit is given by the following pdf :

$$f(x) = \begin{cases} 0.4e^{-0.4x}, & x \geq 0 \\ 0, & \text{otherwise} \end{cases}$$

What is the probability that i) This satellite is still "alive" after 5 year? ii) The satellite dies between 3 and 6 years? (06 Marks)

- b. A production process manufactures compute chips on the average at 2% non conforming. Every day, a random sample of size 50 is taken from the process. Find the probability that i) No non - conforming chips ii) more than two non - conforming chips from the process. (07 Marks)

- c. The time in hours required to load an ocean going vessel,  $x$  is distributed as  $N(12, 4)$ . Find the probability that : i) the vessel loaded in less than 10 hours ii) more than 12 hours iii) between 10 and 12 hours will be required to load a ship. Given  $\phi(0) = 0.500$ ,  $\phi(1) = 0.8413$ ,  $\phi(2) = 0.9772$ . (07 Marks)

**5<sup>th</sup> sem MCA Question papers**

**10MCA USN**

- 4 a. Explain in detail the characteristics of queuing system. What does the formula  $A|B|C|N|K$  represent? (10 Marks)
- b. Generate five random numbers (3 decimal) and hence test for uniformity by K-S test, given that  $x_0 = 2$ ,  $a = 13$ ,  $m = 2^6$  and the critical value  $D_\alpha = 0.565$ . (10 Marks) Time
- 5 a. Test whether the following sequence of numbers are auto correlated test at 5% level of significance where 3<sup>rd</sup>, 8<sup>th</sup>, 13<sup>th</sup> and so on. Given  $Z_{0.025} = 1.96, 0.28, 0.89, 0.23, 0.12, 0.64, 0.83, 0.28, 0.31, 0.93, 0.35, 0.99, 0.33, 0.15, 0.41, 0.91, 0.88, 0.27, 0.60, 0.75, 0.68, 0.05, 0.49, 0.43, 0.87, 0.58, 0.36, 0.69, 0.19$ . (10 Marks)
- b. Give a step by step procedure to generate the random variates, using the inverse transform technique for exponential distribution. (05 Marks)
- c. Using the acceptance – rejection technique, generate three Poisson variates with  $\lambda = 0.02$  (given random numbers 0.4357, 0.4146, 0.8353, 0.9952, 0.8004). (05 Marks)
- 6 a. Write in detail of i) four steps in the development of a useful model of input and ii) parameter estimation. (10 Marks)
- b. The customers arriving at a busy bank counter in a 5 minute period between 10 am to 2 pm was recorded for a day given below :
- | Arrival/ period | 0  | 1  | 2  | 3  | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|-----------------|----|----|----|----|---|---|---|---|---|---|----|
| Frequency       | 15 | 12 | 10 | 10 | 8 | 7 | 5 | 4 | 3 | 2 | 4  |
- Use  $\chi^2$  test goodness fit, to check whether the data follows Poisson distribution at 5% level of significance, given that, the critical value  $\chi^2_{(0.05,6)} = 11.1$ . (10 Marks)
- 7 a. Explain the types of simulation model with respect to output analysis. (08 Marks)
- b. Explain the statistical estimation of performance measures. (06 Marks)
- c. Explain initialization bias in steady state simulation. (06 Marks)
- 8 a. What is verification of simulation models? List the suggestions given for verification model. (10 Marks)
- b. Explain briefly three – step approach to validation by nayler and finger. (10 Marks)

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10MCA52

**Fifth Semester MCA Degree Examination, June / July 2014**  
**System Simulation and Modeling**

Time: 3 hrs.

