Indian Institute of Information Technology, Sri City, Chittoor
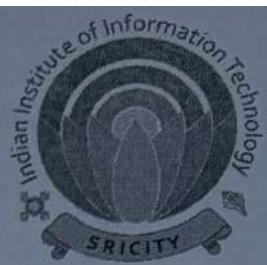### Spring Semester Schedule Quiz 1, February-2026
UG-1, Second Sem

Name of the Exam: P & S (S1)

Duration: 20 Minutes

Feb 14, 2026

Max. Marks: 15

Instructions:

1. *Calculators are allowed.*
2. *All questions are mandatory and carry equal mark.*
3. *Tick only the right option. If we find two ticks for one question, '0' marks will be awarded.*
4. *Rough work should not be done in the question paper.*
5. *Return the question paper along with the rough sheet before leaving the exam hall.*

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1. **The expected number of distinct units in a simple random sample of 3 units drawn with replacement from a population of 100 units is**

   (a) $3 - \left(\dfrac{99}{100}\right)^3$

   (b) $100 - \dfrac{99^3}{100^2}$

   (c) $2 + \dfrac{99^2}{100^3}$

   (d) $3 - \left(\dfrac{99}{100}\right)^2$

2. **If a random variable X has a Poisson distribution with mean 7, then the expression $E[(X+2)^2]$ equals**

   (a) 25

   (b) 45

   (c) 54

   (d) 88

3. **Let E and F be two events such that $0 < P(E) < 1$, $0 < P(F) < 1$, and $P(E \cap F) > P(E)P(F)$. Which of the following statements is TRUE?**

   (a) $P(E \mid F^c) > P(E)$

(P.T.O.)

(b) $P(E \mid F) > P(E)$

(c) $P(F \mid E^c) > P(F)$

(d) E and F are independent

4. Compute the median for the exponential distribution with parameter λ.

(a) $\dfrac{\ln(2)}{\lambda}$

(b) $\dfrac{\ln(2)}{2\lambda}$

(c) $\dfrac{2\ln(2)}{\lambda}$

(d) $\dfrac{\ln(3)}{\lambda}$

5. Which one of the following statements is not true?

(a) The measure of skewness is dependent upon the amount of dispersion

(b) In a symmetric distribution, the values of mean, mode and median are the same

(c) In a positively skewed distribution, mean > median > mode

(d) In a negatively skewed distribution, mode > mean > median

6. For a random variable X (where $-\infty < x < \infty$) following normal distribution, the mean is $\mu = 100$. If the probability is $P(X \geq 110) = \alpha$. Then the probability of X lying between 90 and 110, i.e., $P(90 \leq X \leq 110)$ is equal to

(a) $1 - 2\alpha$

(b) $1 - \alpha$

(c) $1 - \dfrac{\alpha}{2}$

(d) 2α

7. A probability density function on the interval $[a, 1]$ is given by $\dfrac{1}{x^2}$ and outside this interval the value of the function is zero. The value of a is:

(a) 0.05

(b) 0.075

(c) 0.25

(d) 0.5

8. The lifetime of a component of a certain type is a random variable whose probability density function is exponentially distributed with parameter 2. For a randomly picked component of this type, the probability that its lifetime exceeds the expected lifetime (rounded to 2 decimal places) is

(a) 0.37

(b) 0.63

(c) 0.27

(d) 0.43

9. Let $\{1, 2, 3, 4\}$ represent the outcomes of a random experiment, and $P(\{1\}) = P(\{2\}) = P(\{3\}) = P(\{4\}) = \dfrac{1}{4}$. Suppose that $A_1 = \{1, 2\}$, $A_2 = \{2, 3\}$, $A_3 = \{3, 4\}$, and $A_4 = \{1, 2, 3\}$. Then which of the following statements is true?

(a) A_1 and A_2 are not independent.

(b) A_3 and A_4 are independent.

(c) A_1 and A_4 are not independent.

(d) A_2 and A_4 are independent.

10. The probability of getting a "head" in a single toss of a biased coin is 0.3. The coin is tossed repeatedly until a "head" is obtained. If the tosses are independent, then the probability of getting a "head" for the first time on the 5th toss is

(a) 0.072

(b) 0.052

(c) 0.067

(d) 0.085

11. Let X be a random variable with cumulative distribution function given by

$$F(x) = \begin{cases} 0, & \text{if } x < 0, \\ \dfrac{x+1}{3}, & \text{if } 0 \le x < 1, \\ 1, & \text{if } x \ge 1. \end{cases}$$

Then the value of $P(\frac{1}{3} < X < \frac{3}{4}) + P(X = 0)$ is equal to

(a) $\dfrac{7}{36}$

(b) $\dfrac{11}{36}$

(c) $\dfrac{13}{36}$

(d) $\dfrac{17}{36}$

12. The moment generating function of an integer valued random variable X is given by

$$M_X(t) = \frac{1}{10} \left(2 + e^t + 4e^{2t} + 3e^{3t} \right) e^{-t}.$$

Then $P(2X + 5 < 7)$ is equal to

(a) $\dfrac{3}{10}$

(b) $\dfrac{7}{10}$

(c) 1

(d) $\dfrac{4}{10}$

13. Assume that $X \sim \text{Binomial}(n, p)$ for some $n \ge 1$ and $0 < p < 1$ and $Y \sim \text{Poisson}(\lambda)$ for some $\lambda > 0$. Suppose $E(X) = E(Y)$. Then

(a) $\text{Var}(X) = \text{Var}(Y)$

(b) $\text{Var}(Y) < \text{Var}(X)$

(c) $\text{Var}(X) < \text{Var}(Y)$

(P.T.O.)

3

(d) $\text{Var}(X)$ may be larger or smaller than $\text{Var}(Y)$ depending on the values of n, p, λ.

14. Let the continuous r.v. X denote the weight (in pounds) of a package. The range of weight of packages is between 45 and 60 pounds. Determine the probability that a package weighs more than 50 pounds.

(a) $\frac{1}{3}$

(b) $\frac{8}{3}$

(c) $\frac{4}{3}$

(d) $\frac{2}{3}$

15. In a population, 2% of people have a certain genetic condition. A test has been developed to detect this condition, and it correctly identifies the condition in 90% of cases. However, it also produces a false positive result in 5% of cases for people who do not have the condition. If a randomly selected person tests positive, what is the probability that they actually have the genetic condition?

(a) $\frac{19}{65}$

(b) $\frac{17}{65}$

(c) $\frac{16}{67}$

(d) $\frac{18}{67}$

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