

Unique Paper Code : 32371301_OC

Name of The Paper : Sampling Distributions

Name of the Course : B.Sc.(H) Statistics(under CBCS)

Semester : III

Duration : 3 hrs

M.Marks : 75

Instructions for candidates :

1. All questions carry equal marks
2. Attempt any four questions.

1). Let $\{X_n\}$ be a sequence of independent Bernoulli variates such that
 $P(X_n = 1) = p_n$, $P(X_n = 0) = 1 - p_n = q_n$, $n = 1, 2, 3, \dots$
 Examine whether the weak law of large numbers and central limit theorem can be applied to the sequence $\{X_n\}$.

2). For the t-distribution with n d.f., Obtain the recurrence relation between the central moments. Comment about the m.g.f of t- distribution.

3). If X and Y are independent chi-square variates with n_1 and n_2 d.f. respectively. Show that $U = X + Y$ and $V = n_2 X / n_1 Y$ are independently distributed. Also identify their distributions.

4). Derive the p.d.f of r^{th} order statistic. Let $Y_1, Y_2, \dots, Y_{2k+1}$ be an odd size random sample from a $N(\mu, \sigma^2)$ population. Find the p.d.f of the sample median and show that it is symmetric about μ . Hence or otherwise find its mean.

5). Show that for the entries in the following $2 \times r$ contingency table,

	A1	A2	.....	Ai	.....	Ar	Total
B1	a_1	a_2	.....	a_i	.....	a_r	a
B2	b_1	b_2	.....	b_i	.....	b_r	b
Total	n_1	n_2	.....	n_i	.....	n_r	n

The value of $\chi^2 = \sum_{i=1}^r \omega_i (p_i - p)^2$ where $p_i = a_i/n_i$, $p = a/n$, $\omega_i = n_i / pq$ and $q_i = 1 - p_i$, $q = b/n$

6). The mean height of 50 male students who showed above-average participation in college athletics was 68.2 inches with a standard deviation of 2.5 inches, while 50 male students who showed no interest in such participation had a mean height of 67.5 inches with a standard deviation of 2.8 inches.

(a) Test the hypothesis that male students who participate in college athletics are taller than other male students.

(b) What is the P value of the test?

Direct ques.