Max. Marks:100

**Note: Answer any FIVE full questions.**

1. a. What is system modeling? When simulation is appropriate tool? Mention the areas of application of simulation. (10 Marks)  
 b. With the help of flow diagram, explain the steps involved in simulation study. (10 Marks)
2. a. A grocery store has one check out counter. Customers arrive at the checkout counter at random times that range from 1 to 8 minute apart. Each of the 8 values have equal probability. The service times vary from 1 to 6 minutes with probabilities shown in the table.
- | Service times minutes | Probability |
|-----------------------|-------------|
| 1                     | 0.10        |
| 2                     | 0.20        |
| 3                     | 0.30        |
| 4                     | 0.25        |
| 5                     | 0.10        |
| 6                     | 0.05        |
- Simulate for 10 customers and find  
 i) Average waiting time ii) Probability of idle server iii) Average time between arrivals. (10 Marks)
- b. Explain in detail the concepts in discrete event simulation and event scheduling algorithm. (10 Marks)
3. a. Describe the geometric and negative binomial distribution, along with probability density function, mean and variance. (08 Marks)  
 b. Forty percent of the assembled ink-jet printers are rejected at the inspection station. Find the probability that i) the first acceptable ink-jet printer is the third one inspected. ii) The third printer is the second acceptable printer. (06 Marks)  
 c. A bus arrives every 20 minutes at a specified stop beginning at 6.40 AM and continuing until 8.40 AM. A certain passenger does not know the schedule, but arrives randomly (uniformly distributed) between 7.00 AM and 7.30 AM every morning, what is the probability that the passenger waits more than 5 minutes for a bus? (06 Marks)
4. a. Explain the characteristics of queuing systems with an example, what does the format A / B / C / N / K represent in queuing systems. (10 Marks)  
 b. The inter arrival times and service times at a single – chair unisex hair – styling shop have been shown to be exponentially distributed. The values of  $\lambda$  and  $\mu$  are 2 per hour and 3 per hour respectively. For this M / M / 1 queue determine,  
 i) The time – average number of customers in the system.  
 ii) The average time an arrival spends in the system.  
 iii) The average time the customer spends in the queue.  
 iv) The time-average number in the queue. (10 Marks)

## 5<sup>th</sup> sem MCA Question papers

- 5 a. Describe the technique of linear congruential method for generating random numbers. USN (06)  
b. Using Linear congruential method, generate random numbers with  $X_0 = 27$ ,  $a = 17$ , (04)  
and  $m = 100$ .  
c. What are the steps involved in generating random variates by inverse transform tech. Use the following data to generate five random variates exponential distribution. (10) Tin  
mean value as 4.5 and 0.01, 0.15, 0.38, 0.65, 0.55 as inputs. (10)
- 6 a. Discuss the chi-square goodness-of-fit test for testing that a random variable follows a specific distribution. (10)  
b. Explain the time-series input models. (10) 1
- 7 a. With examples, explain the types of simulations with respect to output analysis. (10)  
b. Discuss the confidence-interval estimation on the output produced by simulation. (10) 2
- 8 a. What is verification of simulation models? List the suggestions given for verification of models. (10)  
b. Explain validating input-output transformations with an example. (10) 3

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- 4 a.  
b.  
c.  
5 a.  
b.  
c.  
6 a.  
b.  
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10MCA51

**Fifth Semester MCA Degree Examination, Dec. 2013/ Jan. 2014  
Object – Oriented Modeling and Design Patterns**

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions.

1. a. What is an object orientation? Hence explain the terms – identity, classification, inheritance and polymorphism. (10 Marks)
- b. Define the following terms and hence, explain with example each :
  - i) Links and association
  - ii) Multiplicity
  - iii) Association-class
  - iv) Qualified association. (10 Marks)
2. a. What is generalization? With neat diagram represent inheritance for graphic figures. (10 Marks)
- b. What is an event and hence, explain in detail, the signal event, change event and time event. (10 Marks)
3. a. What do you mean by state? With neat diagram, explain state diagram for a telephone line system. (10 Marks)
- b. List out and explain the following :
  - i) Guidelines for sequence models
  - ii) Guidelines for use case models. (10 Marks)
4. a. List and explain in detail, the sequence of well defined stages of software development. (10 Marks)
- b. What are the high level questions to elaborate the initial systems concept? Hence explain with the help of ATM case study. (10 Marks)
5. a. What are the steps must be performed to construct a domain class model? Hence explain all the steps, in brief. (10 Marks)
- b. What do you mean by implementation modeling? Hence describe the step – fine tuning classes. (10 Marks)
6. a. What is pattern? Describe pattern categories, in detail. (10 Marks)
- b. How patterns are helpful in software development? Discuss. (10 Marks)
7. a. Explain forwarder – receiver design pattern, in brief. (10 Marks)
- b. Explain client – dispatcher – server design pattern, in brief. (10 Marks)
8. Write short notes on :
  - a. Metadata
  - b. Active and passive objects
  - c. Usecase diagram
  - d. Idioms. (20 Marks)

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10MCA52

**Fifth Semester MCA Degree Examination, Dec. 2013/Jan. 2014**  
**System Simulation and Modeling**

Time: 3 hrs.

