(STA30115)

M.Sc. DEGREE EXAMINATION, NOVEMBER 2016.

Third Semester

Statistics

Paper I – DESIGN OF EXPERIMENTS

(Regulation 2015)

Time : Three hours Maximum : 70 marks

Answer ONE question from each Unit.

(18 marks each for Unit I and Unit II, 17 marks each for Unit III and Unit IV)

UNIT I

1. (a) Explain 2^3 factorial experiment. Show that each factorial effect in this design is contrast. Find the variances of the estimates of main effects and interactions.

(b) Explain 2^n factorial experiment with a suitable example in general the particular reference to n=2.

2. (a) Explain 3^3 factorial experiment.

(b) Construct a total cofounded 3^2 factorial experiment with a suitable example.

UNIT II

3. (a) Explain balanced incomplete block design and explain Intra block analysis of BIBD.

(b) Explain resolvable and affine resolvable designs. For a resolvable BIBD, in the usual notation prove that $b \geq v + r - 1$.

4. (a) Explain Partially Balanced Incomplete Block Design (PBIBD) with associate classes.

(b) Explain Partially Balanced Incomplete Block Design (PBIBD) and prove the parametric relations in PBIBD.

UNIT III

5. (a) Explain Youden square Design. Discuss the analysis of simple lattice design.

(b) Explain Strip plot design and their analysis.

6. (a) Explain Split plot design and their analysis.

(b) Explain Gracco Latin square design.

UNIT IV

7. (a) Explain Response Surface Methodology (RSM). Explain second order response surface design.

(b) Obtain the variance of the estimated second order response surface.

8. (a) Explain construction of second order rotatable designs using central composite designs.

(b) Describe balanced incomplete block designs.

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Third Semester

Statistics

Paper II — STATISTICAL QUALITY CONTROL

(Regulation 2015)

Time : Three hours Maximum : 70 marks

Answer ONE question from each Unit.

(18 marks each for Unit I and Unit II, 17 marks each for Unit III and Unit IV)

UNIT I

1. (a) Explain $\bar{x}$ and R charts and write the development and use of $\bar{x}$ and R charts.

(b) Describe operating characteristic function.

2. (a) Obtain the OC and ARL for $\bar{x}$ chart. Describe the situations where individual measurements arise for process monitoring.

(b) Explain V-mask procedure for monitoring the process mean.

UNIT II

3. (a) Define Acceptance sampling plan and Describe guidelines for using acceptance Sampling.

   (b) Define single sampling plan. Obtain the OC curve for the plan. Discuss the effect of the constants n and c on the OC curve.

4. (a) (i) Define Acceptance Sampling. Write the advantages and disadvantages.

   (ii) Explain Sequential sampling plan for attributes.

   (b) Describe the Sampling plan standards. Explain the procedure of MIL STD-105E.

UNIT III

5. (a) Explain the designing of variable sampling plan with a specified OC curve with a suitable example.

   (b) Discuss of MIL and ANSI / ASQC Z1.9 and its use.

6. (a) Explain Sequential sampling by variables.

   (b) Discuss the construction of a variable sampling plan by specified OC curve.

UNIT IV

7. (a) Describe

   (i) failure time distribution

   (ii) failure probability

   (b) Explain the nolion of (i) IFR (ii) CFR and (iii) DFR. Obtain the failure rate of weibull model and examine its features.

8. (a) Describe MTTF in standard models in case of exponential distribution.

   (b) Explain series and parallel systems. Obtain the reliabihties of these systems in the case of exponential failure model.

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M.Sc. DEGREE EXAMINATION, NOVEMBER 2016.

Third Semester

Statistics

Paper III — COMPUTER INTENSIVE STATISTICAL METHODS

(Regulation 2015)

Time : Three hours Maximum : 70 marks

Answer ONE question from each Unit.

(18 marks each for Unit I and Unit II, 17 marks each for Unit III and Unit IV)

UNIT I

1. (a) Define Simulation. Explain when simulation is appropriate tool and when it is not appropriate.

(b) Describe uniform random numbers properties.

2. (a) Explain linear congruential generators and write the advantages of disadvantages of them.

(b) Explain :

(i) inverse transform and

(ii) composition methods of generating random variates with suitable examples. Describe gap test.

UNIT II

3. (a) Explain the generation of (i) Uniform and (ii) exponential variates and write the algorithms.

(b) Explain the generation of (i) Binomial and (ii) lognormal variates and write the algorithms.

4. (a) Describe the generation of (i) Triangular and (ii) gamma variates and write the algorithms.

(b) Discuss the factors to be considered in the selection of (i) Erlang and (ii) geometric distributions in simulation studies.

UNIT III

5. (a) Describe the applications of queuing system in simulation process.

(b) Write a detailed note on applications of simulation in inventory problem.

6. (a) Explain reliability estimation in various life testing models.

(b) Why would an analyst ever prefer a general purpose language such as FORTRAN or BASIC in a simulation, when there are advantages of using special purpose languages such as GPSS or SIMSCRIPT?

UNIT IV

7. (a) Explain common random numbers and control variates.

(b) Describe Jacknife method. Discuss the relationship between jackknife and Bootstrap estimates of standard error.

8. (a) Explain antithetic variables. Explain their use in simulating the reliability function of k-out-of-n system.

(b) Describe the Bootstrap method and write its algorithm.

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M.Sc. DEGREE EXAMINATION, NOVEMBER 2016.

Third Semester

Statistics

Paper III — OPERATIONS RESEARCH

(Regulation 2015)

Time : Three hours Maximum : 70 marks

Answer ONE question from each Unit.

(18 marks each for Unit I and Unit II, 17 marks each for Unit III and Unit IV)

UNIT I

1. (a) Explain :

(i) Payoff Matrix.

(ii) Zero-sum-two person game.

(iii) Pure and Mixed Strategies.

(iv) Maxi-mini and Mini-max principle.

(b) Solve the following game graphically.

	B_1	B_2
A_1	2	7
A_2	3	5
A_3	11	2

2. (a) Explain Dominance Method with a suitable example.

(b) State and Minimax theorem.

UNIT II

3. (a) Describe the basic characteristics of the Inventory system.

(b) Explain purchase I inventory model, Generalize it when purchase cost is subjected to two-price breaks.

4. (a) Define the terms setup cost, holding cost and shortage or penalty cost as applied to an inventory problem.

(b) Explain manufacturing model with shortages.

UNIT III

5. (a) Write a short note of M/M/1 queue and its applications.

(b) Explain $M/E_k/1$ queuing model, find the steady state distribution of the queue size. Derive the average waiting time in the queue.

6. (a) Explain (M/M/1) : (N/FCFS) system and solve it under steady state condition.

(b) For Explain {M/G/1) : (∞/FCFS) queuing model, derive the Pollazek-Khinchine formula for expected number of customers in the system.

UNIT IV

7. (a) Develop a model for the replacement of items whose maintenance cost increase with time and value of money remains same during the period.

(b) How would you deal with replacement of items that fail completely and suddenly?

8. (a) Explain payment series and (A/P, i, n) with suitable examples.

(b) Distinguish between group replacement and individual replacement poleis.