

(STA30115)

UNIT III

M.Sc. DEGREE EXAMINATION,
NOVEMBER 2018.

Third Semester

Statistics

Paper I — DESIGN OF EXPERIMENTS www.kvrssgroup.com

(Regulation 2015)

Time : Three hours

Maximum : 70 marks

Answer ONE question from each unit.

UNIT I

1. (a) Discuss the procedure to test the significance of factorial effects.
(b) Construct a 2^n factorial experiment in general.
2. (a) Construct a 3^2 factorial design for partial confounding.
(b) Construct a total confounded 3^2 factorial experiment with an example.

UNIT II

3. (a) What is an incomplete block design? Discuss.
(b) Prove parametric relations for a BIRD.
4. (a) Discuss the PBIBD with intra block analysis.
(b) Explain resolvable and affine resolvable designs.

5. (a) Explain Gracco latin square design.
(b) Explain simple lattice design. Discuss its analysis procedure.
6. (a) What is strip plot design? Discuss its analysis procedure.
(b) Discuss Youden square design. Also discuss its analysis.

UNIT IV

7. (a) What is response surface design? Explain in detail.
(b) What is response surface methodology? Discuss in detail.
8. (a) Discuss 'Balanced incomplete block design. Explain the procedure.
(b) Discuss the conditions for second order rotatable designs.

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Statistics

Paper II — STATISTICAL QUALITY CONTROL

(Regulation 2015)

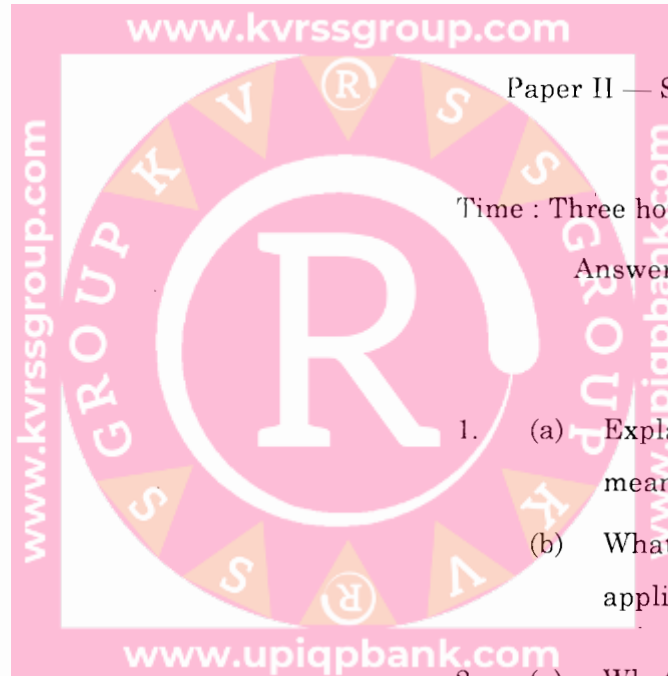
Time : Three hours

Maximum : 70 marks

Answer ONE question from each Unit.

UNIT I

1. (a) Explain the v-mask procedure for monitoring mean (\bar{x}) in detail.
(b) What is a control chart? Write the applications of control charts.
2. (a) What is an R-chart? Discuss its applications.
(b) How do you construct S-chart? Write its applications.



UNIT II

3. (a) What is meant by lot by lot acceptance sampling? Discuss.
(b) What is a sequential sampling? Write the procedure of sequential sampling for attributes.
4. (a) How do you design single sampling with OC curve? Explain.
(b) Discuss the procedure of MIL STD-105 E.

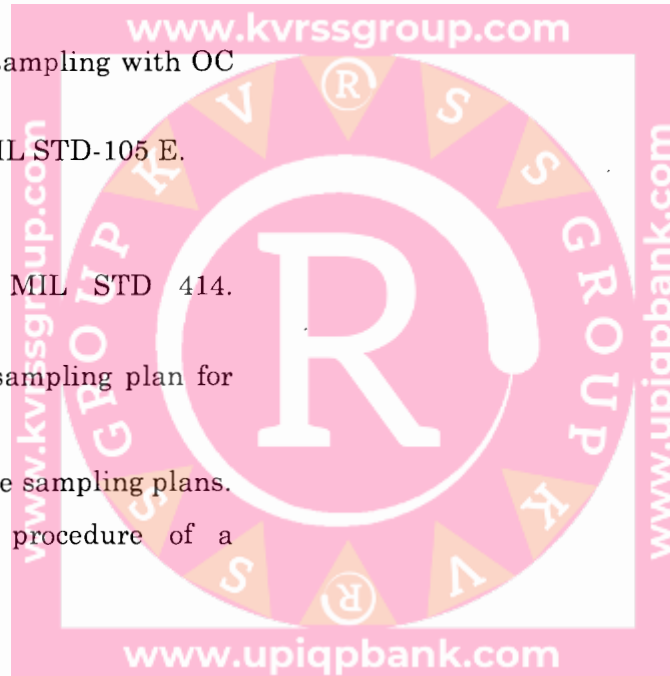
UNIT III

5. (a) Write the procedure of MIL STD 414. Discuss in detail.
(b) Write the construction of sampling plan for variable with OC curve.
6. (a) Discuss the types of variable sampling plans.
(b) Write the notation and procedure of a sequential sampling plan.

UNIT IV

7. (a) Discuss the concepts of (i) IFR (ii) DFR.
(b) Explain MTTF for exponential distributes.

