TB213920V **Reg. No :.....**

Name :.....

B. Sc. DEGREE (C.B.C.S) EXAMINATION, NOVEMBER 2022

(2021 Admissions Regular,2020 Admissions Supplementary/Improvement,2019,2018 & 2017 Admissions Supplementary)

SEMESTER III - COMPLEMENTARY COURSE 2 (PSYCHOLOGY)

PY3CMT09 - STATISTICAL METHODS AND ELEMENTARY PROBABILITY

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

Part A

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

1. Define conditional probability.
2. Define simple event.
3. Write Statistical definition of probability.
4. Two coins are tossed. Obtain the probability that both tosses show same face.
5. State multiplication theorem of mathematical expectation.
6. Write mean and variance of a random variable in terms of expectation.
7. Define a random variable from a coin tossing experiment.
8. If p(X = 0) = 1/2 and p(X = 1) = 1/2. Then obtain the distribution function of the random variable X.
9. Write down the parameters of a normal distribution.
10. Write down E(x) of a normal distribution and standard normal distribution.
11. Define binomial distribution.
12. Obtain the mean and variance of the given normal distribution.

f(x) = $\frac{1}{3\sqrt{2\pi}} e^{-\frac{(x-10)^2}{18}}$, $-\infty < x < \infty$

Part B

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

13. Prove that (i) P(ϕ) = 0.
    (ii) P($\overline{A}$) = 1 - P(A).
14. A company has forty female and sixty male employees. If two employees are selected at random obtain the probability that (i) Both will male (ii) both will females (iii) There will be one of each sex.
15. The numbers 1, 2, 3, 4, 5 and 6 are written on slips of paper and two of them are drawn with replacement. Then obtain the probability that (i) The sum of the numbers drawn is less than 6 (ii) The numbers drawn are both odd (iii) The sum of the numbers are divisible by 2 and 3.
16. Explain probability mass function of a random variable with example.
17. Explain mean and variance in terms of expectation with example.
18. If X is a random variable with the following probability mass function. Obtain (i) The value of k (ii) P(X is even).

x	0	1	2	3	4	5	6	7	8
p(x)	k	3k	5k	7k	9k	11k	13k	15k	17k

19. Derive the mean and variance of binomial distribution.
20. Distinguish between binomial and normal distributions.

21. The probability of a man hitting a target is 1/3. If he fires 6 times obtain (i) The probability of his hitting the target at least twice (ii) The probability that he doesn't hit the target (iii) Obtain the mean and variance.

Part C

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

22. State axiomatic definition of probability and hence deduce addition theorem for any three events.

23. It is 8:5 Against the wife who is 40 years old living till she is 70 and 4:3 against her husband now 50 living till he is 80. obtain the probability that (i) Both will be alive (ii) None will be alive (iii) Only wife will be alive (iv) Only husband will be alive (v) Only one will be alive (vi) At least one will be alive.

24.

(i) Obtain the mean and variance of the following distribution.

x	-3	-2	-1	0	1	2	3
p(x)	0.05	0.10	0.30	0	0.30	0.15	0.10

(ii) obtain the mean and variance of (2x+3) and (2x-3)

(iii) obtain the distribution function of X.

25. X is normally distributed with mean 50 and standard deviation 20. Obtain the probability that

(i) $X \leqslant 30$

(ii) $0 \leqslant X \leqslant 40$

(iii) $X \geqslant 55$

(iv) $X > 45$