Department of Computer Systems Engineering
University of Engineering & Technology
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Probability Methods in Engineering
Mid-Term Examination, Spring 2021

INSTRUCTIONS

1. The maximum time allowed is 2 hours (11 am to 1 pm).
2. Total marks for this exam are 50.
3. All questions carry equal marks except the last question, which carries 8 marks.
4. Write your name and registration number on every page of your answer sheet(s).
5. **You have to submit your answer sheet as per procedure described in Google Classroom.**
6. Answers should be clearly legible and understandable.

Question 1: A fair die is rolled thrice, and the outcome of this experiment is recorded.

a) What is the size of the sample space for this experiment?

b) What is the probability that the sum of first and second outcomes is equal to the third outcome?

Question 2: A team of 3 players has to be selected from among 9 players. What is the probability that two particular players will be included in the team?

Question 3: An urn consists of 8 balls including 5 white balls and 3 black balls. 4 balls are drawn at random. What is the probability that exactly 2 balls are black?

Question 4: A multiple-choice test has five questions with three choices each, i.e. a, b and c. How many ways are there to answer the test? What is the probability that all answers are the same (e.g. a, a, a, a, a)?

Question 5: A fair die is tossed twice and the number of dots facing up is counted and noted in the order of occurrence. Let A be the event "number of dots in first toss is not less than number of dots in second toss," and let B be the event "number of dots in first toss is 6." Find $P[A|B]$ and $P[B|A]$.

Question 6: Traffic police checked the CNICs and driving licenses of all the people driving any vehicle on a particular road on a given day. 85% of the drivers were carrying valid CNICs and 75% of the drivers were carrying valid driving licenses. 65% of the drivers were carrying both valid CNICs and driving licenses. What percent of those who were carrying a valid CNIC were also carrying a valid driving license? What percent of those who were carrying a valid driving license were also carrying a valid CNIC?

Question 7: A computer manufacturer uses chips from three sources. Chips from sources A, B, and C are defective with probabilities 0.005, 0.001, and 0.010, respectively. If a randomly selected chip is found to be defective, find the probability that: the manufacturer was A; that the manufacturer was C. Assume that the proportions of chips from A, B, and C are 0.5, 0.1, and 0.4 respectively.