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SEAT No. \_\_\_\_\_

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**SARDAR PATEL UNIVERSITY**  
**M.Sc. (IV Semester) Examination**

**2018**

**Tuesday, 23<sup>rd</sup> October**

**2.00 pm to 5.00 pm**

**STATISTICS COURSE No. PS04CSTA01**  
**(Computer Oriented Statistical Methods)**

**Note: Figures to the right indicate full marks of the questions. (Total Marks: 70)**

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**1 Attempt all, write correct answers**

- (a) Inverse transform of exponential d.f. with parameter value 1 yields RNG = \_\_\_\_  
(i) a constant (ii) -u  
(iii) 1/u (iv) -ln(1-u)
- (b) Exponential and Beta random deviates generation uses respectively the following operations of uniform numbers  
(i) ratio, logarithmic (ii) logarithmic, ratio  
(iii) logarithmic, product (iv) product, ratio
- (c) In LCG  $2 + 2X_{n-1}$  with modulus 7, worst choice of seed value  $X_0$  is  
(i) 1 (ii) 0  
(iii) 2 (iv) 5
- (d) Monte Carlo Integration value of  $\int_0^{\infty} e^{-y^2} dy$  is given by  
(i) Arithmetic mean of countable uniform deviates (ii) Arithmetic mean of finite Exponential deviates  
(iii) Arithmetic mean of countable Exponential deviates (iv) Geometric mean of countable exponential deviates
- (e) Which of the following is not a data reduction techniques?  
(i) Cluster analysis (ii) Principal component analysis  
(iii) Factor analysis (iv) Discriminant analysis
- (f) The canonical correlation between the first canonical pair of variates is given by  
(i) greatest variance (ii) greatest eigen value  
(iii) greatest eigen vector length (iv) smallest eigen value
- (g) The proportion of variance in variables attributable to the common factors is  
(i) communality (ii) factor score  
(iii) factor loading (iv) none of above
- (h) For the Cox proportional hazard model an assumption is optional, it is  
(i) covariates are time independent (ii) survival times are Weibull  
(iii) covariates are multiplicatively related (iv) baseline hazard is common

①

(PTO)

2 Attempt ANY 7, each carries 2 marks

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- (a) State theorem giving full period LCG. Give appropriate example to explain it.
- (b) Let  $u = 0.2$  be a  $U(0, 1)$  deviate. Generate a pair of (i) negatively correlated exponential deviates and (ii)  $Beta(1, 1)$  deviates.
- (c) Show that rejection method works as equally as the inverse method for generating random deviates from  $X \sim f(x) = x/6, 0 \leq x \leq 3$ .
- (d) Narrate algorithm for generating geometric deviates.
- (e) State formula for generating standard normal deviates as per Box-Muller method.
- (f) Define Principal Components in reference to Principal Component Analysis.
- (g) Define KMO in usual notation and state the multivariate technique using it.
- (h) Briefly describe the objective of the Canonical Correlation Analysis.
- (i) In the context of Discriminant Analysis define the Wilk's Lambda. Write what purpose it serves.
- (j) Give comparison between Cox Regression model and Multiple Regression model.

- 3 (a) State and prove the theorem of (i) inverse transform method (ii) acceptance-rejection method. Also illustrate them. 06
- (b) Show that given  $U$  and  $V$  iid  $U[0, 1]$  deviates, we can generate one  $Beta(a, b)$  deviate,  $a, b > 0$ , otherwise we can generate one standard normal deviate. 06

OR

Write down algorithm for simulating a homogeneous Poisson process.

- 4 (a) What is Monte Carlo integration? Explain how to obtain Monte Carlo estimate of standard error of a Monte Carlo estimate. 06
- (b) Write down Metropolis-Hasting algorithm. How it is different from Metropolis algorithm? 06

OR

What is bootstrapping? Explain with advantages of bootstrapping.

- 5 (a) Discuss Principal Component Analysis. Let all four principle components (PCs) of a data set has variances as given below, use eigen value rule to select appropriate number of PCs 616 18 8 1 06
- (b) Discuss similarities and dissimilarities between Logistic Regression and Discriminant analysis. Give example of their suitability. 06

OR

Write step by step procedure to conduct Discriminant analysis on data.

- 6 (a) Define at least SIX important terms of factor analysis. 06
- (b) Distinguish between exploratory factor analysis and confirmatory factor analysis with adequate detail. 06

OR

Discuss about Cluster Analysis.

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