

## JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST-3 EXAMINATION- JUNE -2016

B.Tech VI Semester

COURSE CODE: 16B22CI621

MAX. MARKS: 35

COURSE NAME: Data Analysis and Simulation Techniques

COURSE CREDITS: 04

MAX. TIME: 2 HRS

*Note: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means.*

**Q.1 a)** A mathematics teacher recorded the length of time,  $y$  minutes, taken to travel to school when leaving home  $x$  minutes after 7 am on the seven selected mornings. The results are as follows:

<b>x</b>	0	10	20	30	40	50	60
<b>y</b>	16	27	28	39	39	48	51

**i) (2.5 Marks)** Calculate the value of Pearson's Correlation coefficient between  $x$  and  $y$ . Also comment briefly on the result obtained.

**ii) (2.5 Marks)** Find the regression equation and determine the length of time  $y$  to travel to school, when the student will leave at 7:28.

**Q.1 b) (3 Marks)** Given a set of paired data ( $X$ ,  $Y$ ). Answer the following questions:

- If  $Y$  is independent of  $X$ , then what value of a correlation coefficient would you expect?
- If  $Y$  is linearly dependent on  $X$ , then what value of a correlation coefficient would you expect?
- How could  $Y$  be closely dependent upon  $X$  yet  $r \approx 0$ ?

**Q.2 a) (3 marks)** Write a short note on the following:

- Turing Test
- Inspection approach
- Validation vs. Calibration

**Q. 2 b) (3 Marks)** Explain the basic steps of model building with the help of a diagram. Also briefly explain the fundamental tactics for model verification.

**Q. 2 c) (2 Marks)** What are some possible causes that may prevent a model from being valid. Explain in detail different steps of validation of a simulation model.

P.T.O

**Q. 3 a) (2 Marks)** Name four principal entities, activities and events to be considered for the simulation of the following systems:

i) University Registration System

ii) Railway Reservation System

**Q. 3 b) (4 Marks)** Customers arrive at Space Mountain in Disneyworld at the rate of 1000/hr according to a Poisson process. They form a long line and are served by one “server” at the rate of 1200/hr. Just for the heck of it, suppose that service times are exponential and first-come-first-served. Find the steady-state expected waiting time.

ii) Now suppose that Disney has decided to hire a two slow “servers”, each of whom can perform services at the rate of 600/hr. Again, assume services are exponential. Now find the steady-state expected waiting time for this alternative system.

**Q.4 (5 Marks)** What is the rationale for a code of professional ethics for simulationists. Explain in detail the code of professional ethics for simulationists for following three areas.

i) Professional Competence.

ii) Compliance with the Code

iii) Personal Development and the Profession

**Q. 5(4 Marks)** A man is travelling with a wolf, a goat, and a cabbage. The four come to a river that they must cross. There is a boat available for crossing the river, but it can carry only the man and at most one other object. The wolf may eat the goat when the man is not around, and the goat may eat the cabbage when unattended. Model the solution of this problem to bring everyone across the river without endangering the goat or the cabbage using Petri net.

**Q. 6 a) (2 Marks)** Explain in detail Concurrency, Synchronization, Conflict and Confusion primitive structures in Petri Net with the help of a diagram.

**Q. 6 b) (2 marks)** What are the different components of an Activity Cycle Diagram. Explain in detail the different steps of developing an activity cycle diagram.