Max. Marks: 100

Note: 1. Answer any FIVE full questions.  
 2. Statistical tables can be permitted.

- 1 a. Define simulation. Draw a neat flow chart and explain the various steps in simulation study. (12 Marks)
- b. Mention the entities, attributes, activities and events for the following systems : Hospital emergency room  
 Cafeteria  
 Laundromat  
 Taxicab company. (08 Marks)

- 2 a. Prepare a simulation table for a single channel queuing system, for 10 customers. Use the interarrival and service time as given in the below table. And also determine the following : Ideal time of server  
 i) Average waiting time  
 ii) Average time customer spends in system  
 iii) Average service time

Interarrival time	5	10	1	2	3	8	5	8	4
Service time	5	8	5	6	5	5	8	3	5

(10 Marks)  
(10 Marks)

- b. Explain briefly the event – scheduling/ time – advance algorithm.

- 3 a. Explain any two from each of the discrete and continuous distribution function of the statistical models. (10 Marks)
- b. A recent survey indicated that 82% of single women aged 25 years old will be married in their life time using the binomial distribution. Find the probability that 2 or 3 women in a sample of twenty will never be married. (04 Marks)
- c. Hurricane hitting the eastern coast of India follows Poisson with a mean of 0.5 per year. Determine :  
 i) The probability of more than 3 hurricanes hitting the Indian eastern cost in a year  
 ii) The probability of not hitting the Indian eastern coast in a year. (06 Marks)

- 4 a. Explain in detail, the characteristics of queuing system. (10 Marks)
- b. Explain briefly the simulation in Java with an example for single server queuing system. (10 Marks)

- 5 a. Use Kolmogorov – Smirnov test with  $\alpha = 0.05$  to determine whether the hypothesis that the numbers given below are uniformly distributed on the interval  $[0, 1]$  can be rejected. (Given the critical value  $D_{0.05, 9} = 0.432$ )  
 The random numbers are : 0.73, 0.82, 0.16, 0.72, 0.79, 0.95, 0.57, 0.63, 0.39. (10 Marks)
- b. Explain the acceptance – rejection technique for the Poisson distribution with its algorithm. Generate 5 random variates by using the Poisson distribution function with  $\alpha = 0.4$ . Given random numbers are : 0.4709, 0.8503, 0.9466, 0.0015, 0.8768, 0.0379, 0.8520, 0.3026, 0.1502. (10 Marks)

## 5<sup>th</sup> sem MCA Question papers

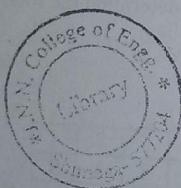
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- 6 a. Explain the steps involved in developing input model. Also list any six suggestions used for enhancing and facilitating the data collection. (06)  
b. Records pertaining to the monthly number of job – related injuries at an underground coalmine were being studied by a federal agency. The values for the past 100 months as follows :

Injuries /month	0	1	2	3	4	5	6
Frequency of occurrence	35	40	13	6	4	1	1

Use  $\chi^2$  test to check whether the data follows Poisson distribution at 5% level of significance. (Given critical value is  $\chi^2_{0.05,2} = 5.99$ ). (12)

- 7 a. Explain the three – step process of Naylor – Finger approach. (10)  
b. Explain the types of simulation with respect to output analysis. Differentiate between point and interval estimation. (10)  
8 Write short notes on : (20)  
a. List processing  
b. Q – Q plot  
c. Network of queues  
d. Optimization via simulation is difficult - justify it.



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07MCA51

**Fifth Semester MCA Degree Examination, December 2011**  
**Object Oriented Modeling and Design Patterns**

Time: 3 hrs.

Max. Marks: 100

**Note: Answer any FIVE full questions.**

1. a. What is object – orientation? What are the three models used for OO development? Describe. (10 Marks)
- b. Draw a sample class model of a OR ATM system. (10 Marks)
  
2. a. What is multiple inheritance? Explain different kinds of multiple inheritances in advanced class modeling concept, with examples. (10 Marks)
- b. Draw and explain state diagram for a telephone line. (10 Marks)
  
3. a. Explain aggregation concurrency. (10 Marks)
- b. Explain the sequence diagram, with an example. (10 Marks)
  
4. a. What are the different approaches to software development? Explain. (08 Marks)
- b. What are the different steps to construct a domain class model? Explain any three steps with example. (12 Marks)
  
