

B.Sc. DEGREE END SEMESTER EXAMINATION - OCTOBER 2024**SEMESTER 3: STATISTICS (FOR PSYCHOLOGY)****COURSE :19U3CPSTP03 : STATISTICAL METHODS AND ELEMENTARY PROBABILITY***(For Regular 2023 Admission and Improvement/Supplementary 2022/2021/2020 Admissions)*

Time: Three hours

Max Marks: 75

PART A***Answer all questions, in not more than two/three sentences.******Each question carries 1 mark.***

1. Aof the sample space of a random experiment is called an event.
2. If A and B are two exhaustive events, then then $P(A \cup B) = \dots\dots\dots$
3. Probability of having 31 days when a month is drawn randomly from the 12 months of an year is
4. The probability of an impossible event is
5. For any two events A and B, $P(A/B) = \dots\dots\dots$
6. The number of customers arriving in a supermarket is an example of random variable.
7. If the random variable X represent the number of heads when 4 coins are tossed at a time, then $P(X = 4) = \dots\dots\dots$
8. The variance of a binomial distribution with parameters 12 and 0.5 is
9. If the mode of a normal distribution is 4000, then median is
10. The mean of a standard normal distribution is **(1 x 10 = 10)**

PART B***Answer any Eight of the following questions in three/four sentences.******Each question carries 2 marks.***

11. Define mutually exclusive events.
12. Write down the sample space when a coin and die are tossed together and faces turning up are observed.
13. A and B are two events such that $P(A) = 0.6$, $P(B) = 0.7$ and $P(A \cup B) = 0.95$. Find the probability of occurrence of A and B.
14. Find $P(A/B)$ if $P(A) = 0.5$, $P(B) = 0.6$ and $P(A \cup B) = 0.90$
15. What is the probability of having 53 Sundays in a randomly selected non leap year
16. Define expectation a random variable.
17. What are the conditions under which a binomial distribution tends to a Poisson distribution?
18. For a binomial distribution, the probability of success is four times that of failure. Find probability of getting 2 successes when the experiment is repeated 8 times.
19. Give two examples of random variables which follow Poisson distribution.
20. If mean and standard deviation of a normal distribution are μ and σ respectively, then what is the probability that a randomly selected observation will have a value between $(\mu - \sigma)$ and $(\mu + \sigma)$ **(2 x 8 = 16)**

PART C

Answer any Five of the following questions in a paragraph.

Each question carries 5 marks

21. What is a random experiment? How is it different from a deterministic experiment?
22. Define conditional probability. Give the condition for two events A and B to be independent in terms of conditional probability.
23. Past records show that A can finish 60% of the work on time and B can finish 70% of the work on time. If both of them are given same kind of a work, what is the probability that
 - (a) Both of them finish the work on time
 - (b) Both of them fail to finish the work on time.
24. Define a discrete random variable. Give the properties of its probability density function.
25. Find the mathematical expectation of the random variable X representing the sum of numbers when two dice are thrown at a time.
26. A discrete random variable X follows a Poisson distribution with parameter m such that $P(X = 1) = P(X = 2)$. Find $P(X = 0)$
27. An opinion poll showed that 70% of the people in a city are satisfied with public transport system in the city. If 8 persons are selected at random, what is the probability that
 - (a) All are satisfied with the public transport system
 - (b) No one is satisfied with the public transport system

(5 x 5 = 25)

PART D

Answer any Two of the following questions in essay form in about 300 words.

Each question carries 12 marks

28.
 - (a) State and prove the Baye's Theorem.
 - (b) There are three groups of students G1, G2 and G3. There are 10 boys and 12 girls in group G1, 9 boys and 10 girls in group G2, 12 boys and 8 girls in Group G3. One student was selected from a randomly chosen group and the student selected was found to be a boy. What is the probability that the student was selected from the group G3?
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):	2a	4a	7a	14a	22a	30a	32a	25a	20a	12a	4a

Calculate the following
 - (a) The value of a
 - (b) $P(3 < X < 4)$
 - (c) $P(X > 7)$
 - (d) $P(X \leq 2)$
30. Give any eight properties of a normal distribution?
31. The mark of students in an examination follows a normal distribution with mean mark of 800 and standard deviation of 250. What is the probability that mark of a randomly selected student is
 - (a) Between 300 and 1000
 - (b) More than 500
 - (c) Less than 1200

(12 x 2 = 24)
