Name of Student: …………………………………………………

Date: ..…………………..

Student ID No. ……………………

Course/Class …………… Branch ………………….

**Final Examination – 2014**

**Quantitative Methods (STAT 201)**

**Time: 2 Hrs. MM: 50**

Answer all the Questions on the same question paper.

**Section-I- TRUE/FALSE**

**State whether the following statements are True or False. (18X1=18 Marks)**

1. Interviews, statistical sampling, and company reports provide input data for quantitative analysis models. TRUE

2. Expected monetary value (EMV) is the average or expected monetary outcome of a decision if it can be repeated a large number of times. TRUE

3. Regression analysis is the most common technique used in causal modeling. TRUE

4. In decision making under risk; the decision maker knows the probabilities of the various outcomes. TRUE

5. One purpose of regression is to predict the value of one variable based on the other variable. TRUE

6. Minimum EOL will always result in the same decision as maximum EMV. TRUE

7. The longest time path through a PERT/CPM network is called the critical path.

TRUE

8. The objective of a transportation problem solution is to schedule shipments from sources to destinations while minimizing total transportation and production costs.

TRUE

9. A goal of many waiting line problems is to help a firm find the ideal level of services that minimize the cost of waiting and the cost of providing the service.

TRUE

10. The economic order quantity helps one estimate the optimal number of units to purchase with each order. TRUE

11. The Monte Carlo simulation is used with variables that are probabilistic. TRUE

12. The purpose of the Economic Order Quantity (EOQ) model is to achieve a balance between the cost of holding inventory and the cost of stock outs. TRUE

13. An M/M/2 model has Poisson arrivals exponential service times and two channels. TRUE

14. . The reorder point occurs during a stock out. FALSE

15. CPM is a probabilistic analysis of managing a project. FALSE

16. The first step in planning and scheduling a project is to develop the work breakdown structure. TRUE

17. PERT and CPM are quantitative analysis tools designed to schedule and control large projects. TRUE

18. Simulation models are designed to generate optimal solutions, which can then be applied to real-world situations. FALSE

**Section-II- MULTIPLE CHOICE QUESTIONS**

**Circle the right answer from the answers given below: (18X1=18 Marks)**

1. Mathematical models that involve risk, chance, or uncertainty are called:

1. Deterministic models.
2. Probabilistic models
3. Mathematical models
4. Sensitivity models

2. Which of the following is not one of the steps in the quantitative analysis approach?

* 1. Defining the Problem
  2. Developing a Solution
  3. Observing a hypothesis

d. Testing a Solution

3.The following is a payoff table giving profits for various situations.

.

What decision would a pessimist make?

* 1. Alternative 1
  2. Alternative 2
  3. Alternative 3
  4. Do Nothing

**4.** Which of the following is a technique used to determine forecasting accuracy?

* 1. Exponential smoothing
  2. Moving average
  3. Regression
  4. Mean absolute percent error (MAPE)

5. The criteria for making decisions under uncertainty, that w*eighted average* compromise between optimism and pessimism is:

* 1. Maximax (optimistic)
  2. Maximin (pessimistic)
  3. Criterion of realism (Hurwicz)
  4. Minimax regret

6. In making inventory decisions, the purpose of the basic EOQ model is to

1. Minimize carrying costs.
2. Minimize ordering costs.
3. Minimize the sum of carrying costs and ordering costs.
4. Minimize customer dissatisfaction.

7. The major objective in inventory control is to:

1. Maximize total inventory costs.
2. Control stock out
3. Minimize total inventory costs.
4. Deal with irregular supply

8. A medium-term forecast is considered to cover what length of time?

1. 2-4 weeks
2. 1 month to 1 year
3. 2-4 years
4. 5-10 years
5. 20 years

9. Which of the following is not a part of every linear programming problem formulation?

1. An objective function
2. A set of constraints
3. Maximization or minimization of a linear function
4. A redundant constraint

10. Which of the following distributions is most often used to estimate the arrival pattern?

1. Negative exponential
2. Normal
3. Poisson
4. Erlang

11. In queuing analysis, total expected cost is the sum of expected \_\_\_\_\_\_\_\_ plus expected \_\_\_\_\_\_\_\_.

1. Service costs, arrival costs
2. Facility costs, calling costs
3. Calling cost, inventory costs
4. Calling costs, waiting costs
5. Service costs, waiting costs

12. The customer who arrives at a bank, sees a long line, and leaves to return another time is

1. Balking.
2. Cropping.
3. Reneging.
4. Blithering.

13. The "point at which to reorder" depends directly on which of the following?

1. EOQ
2. Ordering cost
3. Lead-time
4. Storage costs

14. Which of the following is not part of the transportation algorithm?

1. Northwest corner rule
2. Stepping-stone method
3. Portfolio selection
4. Hungarian method

15. Given an activity's optimistic, most likely, and pessimistic time estimates of 4, 6, and 14 days respectively, compute the PERT expected activity time for this activity.