5. a. Specify the steps to construct the application interaction model. Explain any three steps with examples. (12 Marks)
- b. What are the several kinds of global resources that the software designer must identify? Explain. (08 Marks)
  
6. a. Implement one-way and two-way associations, with examples. (10 Marks)
- b. What are the different steps to improve organization of a class design? (10 Marks)
  
7. a. What is a pattern? What are the different components of pattern descriptions / pattern description template? (08 Marks)
- b. Explain the implementation steps of client – dispatcher server pattern. (12 Marks)
  
8. a. Explain structure and collaborators of command processor pattern, with a diagram. (10 Marks)
- b. Explain the dynamics of forwarder – receiver pattern with a diagram. (10 Marks)

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07MCA52

**Fifth Semester MCA Degree Examination, December 2011**  
**System Simulation and Modeling**

Time: 3 hrs.

Max. Marks: 100

- Note:** 1. Answer any FIVE full questions  
 2. Use of cumulative normal distribution table is permitted.

1. a. Bring out the difference between:  
 i) Static and dynamic model  
 ii) Discrete and continuous model  
 iii) deterministic and stochastic system  
 iv) Analytical and numerical solution. (06 Marks)
- b. List any two entities, two attributes, two events and two activities in a college system. (04 Marks)
- c. Prepare a simulation table for a single channel queuing system, for ten customers. Use the inter arrival time and service time, given in the below table. (10 Marks)
- |                          |   |   |   |   |   |   |   |   |   |   |
|--------------------------|---|---|---|---|---|---|---|---|---|---|
| Inter arrival time (min) | 8 | 6 | 1 | 8 | 3 | 8 | 4 | 3 | 5 | 3 |
| Service time (min)       | 4 | 1 | 4 | 3 | 2 | 4 | 1 | 5 | 2 | 2 |
- Compute the cumulative statistics. (10 Marks)
- i) Server utilization  
 ii) Maximum queue length  
 iii) Average waiting time of customer  
 iv) Average time the customer spends in system  
 v) Average service time.
2. a. Write the event scheduling algorithm. (05 Marks)
- b. Six dump trucks are used to haul coal from the entrance of a small mine to the rail road. Each truck is loaded by one of the two loaders. After loading, the truck immediately moves to the scale to be weighed. Loader and scale have a FCFS queue. The travel time from loader to scale is negligible. After being weighed, a truck begins a travel time, afterwards unloads the coal and returns to the loader queue. Purpose of study is to estimate the loader and scale utilization. It is assumed that 5 trucks are at the loader and one is at the scale at time 0. Simulate the process till the chock reads 20. The activity times are taken from the following list, as needed. (10 Marks)
- |               |    |     |    |    |    |    |    |
|---------------|----|-----|----|----|----|----|----|
| Loading time  | 10 | 5   | 5  | 10 | 15 | 10 | 10 |
| Weighing time | 12 | 12  | 12 | 16 | 12 | 16 | -  |
| Travel time   | 60 | 100 | 40 | 40 | 80 | -  | -  |
- c. Briefly explain simulation in GPSS. (05 Marks)
3. a. What is the use of statistical models in simulation study? (04 Marks)
- b. An industrial chemical that will retard the spread of fire in paint has been developed. The local sales representative has determined, from past experience that 48% of the sales calls will result in an order.  
 i) What is the probability that the first order will come on the fourth sales call of the day?  
 ii) If eight sales calls are made in a day, what is the probability of receiving exactly six orders?  
 iii) If four sales calls are made before lunch, what is the probability that one or less results in an order? (06 Marks)
- c. The life of an industrial lamp is exponentially distributed, with failure rate 1/3.  
 i) Find the probability that the lamp will last longer than its mean life of 3000 hours.  
 ii) Find the probability that lamp will last between 2000 and 3000 hours.  
 iii) Find the probability that lamp will last for another 1000 hours. Give that it is operating after 2500 hours. (06 Marks)
- d. The time required to load an ocean going vessel is normally distributed with  $N(12, 4)$ .  
 i) Find the probability that the vessel will be loaded in less than 10 hours.  
 ii) Find the probability that vessel loading time is between 10 and 12 hours. (04 Marks)

**5<sup>th</sup> sem MCA Question papers**

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- 4 a. Briefly explain the queuing notation A/B/C/N/K. Give two examples. (06 Marks)  
 b. Explain any two long – run measures of performance of queuing system. (06 Marks)  
 c. Explain any four characteristics of queuing system. (08 Marks)

