Reg.No. \_\_\_\_\_\_\_\_\_\_\_\_



**UNIVERSITY**

(Karunya Institute of Technology & Sciences)

(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

**End Semester Examination – April/May – 2017**

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| **Code :** | **14MA2018** | **Duration :** | **3hrs** |
| **Sub. Name :** | **OPERATIONS RESEARCH- II** | **Max. marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

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| Q. No. | Sub Div. | Questions | Course  Outcome | Marks |
| 1. | a. | What is lead time in inventory control? | CO1 | 2 |
| b. | Define dummy activity and loop network with a neat diagram. | CO1 | 2 |
| c. | A manufacturing company purchases 9000 parts of a machine for its annual requirements, ordering one month usage at a time. Each parts costs Rs.20. The ordering cost per order is Rs.15 and the carrying charges are 15% of the average inventory per year. You have been assigned to suggest a more economical purchasing policy for the company. What advice would you offer and how much would it save the company per year? | CO2 | 16 |
| (OR) | | | | |
| 2. | a. | Explain ABC Analysis. | CO2 | 5 |
| b. | The different time estimates of the activities involved in a project are given in the table.   |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | Activities | 1-2 | 1-3 | 2-4 | 2-3 | 3-4 | 3-5 | 4-6 | 5-6 | | to | 2 | 4 | 2 | 2 | 0 | 3 | 6 | 1 | | tm | 6 | 8 | 3 | 4 | 0 | 6 | 10 | 3 | | tp | 10 | 12 | 4 | 6 | 0 | 9 | 14 | 5 |   i. Determine the expected completion of the project  ii. Determine the variance and standard deviation of the project  iii. Determine the probability of completing the project within 23 days  iv. What due date has about 75 percent of chances being met?  v. If the due date is 25 days, what is the probability of not meeting the due date?  v. What is the probability that the project will be completed atleast 2 days earlier than the expected? | CO1 | 15 |
| 3. | a. | Differentiate analogue simulation and computer simulation. | CO1 | 2 |
|  | b. | Define simulation and random number. | CO1 | 2 |
|  | c. | In an airport reception counter, the customer arrival is as per the Poisson distribution with an average of 4 minutes between one arrival and the next. The service time is assumed to be constant and equal to 5 minutes. Using Monte Carlo simulation, determine the mean time a customer spends at the airport reception counter. Simulate the system for twelve customers. Use the following random numbers: 02, 72, 75, 97, 69, 03, 85, 99, 81, 36, 99 and 08. | CO3 | 16 |
| (OR) | | | | |
| 4. | a. | Mention any two methods adopted to generate pseudo random numbers. | CO1 | 2 |
|  | b. | What are the different elements in a simulation model? | CO1 | 2 |
|  | c. | Raw materials are done using trucks. Before the raw materials are sent to the stores, they are to be inspected. The inspector takes 6 minutes for inspecting a truck and he can inspect only one truck at a time. Once the truck is inspected, it is sent to the stores .The following data is available   |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | Inter arrival time of truck(minutes) | 2 | 3 | 4 | 5 | 6 | 8 | 11 | 12 | 14 | | Frequency | 3 | 6 | 9 | 18 | 20 | 19 | 10 | 8 | 7 |   Using the Monte Carlo simulation, determine the following by using the following 15 random numbers  23,89,27,86,10,38,59,43,17,81,36,43,76,84 and 56 for inter arrival time of the truck  a) Average waiting time of the inspector b) average waiting time of truck | CO3 | 16 |
| 5. | a. | How different models in queuing theory are classified by the Kendall’s notation? | CO1 | 2 |
| b. | Discuss the term ‘Queue discipline’. | CO1 | 4 |
| c. | A Self-service firm employs one cashier at its counter. 9 customers arrive on an average every 5 mins while a cashier can serve 10 customers in 5 mins. Assuming poisson distribution for the arrival and service, Find i. The average number of customers in the system ii.The average number of customers in the queue, iii.Average time a customer spends in the system, iv.Average time a customer waits before being served. | CO2 | 14 |
| (OR) | | | | |
| 6. | a. | Distinguish parallel service channel and series service channel with suitable examples | CO1 | 2 |
| b. | A tool grinder finds that the time spent on each tool has a exponential distribution with mean 25 minutes. Find the mean service rate µ. | CO1 | 2 |
| c. | A Fertilizer company distributes its products by trucks loaded at its only loading station. Both company trucks and contractor’s trucks are used for this purpose. It was found that on an average every 5 minutes one truck arrived and the average loading time was 3 minutes. 40% of the trucks belong to the contractors. Making suitable assumptions, determine  i. The probability that a truck has to wait.  ii. The waiting time of a truck that waits.  iii. The expected waiting time of contractor’s truck per day. | CO2 | 16 |
| 7. | a. | Classify and discuss about different types of strategies. | CO1 | 4 |
|  | b. | Solve the following game.   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | **Player B** | | | | | | | | **PlayerA** |  | 1 | 2 | 3 | 4 | 5 | | 1 | **3** | **5** | **4** | **9** | **6** | | 2 | **5** | **6** | **3** | **7** | **8** | | 3 | **8** | **7** | **9** | **8** | **7** | | 4 | **4** | **2** | **8** | **5** | **3** | | CO2 | 16 |
| (OR) | | | | |
| 8. | a. | Solve the game for the payoff matrix given.   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | **B** | | | | | | | | **A** |  | 1 | 2 | 3 | 4 | 5 | | 1 | **10** | **5** | **2** | **9** | **1** | | 2 | **8** | **6** | **5** | **7** | **8** | | 3 | **3** | **5** | **4** | **6** | **9** | | 4 | **6** | **7** | **3** | **3** | **2** | | CO2 | 4 |
|  | b. | Using the concept of dominance solve the following game   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | Player A | Player B | | | | | | |  | I | II | III | IV | V | | I | 3 | 5 | 4 | 9 | 6 | | II | 5 | 6 | 3 | 7 | 8 | | III | 8 | 7 | 9 | 8 | 7 | | IV | 4 | 2 | 8 | 5 | 3 | | CO2 | 16 |
|  | | **Compulsory:** |  |  |
| 9. |  | Determine the cost per period of individual replacement policy of an installation of 250 lighting bulbs, if the cost of replacing an individual bulb is Rs.2.75. The following probability of failure is given.   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | Week | 0 | 1 | 2 | 3 | 4 | | Probability | 0 | 0.2 | 0.3 | 0.4 | 0.1 |   Also, determine the optimal group replacement period if the group replacement cost is Rs.0.95 per bulb. | CO2 | 20 |

ALL THE BEST