1. 8
2. 6
3. 7
4. 9

16. As the service level increases,

1. Carrying cost increases at an increasing rate.
2. Carrying cost increases at a decreasing rate.
3. Carrying cost decreases at a decreasing rate.
4. Carrying cost decreases at an increasing rate.
5. None of the above

17. The critical path of a network is the

1. Path with the least variance.
2. Path with zero slack.
3. Path with the most activities.
4. Path with the largest variance.

18. Simulation can be effectively used in many

1. Inventory problems.
2. Plant layout problems.
3. Maintenance policy problems.
4. Sales forecasting problems.
5. All of the above

**Section-II**

SHORT ANSWER TYPE QUESTIONS

ATTEMPT ANY TWO FROM THE FOLLOWING (8 marks, 4 Marks Each)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1. Use simple exponential smoothing with α = 0.33 to forecast the tire sales for February through May. Assume that the forecast for January was for 22 sets of tires.   |  |  | | --- | --- | | Month | Automobile Battery Sales | | January | 28 | | February | 21 | | March | 39 | | April | 34 |     Answer:       |  |  |  | | --- | --- | --- | | Month | Automobile Battery Sales | Forecast | | January | 28 | 22 | | February | 21 | 22+0.33(28-22)=23.98 | | March | 39 | 23.98+0.33(21-23.98)=22.9966 | | April | 34 | 22.9966+0.33(39-22.9966)=28.2777 | | May |  | 28.2777+0.33(34-28.2777)=30.1661 |   Forecast for Feb. through May = 23.98, 22.9966, 28.2777, and 30.1661 |  |  |  |

2. Cars service center can service the cars at a rate of 3 cars per hour. Customers arrive at a rate of 2 per hour.

1. Find out the average number of customer in the system.
2. Find out average time customer spend in the system.

Answer:

*λ* = 2 cars arriving per hour

*μ* = 3 cars serviced per hour

* 1. L = λ / μ – λ = 2 / 3 - 2= 2 cars in the system on an average.
  2. W = 1 / μ – λ = 1 / 3 - 2 = 1 hour that an average car spend in the system.

3. An auto parts supplier sells Hardy-brand batteries to car dealers and auto mechanics. The annual demand is approximately 1,200 batteries. The supplier pays $28 for each battery and estimates that the annual holding cost is 30 percent of the battery's value. It costs approximately $20 to place an order (managerial and clerical costs). The supplier currently orders 100 batteries per month. Determine the ordering, holding, and total inventory costs for the current order quantity.

Answer:

We are given the following information:

Annual Demand: D = 1200 Batteries Per Year

Item Cost: C = $28 Per Battery

Holding Cost: H = Ic = 0:30(28) = $8:40 Per Battery Per Year

Order Cost: S = $20 Per Order

Current Order Quantity: Q = 100 Batteries

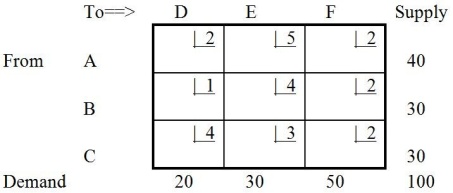
The current ordering and holding costs are:

S += (20) +

**Section-III**

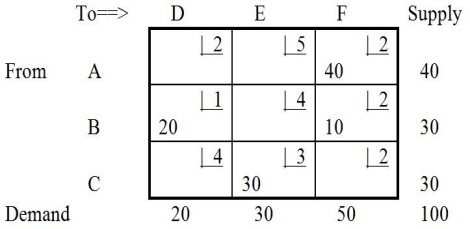
Attempt any one of the following Essay Type Questions (6 Marks)

Q1.

-

Find the optimal solution.

Answer



Solution:

Optimal Cost = 210

OR

1’. A small software development project has five major activities. The times are estimated and provided in the table below.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Activity | Immediate  Predecessor | a | m | b |
| A | -- | 2 | 5 | 8 |
| B | -- | 10 | 10 | 10 |
| C | A | 4 | 7 | 10 |
| D | B | 2 | 5 | 14 |
| E | C | 3 | 3 | 3 |

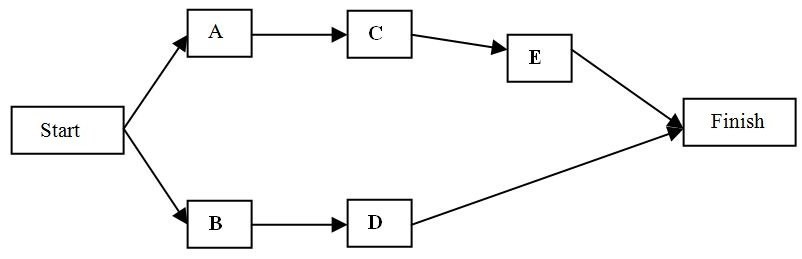
(a) Draw the PERT network associated with the activities.

(b) What is the expected completion time for this project?

(c) What variance would be used in finding probabilities of finishing by a certain time?

Answer:

(a)



(b) expected completion time = 16 (Activities B-D)

(c) variance = 0 + 4 = 4