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 – Nov/Dec – 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. | Explain ABC analysis and construct the graph for the following 10 items consumed in company   |  |  |  | | --- | --- | --- | | Items | Annual Usage(Units) | Unit Cost (Rs) | | 1 | 200 | 11 | | 2 | 3000 | 14 | | 3 | 25 | 9 | | 4 | 1100 | 6 | | 5 | 60 | 5 | | 6 | 250 | 90 | | 7 | 140 | 6 | | 8 | 850 | 6 | | 9 | 550 | 15 | | 10 | 80 | 9 | | CO1 | 20 |
| (OR) | | | | |
| 2. | a. | A tyre manufacturer has to supply 12,000 tyres per year to an automobile industry. The demand is fixed and known. Shortage cost is assumed to be infinite. The inventory holding cost is Rs 0.15/tyre/month and set up cost per run is Rs 325.Detemine the following   1. The optimum run size/Economic ordering quantity 2. Optimum scheduling period 3. Minimum total expected yearly cost 4. Optimal number of orders per year 5. Optimal ordering cost per year 6. Number of days supply per order 7. Optimal ordering interval | CO1 | 14 |
| b. | Explain i) Buffer Stock ii) Shotage cost iii) Carriong cost | CO1 | 6 |
| 3. |  | The various time estimates of activities involved in a project are given below   |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | Activities | 1-2 | 1-3 | 2-4 | 2-3 | 3-4 | 3-5 | 4-6 | 5-6 | | Optimistic Time  (Days) | 2 | 4 | 2 | 2 | 0 | 3 | 6 | 1 | | Normal Time  (Days) | 6 | 8 | 3 | 4 | 0 | 6 | 10 | 3 | | Pessimistic Time  (Days) | 10 | 12 | 4 | 6 | 0 | 9 | 14 | 5 |  1. Draw the network and determine the expected completion time of the project 2. Find the variance and SD of project 3. Determine the total probability of completing the project within 25 days 4. What due date has about 75% of chances of being met(completion)? 5. What is the probability of not completing the project within 23 days? | CO2 | 20 |
| (OR) | | | | |
| 4. |  | The normal cost and duration, crash cost and duration of activities of a project are given in the table. If the overhead cost is Rs.45 Per day, determine the optimal cost schedule for the project by drawing the project schedule vs total cost.   |  |  |  |  |  | | --- | --- | --- | --- | --- | | Activity | Normal | | Crash | | | Cost | Duration | Cost | Duration | | 1-2 | 360 | 3 | 440 | 1 | | 2-3 | 240 | 4 | 320 | 2 | | 2-4 | 100 | 7 | 140 | 3 | | 3-4 | 80 | 5 | 140 | 2 | | CO2 | 20 |
| 5. |  | Using Monte Carlo simulation technique,simulate ( 10 trials) the demand over lead time for the following distribution of demand and lead time   |  |  |  |  |  | | --- | --- | --- | --- | --- | | Demand (Items/week) | 175 | 200 | 225 | 250 | | probability | 0.20 | 0.30 | 0.30 | 0.20 |  |  |  |  |  | | --- | --- | --- | --- | | Lead Time (Weeks) | 1 | 2 | 3 | | Probability | 0.25 | 0.35 | 0.40 |   Take the following random numbers for lead time  4,41,60,89,34,87, 49,47,27 and 23  Random numbers for First week 1,35,96,89,39,76,78,93,11,94  Random numbers for Second week 50,49,08,28,70,74,63,80,72,44  Random numbers for Third week 94,34,07,42,12,52,73,69,22,38 | CO2 | 20 |
| (OR) | | | | |
| 6. | a. | Explain  i) FCFO ii) Inter arrival time and arrival rate iii) Queue size and Population Size iv) Kendall’s Notation | CO3 | 8 |
|  | b. | Arrival at a public telephone booth are considered to be Poisson with an average time of 8 minutes between one arrival and the next. The length of the telephone calls is assumed to be exponentially distributed with a mean value of 2 minutes.   1. What will be the probability that a person arriving at the booth will have to wait? 2. Determine the average queue length that is formed from time to time. 3. The telephone department is interested to install a second booth if convinced that an arrival would expect to have to wait at least 5 minutes for the phone. Determine the increase in flow of arrivals which will justify a second booth. | Co2 | 12 |
| 7. |  | Solve the game whose pay off matrix for A is as follows: (Player A vs Player B)   |  |  |  |  |  | | --- | --- | --- | --- | --- | |  | B1 | B2 | B3 | B4 | | A1 | 3 | 2 | 4 | 0 | | A2 | 2 | 4 | 2 | 4 | | A3 | 4 | 2 | 4 | 0 | | A4 | 0 | 4 | 0 | 8 | | CO3 | 20 |
| (OR) | | | | |
| 8. | a. | In the following pay off matrix for A, determine the saddle point.  (Player A vs Player B)   |  |  |  | | --- | --- | --- | |  | B1 | B2 | | A1 | -3 | 3 | | A2 | -2 | 4 | | A3 | 2 | 3 | | CO3 | 10 |
|  | b. | Solve the game whose pay off matrix is as follows: (Player A vs Player B)   |  |  |  |  | | --- | --- | --- | --- | |  | B1 | B2 | B3 | | A1 | -2 | 16 | -2 | | A2 | -5 | -8 | -4 | | A3 | -5 | 20 | -9 | | CO3 | 10 |
|  | | **Compulsory**: |  |  |
| 9. | a. | The owner of a stone crushing machine determines from his past records that the cost per year for operating the machine is as shown in the table. The purchase price of this machine was Rs.65000 when new.   |  |  |  |  | | --- | --- | --- | --- | | Age | 1 | 2 | 3 | | Operating cost in Rs | 10000 | 12000 | 14000 |   After 3 years, the operating cost is Rs.4000 B, where B=4,5,6 (B indicating age in years). If the resale value decrease by 15 percent of the purchase price every year, what is the optimal replacement policy? | CO3 | 10 |
|  | b. | A hand grinding machine (Type A) costs Rs.9500. Annual operating costs are Rs.220 for the first year and it increases by Rs.1900 every year. Find the optimal age at which the hand grinding machine of type A is to be replaced along with the corresponding average yearly cost of owning and operating it. Assume that the machine has no resale value and future costs are not discounted.  Another hand grinding machine (Type B) costs Rs.10500. Annual operating costs are Rs.410 for the first year and it increases by Rs.820 every year. There is one hand grinding machine of Type A which is one year old in the industry. Should it be replaced with hand grinding machine of Type B? | CO3 | 10 |

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