- 5 a. List five desirable properties of random numbers. (05 Marks)  
 b. Explain the K-S test for random numbers. Perform the K-s test for the generated numbers

0.44, 0.81, 0.14, 0.05, 0.93. The critical value for N = 5,  $\alpha = 0.05$  is 0.565. (10 Marks)

- c. What is the use of inverse transform technique? Apply the same to exponential distribution. (05 Marks)

- 6 a. Explain any two methods to identify the distribution, for the given data. (10 Marks)  
 b. The vehicle arrival data given below is found to follow Poisson distribution. Test this finding, using Chi – square test. Let  $\alpha = 3.64$ ,  $\chi^2_{0.05,5} = 11.1$  (10 Marks)

Arrival per period	Frequency	Arrivals per period	Frequency
0	12	6	7
1	10	7	5
2	19	8	5
3	17	9	3
4	10	10	3
5	8	11	1

- 7 a. Explain the three step approach to validation process. (10 Marks)  
 b. Write a note on input – output transformation. (05 Marks)  
 c. Briefly explain the use of Turing test on input – output validation. (05 Marks)

- 8 a. Explain the two methods of estimating measures of performance. (10 Marks)  
 b. Give an example for terminating simulation and steady – state simulation each. (04 Marks)  
 c. Write a small note on initialization bias in steady – state simulation. (06 Marks)

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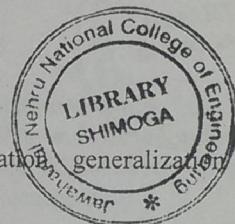
**Fifth Semester MCA Degree Examination, June/July 2011**  
**Object Oriented Modeling and Design Patterns**

Time: 3 hrs.

Max. Marks: 100

**Note:** 1. Answer any FIVE full questions.  
2. Draw diagrams wherever necessary.

- 1 a. Describe object oriented themes. (05 Marks)  
b. Explain the relationship between classes. (15 Marks)
- 2 a. Compare the relationships, association, aggregation and generalization of classes in the following examples : (08 Marks)  
i) Buying beverages from vending machine.  
ii) Making payment.  
iii) Selecting required beverage.  
b. Explain state diagram for a vending machine. (12 Marks)
- 3 a. Discuss advantages of nested states. Explain with 'car' as an example. (04 Marks)  
b. Explain use case diagram for a library information system. Mention at least five use cases and relationships between them. (12 Marks)  
c. Describe sequence diagram. Compare active and passive objects. (04 Marks)
- 4 Explain the procedure to be followed to construct a domain class model. (20 Marks)
- 5 a. Explain various techniques to identify actors, use cases, and use case documentation. (10 Marks)  
b. Discuss factors to allocate subsystems to a physical model. (10 Marks)
- 6 a. Compare reverse and forward engineering. (10 Marks)  
b. Discuss steps involved in designing algorithms for operations. (10 Marks)
- 7 a. Define patterns. Explain types of patterns and template for describing patterns. (10 Marks)  
b. Explain procedure to implement forwarder-receiver design pattern. (10 Marks)
- 8 Explain the design pattern 'view handler'. (20 Marks)



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**Fifth Semester MCA Degree Examination, December 2010**

**Object-Oriented Modeling and Design Patterns**

Time: 3 hrs.

Max. Marks:100

**Note: Answer any FIVE full questions.**

- 1 a. What is object orientation? Explain the class modeling, with an example. (12 Marks)  
b. Draw the class model of a window management system. (08 Marks)
- 2 a. Explain the different kinds of multiple inheritance and workarounds of advanced class modeling, with an example. (10 Marks)  
b. Draw the diagram and describe the state diagram, for telephone line with activities. (10 Marks)
- 3 a. Discuss the concurrency in advanced state modeling, with an example. (10 Marks)  
b. What are the guidelines for sequence models? Explain the sequence model, with an example. (10 Marks)
- 4 a. Explain the activity model and draw the activity diagram, for stock trade processing system. (12 Marks)  
b. What are the guidelines for usecase model? (04 Marks)  
c. Consider a physical bookstore, list the actors and usecarer and draw the usecare diagram. (04 Marks)
- 5 a. What is analysis? What are the steps involved in constructing an application interaction model? Explain any three steps. (10 Marks)  
b. How would you allocate subsystems to hardware unit? Explain. (10 Marks)
- 6 a. Write short notes on :
  - i) Designing algorithms
  - ii) Design optimization, with reference to class design.(12 Marks)  
b. Compare the forward engineering with revere engineering, with an example each. (08 Marks)
- 7 a. What is a pattern? Explain the pattern description template. (10 Marks)  
b. Discuss the dynamics and steps of implementation of forwarder-receiver pattern, with diagrams. (10 Marks)
- 8 a. Write the structure and implement client - dispatcher - server pattern in C++ or java considering any problem specification. (10 Marks)  
b. Discuss the structure, dynamics and variants of command processor pattern. (10 Marks)

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**Fifth Semester MCA Degree Examination, December 2010**

**System Simulation and Modeling**

Time: 3 hrs.

