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PGIS 1064 B-15

M.Sc. Ist Semester (CBCS) Degree Examination

STATISTICS

(Probability Theory)

Paper : HCT : 1.2

Time : 3 Hours Maximum Marks : 80

Instructions to Candidates:

Answer any **Six** questions from **PART - A** and **Five** questions from **PART - B**

PART - A

(6×5=30)

1. State demorgan's rules: Show that for a given class $\{A_i, i=1,2,....n\}$ of n sets these existsa class $\{B_i, i=1,2,....n\}$ of disjoint sets, then $\bigcup_{i=1}^{n} A_i = \sum_{i=1}^{n} B_i$.

2. Define field, σ - field and borel field.

3. Define real valued function, inverse function and indicator function.

4. Discuss the concept of probability and state the axiomatic definition of probability.

5. Define expectation of non - negative and elementary random variables.

6. If $X_n \xrightarrow{G.S} X$ and $X < \infty G.S$ then show that $X_n - X_m \to 0$ as $m,n \to \infty$

7. Find the characteristic function of binomial distribution.

8. Define SLLN.

PART - B

(5×10=50)

9. Prove the following.

   i) If e is a σ - field of subsets of Ω^1 then $X^{-1}_{\underset{\Omega \to \Omega'}{X}}(e)$ is a σ - field of subsets of Ω where and

   ii) The inverse image of minimal σ - field is a minimal σ - field over $X^{-1}(e)$.

10. Define a random variable. Show that if X and Y are random variables then X+Y is also a random variable.

11. If EX and EY exist then show the following.

i) If $X \geq Y$ $a.s \Rightarrow EX \geq EY$

ii) X is integrable if and only if $|X|$ is integrable

12. State and prove Holder's inequality.

13. Show that if $X_n \xrightarrow{L} X$ and $Y_n \xrightarrow{L} C$ then

i) $X_n + Y_n \xrightarrow{L} X + C$

ii) $X_n Y_n \xrightarrow{L} CX$

14. For any characteristic function & show that

i) $\text{Re}[1-\phi(f)] \geq \frac{1}{4}\text{Re}[1-\phi(2E)]$

ii) $|\phi(f)-\phi(f+h)|^2 \leq 2[1-\text{Re}\,\phi(t)]$

15. If the series $\Sigma \sigma_k^2 < \infty$ and $\sum(X_k - EX_k)$ converges in probability then show that if $\sum_{k=1}^{n} \frac{\sigma_k^2}{b_n^2} \to 0$ then $\frac{(S_n - ES_n)}{b_n} \xrightarrow{P} 0$

16. State and prove Lindeberg and Levy form of CLT.

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PGIS 1066 B - 15

M.A/M.Sc. Ist Semester (CBCS) Degree Examination

Statistics

(Statistical Quality Control)

Paper - SCT 1.1

Time : 3 Hours Maximum Marks : 80

Instructions to Candidates

Answer any **six** questions from Part- A and any **five** questions from Part- B

PART - A **(6×5=30)**

1. Discuss the statistical basis of the control chart techniques.

2. Explain

   a) 3 Sigma control limits.

   b) Probability limits.

3. Distinguish between shewhart control charts and CUSUM control charts.

4. Compare control chart technique with chi square test of homogeneity.

5. Distinguish between type A and type B O.C. curves.

6. Define ASN. Obtain it for a double sampling plan for attributes.

7. Explain the need and operation of chain sampling plans.

8. Describe multiple sampling plan.

PART - B **(5×10=50)**

9. Explain with examples, various types of quality characteristics along with theoretical probability models appropriate for studying variations in the same.

10. Explain the construction of $\bar{x}$ and s charts.

11. Describe the control chart for fraction non-confirming. Obtain its O.C. function.

12. Explain the importance of exponentially weighted moving average control charts. Describe its construction.

13. What is rectifying inspection? Derive the expressions for AOQ and ATI functions under such a scheme for single sampling plan for attributes.

14. Describe

a) Sequential sampling plans.

b) Multilevel continuous sampling plans. (5+5)

15. Describe CSP-1 plan. Derive the expression for ATI of this plan.

16. Derive a known sigma sampling plan for variables based on normal approximation. When lower specification limit is given.

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PGIS 1067 B-15
M.Sc. Ist Semester (CBCS) Degree Examination
STATISTICS
(Computer Programming in C language with statistical Applications)
Paper : HCP 1.1

Time : 2 Hours Maximum Marks : 30

Instructions to Candidates:

1. Answer any **two** questions
2. All question carry **equal** marks

1. a) Draw flow chart to find the sum of first 50 odd number.

b) Which of the following constants are invalid constants and why ?

698355M, 25,350, + .OE3,7.2e4, 1.5E+2.5,$314, OX7B, 28704.

c) Discuss different categories of character set. (5+5+5)

2. a) Write a note on conditional operators.

b) Distinguish between scanf( ) and printf( ) function in C program.

c) What are the rules for evaluation of expression in G. (5+5+5)

3. a) Discuss increment and decrement operators used in C- language.

b) Explain 'nested if else' and 'switch' statement.

c) Write a note on 'go to' statement. (5+5+5)

4. a) Distinguish between getchar( ) and putchar ( ) functions.

b) Explain the various components of scanf( ) function along with examples.

c) Write a C program to find the largest of three numbers. (5+5+5)

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PGIS 1068 B-15

M.Sc. Ist Semester (CBCS) Degree Examination

Statistics

(Computer Programming in C with Statistical Applications)

Paper : HCP - 1.2

Time : 2 Hours Maximum Marks : 30

Instructions to Candidates:

Answer any **Two** full questions.

