Reg.No. | | | | | | | | |

D.K.M.COLLEGE FOR WOMEN (AUTONOMOUS), VELLORE-1

SEMESTER EXAMINATIONS

APRIL – 2016 13RPMA4B/RPMA3D

MATHEMATICAL STATISTICS

Time : 3 Hrs **Max. Marks : 75**

SECTION-A (5 x 6 = 30)

Answer ALL questions.

1. *(a) Derive the distribution of arithmetic mean of normally distributed random variables.*

   (Or)

   (b) The sequence $\{F_n(t)\}$ *of distribution function of student's t with n degree of freedom satisfies for every t, prove that*

$$\lim_{n\to\infty} F_n(t) = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{t} e^{\frac{-t^2}{2}}\, dt$$

2. *(a) Discuss the drugs A and B having the same effect.*

A	1.9	0.8	1.1	0.1	-0.1	4.4	5.5	1.6	4.6	3.4
B	0.7	-1.6	-0.2	-1.2	-0.1	3.4	3.7	0.8	0.0	2.0

   (Or)

   (b) From 10% of the items are defective in a lot of simple sample of size '30', find the probability of the 4 defective items.

3. *(a) Write short notes on efficiency of an estimate.*

   (Or)

   (b) Discuss method of finding estimates.

4. *(a) Explain two – way classification.*

   (Or)

   (b) Explain the OC function.

5. *(a) Determine the values A and B with usual notations.*

   (Or)

   (b) Explain Sequentially Probability Ratio Test.

SECTION-B (3 x 15 = 45)

Answer any THREE of the following questions.

6. *Derive Fisher's Z distribution.*
7. *Suppose that the theoretical frequencies π_k are given. Then the sequence $\{F_n(z)\}$ of distribution function of the statistic χ^2 defined by $\chi^2 = \sum_{k=1}^{r} \frac{(n_k - n\pi_k)^2}{n\pi_k}$ satisfy the relation*

$$\lim_{n\to\infty} F_n(z) = \begin{cases} \frac{1}{2^{(r-1)}\Gamma\left(\frac{1}{2}(r-1)\right)} \int_0^z z^{\frac{(r-1)}{2}} e^{\frac{-z}{2}} dz & for\ z > 0 \\ 0 & for\ z \le 0. \end{cases}$$

The above expression is the distribution function of the random variable χ^2 with $r-1$ degree of freedom.

8. *An unbiased estimate U of the parameter Q is the most efficient if and only if*
   a. *The estimate U is sufficient*
   b. *For $g(u, Q) > 0$, the density $g(u, Q)$ almost everywhere satisfies the relation.*

$$\frac{\partial log\ g(u, Q)}{\partial Q} = c(u - Q),$$

Where the number c is independent of u.

9. *If the point in sample space is a random variable of the continuous type with density where the parameter Q is unknown and $H_0(Q = Q_0)$ and $H_1(Q = Q_1)(Q_0 \neq Q_1)$ are the null and alternate hypothesis respectively, prove that a most powerful test exists.*
10. *Explain the evaluation of E(n).*

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