Max. Marks: 100

**Note: Answer any FIVE full questions.**

1. a. What is simulation? What are its advantages and disadvantages? (08 Marks)  
 b. Differentiate between discrete and continuous systems, with suitable examples. (05 Marks)  
 c. Explain the following steps in a simulation study:  
 i) Model conceptualization      ii) Experimental design. (07 Marks)
  
2. a. Explain the steps in a project simulation by drawing an associated activity network diagram. (10 Marks)  
 b. Define an order-up-to-level inventory system. Calculate the average ending inventory and number of shortage days. (Assume the initial inventory and the lead time) (10 Marks)
  
3. a. Define: i) System      ii) Model      iii) System state      iv) Entity  
 v) Attributes      vi) Event      vii) Event notice (07 Marks)  
 b. Explain the event scheduling / time advance algorithm. Draw the snapshot at simulation time, t. (07 Marks)  
 c. Explain the three different types of world views. (06 Marks)
  
4. a. Explain the characteristics of queuing systems. What does the format A / B / C / N / K represent? (10 Marks)  
 b. Test whether the following sequence of numbers are auto correlated,  $i = 2$  and  $m = 2$  ( $Z_{0.025} = 1.96$ ):  
 .594, .928, .515, .055, .507, .351, .262, .797, .788, .442,  
 .097, .798, .227, .127, .474, .825, .007, .182, .929, .852. (10 Marks)
  
5. a. Give a step by step procedure to generate the random variates, using the inverse transform technique for : i) Uniform distribution      ii) Weibull distribution. (10 Marks)  
 b. Explain the acceptance-rejection technique. Generate three Poisson variates with mean  $\alpha = 0.2$ . Generate the required number of random numbers using calculator. (10 Marks)
  
6. a. Distinguish between verification and validation. (04 Marks)  
 b. Briefly describe the commonly used methods in the verification process. (06 Marks)  
 c. The rates of return on ten investments in a portfolio are given as follows:  
 18.8, 27.9, 21.0, 6.1, 37.4, 5.0, 22.9, 1.0, 3.1 and 8.3 percent.  
 Estimate the parameters by identifying from which distribution the data belongs to. (10 Marks)
  
7. a. What are transient and steady state simulation with respect to output analysis? Explain with an example for each. (10 Marks)  
 b. Explain point estimation and interval estimation. (08 Marks)  
 c. Explain Naylor and Finger method for validation. (06 Marks) (06 Marks)
  
8. Write short notes on:  
 a. Random-search algorithm  
 b. Types of simulation models  
 c. Steps in input modeling  
 d. Statistical models in simulation. (20 Marks)

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Question paper (New scheme) Lib Ref S

Fifth Semester MCA Degree Examination, May/June 2010  
**Object Oriented Modeling and Design Patterns**

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions.

1. a. Name the different themes that pervade the object oriented technology. Explain them briefly. (06 Marks)  
b. What are the several purposes for building a model? Briefly explain them. (04 Marks)  
c. Explain the concept of object, class and associations with respect to class modeling, with suitable sketches. Give examples. (10 Marks)
2. a. What is aggregation? Compare aggregation with association and aggregation with composition. (08 Marks)  
b. What is an event? Explain the different types of events with examples. (12 Marks)
3. a. What is a state? Write a sample state model for programming a thermostat. (12 Marks)  
b. Explain in detail, use case model. Write the use case diagram for a vending machine. (08 Marks)
4. a. Explain in detail the sequence model. Write the sequence diagram for a session with an online stock broker. (10 Marks)  
b. What are the different stages in the development of software? Explain them. (10 Marks)
5. a. What is a domain class model? Discuss any five steps to construct a domain class model. (12 Marks)  
b. Briefly explain the architecture of an ATM system. (08 Marks)
6. a. List the different steps to construct an application interaction model. Explain any five of them. (12 Marks)  
b. Compare reverse engineering with forward engineering. (08 Marks)
7. a. What is a pattern? Briefly explain the pattern categories. (08 Marks)  
b. With a neat diagram, write the design pattern of client-dispatcher server. (12 Marks)
8. Write short notes on:  
a. Generalization  
b. Multiplicity  
c. Reification of behavior  
d. Wrapping (20 Marks)

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**Fifth Semester MCA Degree Examination, May/June 2010**  
**System Simulation and Modeling**

Time: 3 hrs.