1. a) Distinguish between while loop and do while construct'

b) Write a computer program using 'for' loop to computes and print the sum of fifth powers of first 100 natural numbers. **(7+8)**

2. a) Explain the declaration and initialization of one dimensional array of character data type through an example.

b) How do you use the scanf( ) function to initialize a two dimensional array of rural numbers?

c) Write a computer program to find the mean of raw data using an array. **(5+5+5)**

3. a) Discuss the definition and declaration of a structure through an example. Explain the initialization of the elements of a structure through scanf ( ) function.

b) Explain a user defined function. Give an example. **(10+5)**

4. Write short notes on any **Three** of the following. **(3×5=15)**

a) Special features of a 'for' loop

b) Category of user defined functions.

c) Pointers.

d) Unions.

e) Skipping apart of the loop.

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PGIS 1069 B-15
M.A./M.Sc. Ist Semester(CBCS) Degree Examination
Statistics
(Practical Based On HCT 1.1 and HCT 1.3)
Paper : HCP - 1.3

Time : 2 Hours Maximum Marks : 30

Instructions to Candidates:

1) Answer any **Two** questions
2) **All** questions carry **equal** marks

Section - A

1. For the following matrix A

$$A = \begin{bmatrix} 0.25 & 0.5 & 0.25 \\ 0.32 & 0.28 & 0.4 \\ 0.26 & 0.34 & 0.4 \end{bmatrix} \text{ find}$$

a) A^{-1}

b) $\text{adj}(\lambda I - A)$ and

c) $|\lambda I - A|$ using frames method

2. For two factors starchy or sugary and green base leaf or white base leaf the following coats for the progeny of self fertilized heterozygotes were observed

Type	Count
Storchy green	1997
Storchy white	906
Sugary green	904
Sugary white	32

According to genetic theory the cell probabilities are $0.25(2+\theta)$, $0.25(1-\theta)$, $0.25(1-\theta)$ and 0.25θ. where $0<\theta<1$ is a parameter related to the linkage of the factors find mle of θ.

3. A chemical compound containing 12.5% of iron is given to two technicians A and B for chemical analysis. A made 15 determinations and B made 10 determinations of percentage of iron . The results are as follows.

A:	12.46	11.89	12.76	11.95	12.77
	12.43	12.12	11.85	12.24	12.28
	12.77	12.33	12.56	12.65	12.12
B:	12.05	12.22	12.45	11.97	12.21
	12.33	12.45	12.39	12.37	12.65

Assuming that the above two sets of observation are from normal distribution with equal variance construct 95% confidence interval for $\mu_A - \mu_B$

4. The following data gives the yield of brown seeds from square cells of 5ft×5ft. Construct 95% confidence interval for σ^2 if the mean yield is 102 . The data is as follows.

116, 160, 114, 112, 110, 110, 116, 96, 96, 88, 114, 112, 92, 94, 92, 86, 100, 100, 86, 86, 110

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PGIS 1070 B-15

M.A./M.Sc. Ist Semester (CBCS) Degree Examination

Statistics

(Practical Based on SCT 1.1)

Paper - SCP 1.1

Time : 2 Hours Maximum Marks : 30

Instructions to Candidates

1. Answer any **Two** questions
2. **All** questions carry **equal** marks.

1. Piston rings for an automotive engine are produced by a forging process. Establish statistical control of the inside diameter of the rings manufactured by this process using $\bar{x}$ and s charts. The inside diameter measurement data from 6 samples are given in the following table.

Sample Number	Observations				
1	74.03	74.02	74.01	73.99	74.08
2	73.95	73.99	74.00		
3	73.98	74.02	74.02	74.01	74.09
4	74.02	73.99	73.93	74.05	74.01
5	73.99	74.00	74.01	73.98	74.04
6	74.09	73.99	73.99	73.98	

2. The number of nonconformities observed in the final inspection of disc-drive assemblies has been tabulated as shown here. Does the process appear to be in control?

Day	:	1	2	3	4	5	6	7	8	9	10
No. of assemblies Inspected	:	2	4	2	1	3	4	2	4	3	1
Total no. of Non Conformities	:	10	30	18	10	20	24	15	26	21	8

3. Draw OC, ATI and AOQ Curves for a double sampling plan for attributes with $N = 900$, $n_1 = 40$, $n_2 = 90$, $C_1 = 0$ and $C_2 = 2$. Assume that the fraction defective at any stage of sampling remains constant.

4. The current consumption of certain lamp is normally distributed with standard deviation 1.75. The lower specification limit on current consumption is 15 milliamperes, Lamps with current consumption below this limit are classified as defective, construct the sampling plan by variables that has $P_1 = 0.01$, $P_2 = 0.03$, $\alpha = 0.05$ and $\beta = 0.1$. Compare this with single sampling plan for attributes.
