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

G:\logo and QP Template\logo 3 Feb 2018 final.tif

**End Semester Examination – Nov/Dec – 2018**

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

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | A tyre manufacturer has to supply 12000 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/month and the setup cost per run is Rs.325. Determine the following:   1. The optimum run size, 2. Optimum scheduling period 3. Minimum total expected yearly cost. | CO1 | 12 |
| c. | The demand for a small electronic component is at the rate of 7000 units. The cost of a single component is Rs.1.25 and the inventory carrying cost is 20%. For placing an order, it costs Rs.50. Determine:   1. EOQ 2. Total inventory carrying cost | CO1 | 8 |
| (OR) | | | | |
| 2. | a. | The demand for a computer monitor cable is 1050 cables per month and shortages are allowed. If the cost per cable is Rs.125, cost of making one purchase is Rs.700, the holding cost of one cable is Rs.3 per year and cost of one shortage is Rs.50 per year. Determine the following:   1. Optimum purchase quantity 2. Optimum number of shortages 3. Optimum total yearly cost 4. Number of orders per year | CO1 | 12 |
| b. | Write short notes on   1. ABC analysis 2. Buffer stock and Re-order point 3. Inventory carring cost | CO1 | 2+4+2 |
| 3. |  | The activities involved in a project with their respective time estimates are given in the table (in weeks)   |  |  |  |  |  | | --- | --- | --- | --- | --- | | Activity | 1-2 | 1-3 | 2-3 | 3-4 | | to | 1 | 2 | 2 | 3 | | tm | 1 | 5 | 2 | 6 | | tp | 7 | 14 | 14 | 15 |  1. Find the expected duration , variance and Standard deviation of the project. 2. What is the probability that the project will be completed atleast 2 weeks later than expected? 3. What is the probability that the project will not be completed atleast 2 weeks later than expected? 4. What is the probability that the project will be completed atleast 2 weeks earlier than expected? | 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. | a. | The demand per day for a belt used in the engine of an automobile has the following probability distribution. Simulate the demand for 20 days.   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | Demand/day | 3 | 4 | 5 | 6 | 7 | | Probability | 0.10 | 0.30 | 0.30 | 0.20 | 0.10 | | CO2 | 10 |
| b. | In a big textile mill, trucks loaded with raw cotton arrive at a rate of 12 trucks per day. Assuming that the inter arrival time follows an exponential distribution and the service time distribution is also exponential with an average 34 minutes. Determine the following:   1. Mean line length. 2. Probability that the queue size exceeds 12. | CO2 | 10 |
| (OR) | | | | |
| 6. | a. | Write short notes on   1. FCFS and LCFS 2. Transient and Steady state of Queuing system 3. Single channel and multi channel server 4. Inter arrival time and arrival rate | CO3 | 2+2+2+2 |
| 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 atleast 5 minutes for the phone. Determine the increase in flow of arrivals which will justify a second booth. | CO2 | 12 |
| 7. | a. | Solve the game whose pay off matrix is as follows: (Player A vs Player B)   |  |  |  |  |  | | --- | --- | --- | --- | --- | |  | B1 | B2 | B3 | B4 | | A1 | -5 | 2 | 0 | 7 | | A2 | 5 | 6 | 4 | 8 | | A3 | 4 | 0 | 2 | -3 | | CO3 | 10 |
| b. | Solve the game graphically, whose pay off matrix is as follows: (Player A vs Player B)   |  |  |  |  | | --- | --- | --- | --- | |  | B1 | B2 | B3 | | A1 | 1 | 3 | 11 | | A2 | 8 | 5 | 2 | | CO3 | 10 |
| (OR) | | | | |
| 8. | a. | In the following pay off matrix, 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. | The cost of a new ink jet printer is Rs 5500.the running cost of nth year is given by Rn =550(n-1),where n=1,2,3….if the discount rate is 0.4 per year.determine after how many years it will be economical to replace the printer by a new one. | CO3 | 10 |