B. Sc. DEGREE END SEMESTER EXAMINATION - OCTOBER 2022

SEMESTER – **3: STATISTICS (FOR PSHYCHOLOGY)**

COURSE: **19U3CPSTP03–: STATISTICAL METHODS AND ELEMENTARY PROBABILITY**

(*For Regular – 2021 Admission and Improvement/Supplementary – 2020 Admission*)

Time: Three Hours   Max. Marks: 75

PART A

Answer all questions .*Each question carries 1 mark*

1. If A and B are exhaustive events, then P(A ∪ B) = …………
2. Two events A and B are said to be mutually exclusive if (A ∪ B) = ……………
3. The Probability that a student A can solve a problem is $\frac{2}{5}$ and B can solve a problem is $\frac{3}{5}$ then the probability that both of them solve a problem is …………….
4. The probability of getting a doublet when two dice are thrown at a time is ………….
5. For any two events A and B, P (A ∩ B) = ……………
6. The number of participants in a meeting is an example of …………random variable.
7. If X is a discrete random variable with probability mass function given by f(x) = Kx, where x = 0, 1, 2, 3, 4, 5. Then P(1.5) = …………
8. The mathematical expectation of a random variable gives the ……………value of the random variable
9. The variance of a Binomial distribution with parameters n and p is …………
10. The mode of a normal distribution with mean 1.5 is ……….

<div align="right">(1 x 10 = 10)</div>

PART B

Answer any eight of the following questions. *Each question carries 2 marks*

11. Define an event and give one example.
12. Write down the sample space when a coin and a die are tossed and faces turning up are observed.
13. State the addition theorem of probability for three events
14. Define conditional probability
15. What is the probability of having exactly 52 Sundays in a randomly selected leap year?
16. Define a continuous random variable.
17. Give the expressions for mean and variance of a random variable X in terms of the mathematical expectation.
18. Can there be a Binomial distribution with mean 4 and variance 5? Why?
19. Give the area property of normal distribution.
20. What is the area under standard normal curve between -1 and +2?

<div align="right">(2 x 8 = 16)</div>

PART C
Answer any five of the following questions
Each question carries 5 marks

21. Give the addition and multiplication 'rules of counting.

22. Briefly explain the mathematical and statistical approaches to probability.

23. State and prove the addition theorem of probability for three events.

24. There are two conference halls, H1 and H2 in an institution. There are seven men and eight women in H1 and 12 men and 13 women in H2. One person was selected from a randomly chosen conference hall. What is the probability that the selected person is a woman?

25. Write down the probability distribution function of the random variable representing the difference between numbers when two dice are thrown at a time.

26. Find the mathematical expectation of the random variable X representing the number of Tails when four coins are tossed at a time.

27. For a Binomial distribution, the probability of success is thrice that of failure. If the experiment is repeated 8 times, what is the probability of getting 3 successes?

(5 x 5 = 25)

PART D
Answer any two of the following questions
Each question carries 12 marks

28. (a) State and prove the Baye's Theorem.

    (a) There are three candidates A, B and C for the post of chairman of a public limited company. The probability that A will get the appointment is $\frac{3}{7}$, B will get the appointment is $\frac{2}{5}$ and C will get the appointment is $\frac{4}{9}$. If A is appointed, he will change the working time with a probability $\frac{1}{7}$ and the corresponding probability for B and C are $\frac{2}{9}$ and $\frac{3}{11}$ respectively. If working time is changed after the appointment, what is the probability that B is appointed?

29. The probability density function of a discrete random variable is given below

X:	0	1	2	3	4	5	6	7	8	9	10
F(x):	k	4k	8k	17k	24k	26k	30k	22k	18k	7k	3k

Find the following
(a) Value of k
(b) $P(5 \leq X \leq 7)$
(c) $P(5 < X < 9)$
(d) $P(4 < X < 7 / X > 5)$

30. What are the properties of normal distribution?

31. The IQ score of students follow a normal distribution with mean score of 150 and standard deviation of 50. What is the probability that IQ score of a randomly selected student is
(a) Between 100 and 250.
(b) More than 200.
(c) Less than 300.
(d) Between 200 and 250

(12 x 2 = 24)