Max. Marks:100

**Note:** 1. Answer any FIVE full questions.  
 2. Statistical tables are allowed.

1. a. What is simulation? When is the simulation tool appropriate and when it is not appropriate? (08 Marks)
- b. What is a system and system environment? Explain the components of a system with examples. (08 Marks)
- c. What is model of a system? Mention various types of models. (04 Marks)
  
2. a. Explain the steps involved in simulation, with a neat flow chart. (10 Marks)
- b. Discuss advantages and disadvantages of simulation. With a suitable example, explain the inventory problem. (10 Marks)
  
3. a. Explain event scheduling algorithm, with a suitable example. (12 Marks)
- b. Discuss the simulation in Java. (08 Marks)
  
4. a. Define a random variable and its types. Also mention the discrete distribution and continuous distribution types. (10 Marks)
- b. Explain the characteristics of queuing systems. (10 Marks)
  
5. a. Give the properties of random numbers. Use linear congruential method to generate 6 random numbers, given that  $X_0 = 27$ ,  $a = 17$ ,  $c = 43$  and  $m = 100$ . (10 Marks)
- b. Explain Kolmogorov – Smirnov test for uniformity of random numbers. Hence test for uniformity of 0.36, 0.23, 0.64, 0.18, 0.02, 0.71, 0.47, 0.86, 0.43, 0.91. Given the critical value  $D_a = 0.410$ . (10 Marks)
  
6. a. Explain the method of generating exponential variates using inverse transform technique. (06 Marks)
- b. Explain acceptance rejection technique. (04 Marks)
- c. Test the following sequence of 30 random numbers for uniformity using  $\chi^2$  – test, given  $\chi^2(0.05, 9) = 16.9$ .  
 0.49, 0.21, 0.30, 0.36, 0.83, 0.76, 0.23, 0.97, 0.19, 0.11, 0.56, 0.66, 0.99, 0.40, 0.60, 0.29, 0.05, 0.74, 0.87, 0.49, 0.96, 0.17, 0.01, 0.64, 0.47, 0.78, 0.65, 0.44, 0.28, 0.02. (10 Marks)
  
7. a. Briefly discuss the commonly used methods in the verification process. (10 Marks)
- b. Discuss the calibration and validation of models. (10 Marks)
  
8. a. Explain the types of simulation model with respect to output analysis. (06 Marks)
- b. Explain the statistical estimation of performance measures. (08 Marks)
- c. Explain initialization bias in steady state simulation. (06 Marks)

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**Fifth Semester MCA Degree Examination, Dec.09/Jan.10  
Object Oriented Modelling and Design Patterns**

Time: 3 hrs.

Max. Marks:100

**Note: Answer any FIVE full questions.**

- 1 a. What is a model? What purpose does it serve? (08 Marks)  
b. What are links and association? Write UML notation for links and association and explain with an example. Explain qualified associations with example. (12 Marks)
  
- 2 a. What is aggregation and composition? How is aggregation different from composition? Give their respective UML notations with example. (10 Marks)  
b. What is an event? Explain different types of events with example. (10 Marks)
  
- 3 a. Draw use-case diagram for vending machine. What are the guidelines needed to be followed while drawing use-case diagrams? (10 Marks)  
b. How can you represent branching and concurrency in activity diagram? (10 Marks)
  
- 4 a. Explain the stages of software development. (10 Marks)  
b. Write and explain the steps performed in constructing a domain state model. (10 Marks)
  
- 5 a. Explain the steps followed in constructing application class model with the diagram. (10 Marks)  
b. Explain architecture of the ATM system with diagram. (10 Marks)
  
- 6 a. Explain the different tasks involved in design optimization with appropriate UML diagram. (09 Marks)  
b. What is reverse engineering? Compare reverse engineering Vs forward engineering. (11 Marks)
  
- 7 a. Write and explain the three categories of pattern in detail. (12 Marks)  
b. What is view-handler design pattern? Explain the class diagram of view handler that shows the structure of view handler pattern. (08 Marks)
  
- 8 a. What are forward-receiver design patterns? Write and explain the steps to implement a forward-receiver design pattern. (12 Marks)  
b. What are Idioms? How they are helpful in selecting optimized solution for a given problem? (08 Marks)

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**Fifth Semester MCA Degree Examination, Dec.09/Jan.10**  
**System Simulation and Modeling**

Time: 3 hrs.

