M 6065

Reg. No.: .....

Name: .....

VI Semester B.Sc. Degree (CCSS – Reg./Supple./Improv.) Examination, May 2014
Core Course in Statistics
6B11 STA : STATISTICAL INFERENCE – II

Time : 3 Hours Max. Weightage : 30

Instruction : *Use of calculators and statistical tables are* ***permitted.***

PART – A
(Short Answer)

Answer **any 10** questions. **(Weightage 1 each)**

1. Define Type I and Type II errors in testing of hypothesis.
2. Distinguish between simple and composite hypothesis.
3. State Neyman Pearson lemma in testing.
4. Define uniformly most powerful test of size α.
5. Point out the difference between one-tailed and two tailed tests.
6. Give the test statistics and their distributions in testing the mean $\mu = \mu_0$ when the population standard deviation is (1) known (2) unknown, based on a sample of size n (> 30).
7. From the following contingency table for testing independence of 2 attributes A and B, give the expression for the test statistic.

	A_1	A_2
B_1	a	b
B_2	c	d

where a + b + c + d = N.

P.T.O.

8. Indicate any 2 applications of t – distribution in testing mean/means of normal populations.

9. Among 64 offsprings of a certain cross between guinea pigs, 34 were red, 10 were black and 20 were white. According to genetic model, these numbers should be in the ratio 9 : 3 : 4. Find out the expected frequencies.

10. Define :
    1) run
    2) length of run in a sequence of letters.

11. Write the null hypothesis in sign test and if n > 30 which is the test statistic to be used. **(10×1=10)**

PART – B
(Short Essay)

Answer **any 6** questions. **(Weightage 2 each)**

12. Suppose that 2 different concerns manufacture drugs for inducing sleep, drug A manufactured by 1st concern and B manufactured by 2nd concern. Each company claims that its drug is superior to the other and it is desired to test the hypothesis that drug A is superior to drug B. Formulate the Null and Alternative hypotheses concerning the mean of additional hours of sleep. Is the test one-tailed or two tailed ? Give the critical region if sample size is large and population s.d. is unknown and equal.

13. Define Likelihood Ratio Test. Compare it with Neyman Pearson Test (Obtained by Lemma).

14. Let p be the probability that a coin will fall head in a single toss in order to test $H_0 : P = \frac{1}{2}$ against $H_1 : P = \frac{3}{4}$. The coin is tossed 5 times and H_0 is rejected if more than 3 heads are obtained. Show that power of the test = 81/128.

15. Explain the testing of Binomial proportion $p = p_0$. In a large consignment of oranges, a random sample of 64 oranges revealed that 14 oranges were bad. Is it reasonable to assume that 20% of the oranges were bad ?

16. Explain the test procedure to test the equality of means of 2 normal populations with unknown but (1) equal variances (2) unequal variances, based on large samples.

17. Explain the test procedure to test $\sigma = \sigma_0$ where σ is the standard deviation of a Normal population.

18. The following is the distribution of the no. of trucks arriving at a company's warehouse.

Trucks arriving per hour :	0	1	2	3	4	5
Frequency :	52	151	130	102	45	20

Find the mean of this distribution and find the expected frequencies to fit Poisson distribution to the data.

19. Describe Mann-Whitney-Wilconon u-test.

20. How will you test the equality of distribution functions ? **(6×2=12)**

PART – C
(Long Essay)

Answer **any 2** questions. **(Weightage 4 each)**

21. Given $f(x,\theta) = \frac{1}{\theta}$, $0 < x < \theta$ and zero elsewhere, you are testing $H_0 : \theta = \frac{7}{5}$ against $H_1 : \theta = 1$ by means of a single observed value of x. Find α, β and power of the test if the interval $x \leq 0.8$ is chosen as the critical region.

22. For a normal population $N(\mu, \sigma^2)$ with known σ, construct a test for $H_0 : \mu = \mu_0$ against $H_1 : \mu > \mu_0$.

23. Using no. of runs above and below median, test for randomness, the following table of 2 digit numbers. 15, 77, 01, 65, 69, 69, 58, 40, 81, 16, 16, 20, 00, 84, 27, 28, 26, 46, 66, 36, 86, 66, 17, 43, 49, 85, 40, 51, 40, 10

24. The following table gives the classification of respondents according to their education level and type of TV programmes they prefer. Are the 2 attributes independent ?

	School	Degree	Post Gradu./Professional age
Entertainment	20	15	8
News	10	15	15
Scinece prog.	12	10	15

(2×4=8)