

B.N. Bhandodkar College of Science, Thane
T.Y. B.Sc Preliminary Examination Feb 2012 ,
Statistics Paper III

Max marks: 100

Duration : 3 hrs

N.B. 1) All Questions are compulsory.

- 2) Attempt any FOUR sub-questions from question 1 and any TWO sub –questions from the remaining questions.
- 3) Figures to the right indicate full marks.
- 4) Use of calculators is allowed.

Q.1) Attempt any four

1. Explain the following terms. i) Incubation period ii) Latent period iii) Serial interval 5
2. Explain the procedure to obtain EOQ in case of the problem with two price breaks. 5
3. Explain the dominance property. 5
4. Explain various costs involved in inventory problem. 5
5. Explain:- (i) Pay-off matrix (ii) Two person zero sum game 5
6. Explain : Decision under risk and uncertainty 5

Q.2) a) For a simple epidemic deterministic model with no removals and 'a' infections introduced in a group of 'n' susceptible obtain an equation for epidemic curve. When this curve attains maximum. Obtain the values of number of susceptible and infective at that time. 10

b) For deterministic carrier model obtain an expression for the number of carriers at time t, stating clearly the assumptions. Also obtain an expression for total size of an epidemic. 10

c) Explain the Reed-Frost model. 10
For household of size 3 the frequencies of the chains {1} {1²},{13},{1,2} are a, b, c, d, respectively. Assuming Reed-Frost model obtain an estimate of P, Also find its S.E.

Q.3) a) What do you understand by direct assay and indirect assay? 10

- Explain the structure of direct assay and explain how do you estimate relative Potency.
- b) Explain (3, 3) parallel line assay. 10
- c) Explain (i) Protocol (ii) Case Report Form (ii) Phase I and Phase II used in clinical trials. 10
- Q.4) a) In a certain manufacturing situations C_1 & C_2 are holding & shortage costs per item/unit time respectively. C_3 is the setup cost/production cycle, 'r' is the demand rate and production rate is infinite. 't' is the interval between the short of successive production cycles. 'q' the no. of items produced/production run ($q = rt$). Find an expression for i) Optimum order quantity. ii) Minimum cost/unit time. 10
- b) The demand for a certain type of the product is a continues r.v. having rectangular distribution over (1000, 2000) 10
- (1) Find the optimum order quantity of the holding cost is Rs. 2/unit & Shortage cost Rs.6/unit.
- (2) Derive the formula you have used assuming that demand is instantaneous.
- c) Describe Pure strategy & mixed strategy with reference to game theory . 10
- For 2x2 game without saddle point, show that value of the game is given by where (aij) is a pay-off matrix for the player 'A'
- Q.5) a) Explain replacement problem. Obtain the replacement policy for the item whose maintenance cost increases with time, item has fixed resale value and money value is fixed.(Assume time is discrete) 10
- b) Explain the group replacement policy . Derive the criteria for group replacement when system consists of N items, cost of replacing item individually when failed is C_1 and cost of item in group replacement is C_2 ($C_1 > C_2$). 10
- c) Explain :-
- (i) Min-Max Regret method
 - (ii) Laplace criterion
 - (iii) Hurwitz method
 - (iv) EMV method
