

Indian Institute of Information Technology, Sri City, Chittoor

Name of the Exam: M2 Mid Examination

Duration: 1.5 hrs

Max. Marks: 15

Instructions: (Please Read all of them carefully before attempting the questions)

1. Write your Roll No. and Name on top of every page of the answer sheet. It is mandatory.
 2. All questions are mandatory.
 3. Marks are indicated in [] after each question.
 4. Rough Work should be done separately, not in the answer sheet.
 5. Answers should be reasoned and derived clearly, not a single word answer.
 6. You are required to write the answers in A4 sheets.
 7. At the end of the exam, you are expected to submit the scanned copy of the answer sheets in pdf format on provided link before the indicated closing time (not beyond 10.30 AM)
 8. Preferably use a ballpoint pen. The writing should be readable after scanning. (This is very important)
 9. Copying in any form will be dealt strictly.
 10. This is a proctored exam. You need to keep your video on throughout the exam.
 11. Please note that the total time of the written exam is 1.5 hours including scanning and uploading. You are expected to submit the answer sheet strictly by 1.5 hours. Manage your time accordingly.
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1. (a) A sack contains five balloons, three green and two blue. Balloons are randomly drawn until all the green balloons are drawn or all the blue balloons are drawn from the sack one at a time without replacement. What is the probability that the last balloon drawn is blue?

(b) Geetha and her friend Rekha appear in an interview for two vacancies in the same post. The probability of Geetha's selection is $\frac{1}{9}$ and the probability of Rekha's selection is $\frac{1}{4}$. What is the probability that only one of them is selected?

[1.5+1.5]

2. A new device is introduced in the market. The Company “A” manufactures 70% of the devices, the Company “B” manufactures 25% of them, and the Company “C” manufactures the other 5%. The devices made by “A” have a 5% rate of defects, the company B’s devices have a 8% rate of defects, and the C’s have a 7% rate of defects.

(a). If a device is randomly selected from the general population of all devices, find the probability that it is a defective device.

(b). If a randomly selected device is then tested and is found to be defective, find the probability that it was made by the Manufacturing Company “C”

[1.5+1.5]

3. For the following probability density function find

$$f(x) = \begin{cases} x & \text{if } 0 \leq x < 1 \\ 2-x & \text{if } 1 \leq x \leq 2 \\ 0 & \text{otherwise} \end{cases}$$

(a) Cumulative distribution function

(b) Expectation of Y where $Y=2X$

(d) $P(0.16 < x < 1.75)$

[1+1+1]

4. (a) Suppose average heights of employees are normally distributed with mean 75 inches and variance 18 inches. Find the probability that a randomly chosen employee is at least 6 feet and not more than 7.3 feet (1 foot = 12 inches)

(b) The number of births in a city follows Poisson distribution with mean rate of 8 per day. What is the probability that at least 64 have born in 7 days?

[1.5+1.5]

5. Average lifetime of an electronic device is 11.3 years with a standard deviation 3.6. If the distribution is not known, give an interval of lifetimes of the device that will contain the lifetime at least 87.9% of device lifetimes.

[3]