TB214490W **Reg. No :.....**

Name :.....

B.A. DEGREE (C.B.C.S.) EXAMINATION, MARCH 2023

(2021 Admissions Regular, 2020 Admissions Supplementary / Improvement, 2019 &2018 Admissions Supplementary)

SEMESTER IV - COMPLEMENTARY COURSE 2 (STATISTICS)

ST4C03B18 - STATISTICAL TOOLS

(For Sociology)

Time : 3 Hours **Maximum Marks : 80**

Part A

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

1. Mention the properties of Karl Pearson's co-efficient of correlation.
2. Give the formula for Spearman's rank correlation.
3. What is the relation between correlation co-efficient and regression co-efficients of a bivariate data?
4. What is the point of intersection of the two regression lines of a bivariate data?
5. What is the probability of getting a sum of 9, when two dice are tossed?
6. When are the two events said to be mutually exclusive?
7. Define sample space of a random experiment.
8. Distinguish between discrete and continuous random variables.
9. Define expected value of a random variable.
10. What is meant by critical region of a test?
11. Explain one-tailed and two-tailed tests.
12. Give one example each of a simple hypothesis and a composite hypothesis.

Part B

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

13. Find Spearman's rank correlation from the following data

X	59	65	45	52	60	62	70	55	43	49
Y	75	70	55	65	60	69	80	68	51	61

14. Given that $\bar{x}$ = 40, $\bar{y}$ = 48, σ_x = 12, σ_y = 16 and r = 0.48, predict the value of x when y = 50.
15. Given the following data, find the probable value of x when y = 30
    $\bar{x}$ = 27.6, $\bar{y}$ = 14.8, σ_x = 40, σ_y = 20, r = 0.8
16. A committee of 5 members is to be formed from a group of 8 boys and 7 girls. Find the probability that the committee consists of (i) 3 boys and 2 girls (ii) at least one girl
17. Given that P(A) = 0.5 and P(A $\cup$ B) =0.7, find P(B) if
    (i) A and B are independent and (ii) A and B are mutually exclusive.
18. A player is to toss three coins; he wins Rs. 10 if three heads appear, Rs. 5 if two heads appear, Re. 1 if one head appears. And he will lose Rs. 12 if no head appears. What is the expected amount?
19. Define p.d.f. of a random variable. State the properties of p.d.f. of a random variable.
20. The mean life of 100 tyres taken from a normal population is found to be 25325 kms with a standard deviation of 120 kms. Can it be claimed that the mean life in the population is 25000 kms?

21. The mean weight of a sample of 100 students is 50 kgs with a standard deviation of 3 kgs. Can it be claimed that the mean weight of all the students is 52 kgs?

Part C

III. Answer any Two questions. Each question carries 15 marks **(2x15=30)**

22. The following is a set of observations on age and blood pressure of a group of twelve people. Estimate the blood pressure when age is 45 years.

Age(in years)	56	42	72	36	63	47	55	49	38	42	68	60
Blood pressure	147	125	160	118	149	128	150	145	115	140	152	155

Estimat

23. Calculate the Karl Pearson's co-efficient of correlation between price and demand

Price	14	16	17	18	19	20	21	22	23
Demand	84	78	70	75	66	67	62	58	60

24. (a) State and prove addition theorem on probability. (b) A bag contains 4 red and 5 black balls. Two balls are drawn out at random. What is the probability that (i) Both are red (ii) Both are black (iii) One is red and the other is black.

25. A potential buyer of light bulbs bought 50 bulbs each of two brands A and B. Upon testing the bulbs, he finds that the sample from brand A had a mean life of 1282 hours with a standard deviation of 80 hours whereas the sample from brand B had a mean life of 1208 hours with a standard deviation of 70 hours. Can the buyer conclude that the mean life of brand A is higher than that of brand B?