

Seat No. : \_\_\_\_\_

**NG2-112**  
**December-2015**  
**M.Sc., Sem.-III**  
**504 : Statistics**  
**(Operations Research)**

**Time : 3 Hours]**

**[Max. Marks : 70**

**Instructions :** (i) Attempt **all** questions.

(ii) **All** questions carry equal marks.

1. (a) Explain the various costs that are involved in inventory problems with suitable examples. How they are inter-related ?

**OR**

Why inventory is maintained ?

- (b) Formulate and solve continuous probabilistic reorder point lot size model to determine optimal reorder point for a presented lot size. Lead time is finite. Shortages are allowed and fully backlogged.

**OR**

Find the optimal quantity in a continuous simple probabilistic model for a time dependent case. Shortages are allowed and backlogged fully, setup cost per period is constant.

2. (a) What is replacement problem ? Explain, with examples, the failure mechanism of items.

**OR**

Discuss staffing problem with example.

- (b) The maintenance cost increases with time and the money value decreases with constant rate. Obtain a mathematical result in order to support the following:
- (i) Replace if the running cost of next period is greater than the weighted average of previous costs.

- (ii) Do not replace if the running cost of the next period is less than the weighted average of the previous costs.

**OR**

Explain group replacement concept and its applications.

3. (a) Discuss matrix solution method in network analysis.

**OR**

Explain the significance of 'working out of float' in the network of project activities. Discuss, in brief, the different types of floats.

- (b) State and prove maximum-flow minimum-cut theorem.

**OR**

Compare and contrast CPM and PERT. Under what conditions would you recommend the scheduling by PERT ? Justify your answer with reasons.

4. (a) What is non-linear programming ? Explain Lagrangian method for solving it.

**OR**

What is Quadratic programming ? Explain Wolfe's method for solving it.

- (b) What do you understand by simulation ? Explain briefly its limitations and advantages.

**OR**

Discuss simulation of maintenance problems with examples.

5. Answer the following :

- (i) Operating decisions in an inventory system are concerned with

- |                            |                      |
|----------------------------|----------------------|
| (a) order quantity         | (b) reorder level    |
| (c) customer service level | (d) all of the above |

- (ii) If the unit cost rises, then optimal order quantity

- |                                 |                       |
|---------------------------------|-----------------------|
| (a) increases                   | (b) decreases         |
| (c) either increase or decrease | (d) none of the above |

- (iii) Define lead time.

- (iv) The problem of replacement is felt when job performing units fail
- (a) suddenly
  - (b) gradually
  - (c) both (a) and (b)
  - (d) (a) but not (b)
- (v) The sudden failure among items is seen as
- (a) progressive
  - (b) retrogressive
  - (c) random
  - (d) all of the above
- (vi) The group replacement policy is suitable for identical low cost items which are likely to
- (a) fail over a period of time
  - (b) fail suddenly
  - (c) fail completely and suddenly
  - (d) none of the above
- (vii) Float or slack analysis is useful for
- (a) projects behind the schedule only
  - (b) projects ahead of the schedule only
  - (c) both (a) and (b)
  - (d) none of the above
- (viii) The techniques of operations research used for planning, scheduling and controlling projects are referred to as network analysis.
- (a) True
  - (b) False
- (ix) Generally the PERT technique deals with the project of
- (a) repetitive nature
  - (b) non-repetitive nature
  - (c) deterministic nature
  - (d) none of the above.
- (x) Beta probability distribution is often used in computing the expected activity completion times and variances in networks.
- (a) True
  - (b) False
- (xi) Bordered Hessian matrix is related to Wolfe's method.
- (a) True
  - (b) False

