Reg. No :...........................

Name :.........................

**BACHELOR'S DEGREE (C.B.C.S) EXAMINATION, MARCH 2025**
**2017, 2018, 2019, 2020, 2021, 2022 ADMISSIONS SUPPLEMENTARY**
**PSYCHOLOGY SEMESTER IV - COMPLEMENTARY COURSE 2**
**PY4CMT12 - Statistical Inference**

Time : 3 Hours                                                                                         Maximum Marks : 80

## Part A

**I. Answer any Ten questions. Each question carries 2 marks**                                   (10x2=20)

1. Define type 1 error

2. Give an example for null hypothesis

3. Define alternative hypothesis

4. Define composite hypothesis

5. State the statistic to test $\mu = \mu_0$ with known population standard deviation when sample size is large and its distribution.

6. Write down the z-statistic to test the equality of two population proportions.

7. Differentiate between observed and expected frequencies.

8. The value of the test statistic to test $p = p_0$ against $p \neq p_0$ is 2.532. Write your conclussion at 5% level of significance.

9. Write down the applications of z-statistic in small sample test.

10. Write down the F-statistic to test the equality of two population variances.

11. Write down any one of the small sample z-test with corresponding test statistic.

12. Test $H_0 : \mu = 64$ against $H_1 : \mu > 64$, the value of the Student's t-statistic with 9 degrees of freedom is 2. Write down the result of the test at 5% level of significance.

## Part B

**II. Answer any Six questions. Each question carries 5 marks**                                    (6x5=30)

13. Distinguish between power of the test and Size of the test

14. Explain the terms 1) critical region 2) significance level 3) acceptance region

15. Distinguish between alternative hypothesis and null hypothesis

16. Explain the large sample test of equality of the mean of two populations when the population standard deviations are unequal but known.

17. Explain the large sample test of equality of the mean of two populations when the population standard deviations are unequal and unknown.

18. A sample of 900 members has a mean 3.4 cms. Is the sample from a population of mean 3.25 cms. and standard deviation 2.61 cms.

19. The amount of a certain trace element in blood is known to vary with a standard deviation of 14.1 ppm (parts per million) for male blood donors and 9.5 ppm for female donors. Random samples of 75 male and 50 female donors yield concentration means of 28 and 33 ppm, respectively. Test the hypothesis that the population means of concentrations of the element are the same for men and women?

20. Explain t-test for $\mu = \mu_0$ when sample size is small.

21. The mean weekly sales of soap bars in departmental stores was 146.3 bars per store. After an advertising campaign the mean weekly sales in 22 stores for a typical week increased to 153.7 and showed a standard deviation of 17.2. Was the advertising campaign successful?

## Part C

22. If x≥1 is the critical region for testing $\theta=2$ against the alternative $\theta=1$ on the basis of a single observation from the population with pdf $f(x)= \theta e^{-\theta x}$ , $0\leq x\leq \infty$, obtain type 1 and type 2 error

23. A food services manager for a baseball park wants to know if there is a relationship between gender (male or female) and the preferred condiment on a hot dog. The following table summarizes the results. Test the hypothesis with a significance level of 10%.

|  |  | Condiment | | | |
|---|---|---|---|---|---|
|  |  | Ketchup | Mustard | Relish | Total |
| Gender | Male | 15 | 23 | 10 | 48 |
|  | Female | 25 | 19 | 8 | 52 |
|  | Total | 40 | 42 | 18 | 100 |

24. a) Write down the applications of Chi-square statistic. b) Explain the one sample test regarding population variance.

25. In a certain experiment to compare two types of animal foods A and B the following results of increase in weights were observed in animals:

| Animal number | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| Increase weight in lb | Food A | 49 | 53 | 51 | 52 | 47 | 50 | 52 | 53 | 407 |
|  | Food B | 52 | 55 | 52 | 53 | 50 | 54 | 54 | 53 | 423 |

a) Assuming that the two samples of animals are independent, can we conclude that food B is better than food A?

b) Also examine the case when the same set of eight animals were used in both the foods.