Max. Marks:100

**Note: Answer any FIVE full questions.**

- 1 a. Briefly explain the various steps involved in simulation process. Draw necessary flow diagram. (10 Marks)  
 b. What are advantages and disadvantages of simulation? List a few applications of simulation. (10 Marks)

- 2 a. An automobile production line turns out about 100 cars a day but variations occur owing to many causes. The production is more accurately described by the probability distribution below :

Production /day	Probability	Production /day	Probability
95	0.03	101	0.15
96	0.05	102	0.10
97	0.07	103	0.07
98	0.10	104	0.05
99	0.15	105	0.03
100	0.20		

This question paper is to be treated as a practice.

Finished cars are transported across the bay at the end of each day by ferry. If the ferry has space for only 101 cars what will be the average number of cars waiting to be shipped? What will be the average number of empty spaces on the ship? The random numbers are established :

- b. 97, 02, 80, 66, 96, 55, 50, 29, 58, 51. (10 Marks)  
 Explain the characteristics of queuing system. (10 Marks)

- 3 a. What is boot strapping? Write all the steps involved in event scheduling. (08 Marks)  
 b. Six dump trucks are used to haul coal from the entrance of a small mine to the rail road.  
 c. Each truck is loaded by one of two loaders. After loading, the truck immediately moves to the scale to be weighed. Loader and scale have a FCFS queue. The travel time from loader to scale is negligible. After being weighted, a truck begins a travel time, afterwards unloads the coal and returns to the loader queue. Purpose of study is to estimate the loader and scale utilization. It is assumed that five trucks are at the loader and one is at the scale at time 0. Simulate the process till the clock reads 15 minutes. Use the following randomly generated activity times. (12 Marks)

Loading time	5	10	5	10	15
Weighing time	12	12	12	16	12
Travel time	100	80	60	40	80

- 4 a. Why random numbers are required? What are the important characteristics of random numbers routines? Explain briefly. (10 Marks)  
 b. Generate five random numbers and hence test for uniformity by KS test. Given  $x_0 = 117$ ,  $a = 43$  and  $m = 1000$ ,  $\alpha = 0.05$ . (10 Marks)

**5<sup>th</sup> sem MCA Question papers**

**07MCA52**

- 5** a. From the following sequence, test for auto correlation at 5% level of significance of 3<sup>rd</sup>, 8<sup>th</sup>, 13<sup>th</sup> so on

0.69	0.87	0.23	0.28	0.98	0.31	0.65	0.28	0.83
0.93	0.99	0.15	0.33	0.35	0.91	0.41	0.60	0.27
0.57	0.88	0.86	0.49	0.05	0.43	0.95	0.58	0.19
0.36	0.12	0.01						

(10 Marks)

- b. What are the steps involved in generating random varieties by inverse transform technique? Use the following data to generate five random variates exponential distribution. Mean 4.5 and take 0.01, 0.15, 0.38, 0.65, 0.55 as inputs.

(10 Marks)

- 6** a. Explain briefly the various steps of input modeling.

(10 Marks)

- b. The customers arriving at a busy bank counter in a 5 minute period between 10 am to 2 pm was recorded for days given below

Arrival/ period 0 1 2 3 4 5 6 7 8 9 10

Frequency 15 12 10 10 8 7 5 4 3 2 4

Use  $\chi^2$  test to check whether the data follows Poisson distribution at 5% level of significance.

(10 Marks)

- 7** a. What is verification of simulation model? List the suggestions given for verification of models.

- b. Describe three-step approach to validation by Naylor and finger.

(08 Marks)

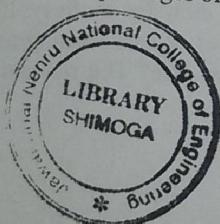
(12 Marks)

- 8** Write short note on :

- Random number generation and ability
- World views on simulation
- Q-Q plot
- Software packages of simulation.

(20 Marks)

\* \* \* \* \*



6

7

8