

B. Sc. DEGREE END SEMESTER EXAMINATION – OCT. /NOV. 2021**SEMESTER 3: STATISTICS (FOR PSYCHOLOGY)****COURSE: 19U3CPSTP03 – STATISTICAL METHODS AND ELEMENTARY PROBABILITY***(For Regular 2020 Admission)*

Time: Three Hours

Max. Marks: 75

PART A***Answer all questions . Each question carries one mark***

1. The set of all outcomes of a random experiment is called
2. If A and B are two mutually exclusive events, then $P(A \cap B) = \dots\dots\dots$
3. Probability of getting one red ball and one blue ball when two balls are drawn from a box containing 8 red balls and 7 blue balls is
4. The probability of getting 4 Spade cards when 4 cards are drawn from a well shuffled packet of 52 cards is
5. For any two events A and B, $P(A \cap B) = \dots\dots\dots$
6. The number of petals in a flower is an example ofrandom variable.
7. If X is a discrete random variable with probability mass function given by $f(x) = \frac{x}{55}$, where $x = 0,1,2,3,4,\dots\dots\dots 10$, the value of $P(X = 2.5) = \dots\dots\dots$
8. The mathematical expectation of a random variable gives thevalue of the random variable
9. The variance of a Binomial distribution with parameters n and p is
10. Measure of skewness is for normal distribution

(1 x 10 = 10)**PART B*****Answer any eight of the following questions. Each question carries two marks***

11. Define random experiment
12. Write down the sample space when 3 coins 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 53 Sundays in a randomly selected leap year
16. Define a random variable.
17. Define Mathematical expectation of a discrete random variable
18. Find the probability of getting a success when the mean and variance of a Binomial distribution are 3 and 2 respectively.
19. Define standard normal distribution.
20. What is the area under standard normal curve between -2.0 and +2.5?

(2 x 8 = 16)

Answer any five of the following questions. Each question carries five marks

21. Briefly explain any two approaches to probability.
22. State and prove the addition theorem of probability.
23. A speaks the truth in 80% of the cases and B in speaks the truth in 70% of the cases. In describing a certain incident which they have witnessed, what is the probability that
 - (a) Both of them speak the truth
 - (b) Both of them do not speak the truth.
24. Differentiate between discrete and continuous random variables.
25. Write down the probability distribution function of the random variable representing the sum of numbers when two dice are thrown at a time.
26. Find the mathematical expectation of the random variable X representing the number of heads when four coins are tossed at a time.
27. A survey showed that 70% of the workers in a company are satisfied with working conditions. If 8 workers are selected at random, what is the probability that
 - (a) All are satisfied with working conditions
 - (b) No one is satisfied with the working conditions

(5 x 5 = 25)

PART D

Answer any two of the following questions. Each question carries twelve marks

28. (a) State and prove the Baye's Theorem.
 (b) There are three class rooms labelled R1, R2 an R3. There are 12 boys and 15 girls in room R1, 16 boys and 10 girls in room R2, 15 boys and 15 girls in room R1. One person was selected from a randomly chosen room and the person selected was found to be a boy. What is the probability that the person was selected from the Room R3?
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	3k	7k	17k	26k	31k	28k	19k	10k	2k	k

 Calculate the following
 - (a) The value of k
 - (b) $P(2 < X \leq 5)$
 - (c) $P(X > 7)$
 - (d) $P(X \leq 3)$
30. What are the properties of normal distribution?
31. The life of electric bulbs follows a normal distribution with mean life of 3600 hours and standard deviation of 1000 hours. What is the probability that life of a randomly selected bulb is
 - (a) Between 3000 and 4000 hours
 - (b) More than 5000 hours
 - (c) Less than 2000 hours

(12 x 2 = 24)