RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College affiliated to University of Calcutta)

SECOND YEAR [2017 - 20]

B.A./B.Sc. THIRD SEMESTER (July – December) 2018 Mid-Semester Examination, September 2018

: 27/09/2018 STATISTICS (General)

Time : 12 noon - 1 pm Paper: III Full Marks: 25

[Use a separate Answer Book for each group]

Group: A

Answer **any two** questions of the following:

 (2×5)

- 1. Explain different types of errors in index number.
- 2. State Fisher's formula to obtain index number. Give reason why is this formula called an ideal formula to obtain index number?
- 3. Discuss how you will proceed for constructing a cost of living index number.

Group: B

Answer any three questions of the following:

 (3×5)

- 4. If X follows Normal $(10,5^2)$ and X_1, X_2, \dots, X_{501} is a random sample of size 501 from the population X, then what is the expected value of the sample variance S^2 ?
- 5. If T follows t_{19} (i.e. t distribution with degrees of freedom 19) then what is the value of the constant c such that P ($|T| \le c$) = 0.95? [t table (no pun intended!) is provided overleaf]
- 6. If X_1, X_2, \dots, X_n is a random sample from a distribution with density function $f(x; \theta)$

$$=\frac{1}{\theta}$$
 if $0 < x \le \theta$

= 0 otherwise

then what is the maximum likelihood estimator of θ ?

7. Let X_1, X_2, \dots, X_n be a random sample of size n from a population with density $f(x; \theta)$

$$=\frac{1}{\theta}.e^{\frac{-x}{\theta}}$$
 if $0 < x < \infty$

= 0 otherwise, where $\theta > 0$ is a parameter.

Are the estimators X_1 and \bar{X} unbiased? Given X_1 and \bar{X} , which one is a better estimator of θ ?

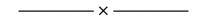


TABLE IV t-DISTRIBUTION*

	100	v a	0.05	0.025	0.01	0.005
6 . VI 00.034 02.044	6.635 9.210 11.345 13.277 15.086	1 2 3 4 5	6.314 2.920 2.353 2.132 2.015	12.706 4.303 3.182 2.776 2.571	31.821 6.965 4.541 3.747 3.365	63.657 9.925 5.841 4.604 4.032
が、	8\4.81 80.038 80.038 80.238	6 7 8 9 10	1.943 1.895 1.860 1.833 1.812	2.447 2.365 2.306 2.262 2.228	3.143 2.998 2.896 2.821 2.764	3.707 3.499 3.355 3.250 3.169
		11 12 13 14 15	1.796 1.782 1.771 1.761 1.753	2.201 2.179 2.160 2.145 2.131	2.718 2.681 2.650 2.624 2.602	3.106 3.055 3.012 2.977 2.947
35.716 37.156 38.58 39.907		16 17 18 19 20	1.746 1.740 1.734 1.729 1.725	2.120 2.110 2.101 2.093 2.086	2.583 2.567 2.552 2.539 2.528	2.921 2.898 2.878 2.861 2.845
77.44 97.54 81.44 85.54 60.04	38.932 40.289 42.980 44,314		1.721 1.717 1.714 1.711 1.708	2.080 2.074 2.069 2.064 2.060	2.518 2.508 2.500 2.492 2.485	2.831 2.819 2.807 2.797 2.787
48.24 49.64 50.99 52.33 52.33		26 27 28 29 30	1.706 1.703 1.701 1.699 1.697	2.056 2.052 2.048 2.045 2.042	2.479 2.473 2.467 2.462 2.457	2.779 2.771 2.763 2.756 2.750
04.00 M2 04.00 104.01 104.01 104.01		40 60 120 8	1.684 1.671 1.658 1.645	2.021 2.000 1.980 1.960	2.423 2.390 2.358 2.326	2.704 2.660 2.617 2.576

^{*}Abridged from Table 12 of Biometrika Tables for Statisticians, Vol. I, with the kind permission of the Biometrika Trustees.