8. (a) What is failure rate? Discuss the procedure of calculating failure rae.
(b) Discuss the methods of testing reliability for exponential distribution.



6. (a) Obtain the solution of $M|E_k|I : \infty|FIFO$ queue model and derive an expression for the expected number in the queue.
- (b) Discuss the salient features of $M|G|I$ queueing system.

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UNIT IV

www.kvrssgroup.com Paper III — OPERATIONS RESEARCH

(Regulation 2015)

7. (a) Discuss the replacement policy of an item whose maintenance cost increases with time and money value changes with constant rate.
- (b) A truck is priced at Rs.60,000 and running costs are estimated at Rs.6,000 for each of the first four years, increasing by Rs.2,000 per year in the fifth and subsequent years. If money is worth 10% per year. When should the truck be replaced? Assume that truck will eventually be sold for scrap at negligible price.

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

8. (a) Explain the basic concepts in individual and group replacement policies.
- (b) Explain the difference between present-worth factor and equal payment series capital recovery factor with suitable examples.

1. (a) Explain the following terms with suitable examples :

- (i) Maximin criterion.
- (ii) Pure and Mixed strategies.
- (iii) Two person zero-sum game.
- (iv) Payoff matrix.

- (b) Solve the following game using dominance principle.

		Player B				
		I	II	III	IV	V
Player A	I	3	2	4	0	1
	II	3	4	2	4	2
	III	4	2	4	0	2
	IV	0	4	0	8	1

2. (a) Express the 2 person zero-sum game as a linear programming problem and hence solve the following game :

		Player B		
		1	2	3
Player A	1	8	-3	7
	2	6	-4	5
	3	-2	2	-3

- (b) Solve the following game graphically :

3	-3	4	5
-1	1	-3	1

UNIT II

3. (a) Explain the inventory purchase model with instantaneous replenishment and with shortages.

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- (b) Find the optimal order quantity for a product for which the price breaks are as follows :
Rs.20 per unit for $0 \leq q < 100$, Rs.18 per unit for $100 \leq q < 200$, Rs.16 per unit for $200 \leq q$.
The monthly demand for the product is 400 units. The shortage cost is 20% of the unit cost of the product and the cost of ordering is Rs.25 per month.

- (a) Explain the manufacturing inventory model without shortages.
(b) A contractor has to supply 20,000 units per day. He can produce 30,000 units per day. The cost of holding a unit in stock is Rs. 3 per year and the set-up cost per run is Rs.50. How frequently, and of what size, the production runs be made?

UNIT III

5. (a) Explain the following terms :

- Transient state and steady state.
- Pure birth process.
- Traffic intensity.
- Exponential distribution as arrival and service process.

- (b) Explain M/M/1 : N/FCFS system and solve it under the steady state. Find the average queue length of the system.

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Third Semester

Statistics

Paper III — COMPUTER INTENSIVE STATISTICAL
METHODS

(Regulation 2015)

Time : Three hours

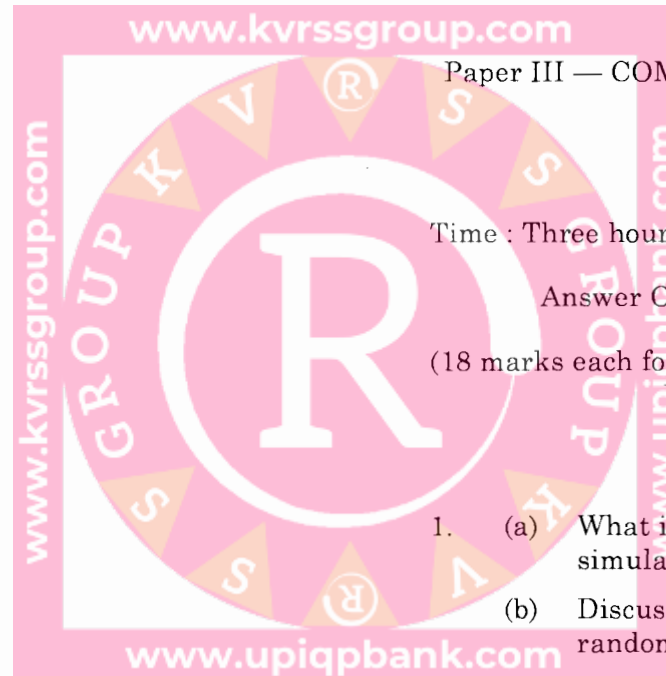
Maximum : 70 marks

Answer ONE questions 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) What is simulation? Discuss the procedure of simulating given by monte-carlo.
(b) Discuss various methods of generating random numbers.
2. (a) Discuss any one method of generate non-uniform random number.
(b) Discuss the steps in Runs test.



UNIT II

UNIT IV

3. (a) Write the algorithm to generate non-uniform random numbers from Exponential Distribution.
(b) Explain the algorithm to generate non-uniform random numbers from Bernouli Distribution.
4. (a) How can you generate non-uniform random numbers from Empirical Distributions? Discuss.
(b) Write the steps in generation of random numbers from
 - (i) Poisson
 - (ii) Geometric Distribution.

UNIT III

5. (a) Discuss the applications of Queuing theory in O.R.
(b) Discuss any two inventory management models.
6. (a) Discuss the general characteristics of simulation languages.
(b) Write the characteristics of GPSS.

7. (a) Discuss Bootstrap method with a suitable example.
(b) Explain the method of variance reduction.
8. (a) What is stratified random sampling? Discuss the procedure.
(b) Discuss Jackknife method with an example.