AMERICAN INTERNATIONAL UNIVERSITY – BANGLADESH

Faculty of Science and Technology

Department of Mathematics

MAT 3103: Computational Statistics and Probability (All Sections)

Mid-Term Examination Summer: 2022-23

Total Marks: 40 Time: 2 hours

***Faculty members****: ……………………………………………………..*

*Name: ID: Section:*

**Question 1 (OBE) must be answered in given space**

**1.** The following is the distribution of consumption of electricity (MW/locality) in different days:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Class Interval | 1 - 4 | 4 - 8 | 8 - 12 | 12 - 16 | 16 - 20 | Total |
| Frequency | 5 | 8 | 15 | 18 | 4 | 50 |

1. What do you understand by **central tendency**? **2**
2. Calculate the **mode** of the distribution.  **4**
3. Also, calculate the **variance** for the distribution.  **4**

**Answer any three from Question 2 to Question 5 (10 X 3 = 30) in answer script**

**2.** **a)** In a box there are 20 bulbs. The bulbs are identified by identity number 1 to 20. One bulb is selected randomly. Find the probability that the selected bulb has the identity number **(i)** either multiple of 4 or 5, and **(ii)** even under the condition that it is multiple of 5. **5**

**b)** There are 40 students in a course at AIUB, out of which, 22 are from EEE and 18 are from CSE department. The CGPA of 12 EEE and 8 CSE students are found to be good. One student is selected randomly. Find the probability that the selected student is **(i)** from CSE dept. given that his CGPA is good, and **(ii)** either from EEE dept. or his CGPA is not good. **5**

**3.** The joint probability density function of two continuous random variables *X* and *Y* is:

*f (x, y) =4xy; 0 < x < 1, 0 < y < 1*.

1. Show that *X* and *Y* are independent random variables. **4**
2. Calculate *V (2X - 3Y)*. **6**

**4.** **a)** In a firm, 45% staffs get injured during work. Six staffs are selected randomly. Find the probability that out of the 6, **(i)** 2 staffs get injured, and **(ii)** at best 2 staffs get injured. **5**

**b)** The average number of signals sent from Dhaka railway station, not reaching properly to Chittagong railway station, is 5 per day. Find the probability that on a particular day, the number of signals not reaching properly is **(i)** at best 5, and **(ii)** at least 5. **5**

**5.** **a)** The mode of the density of faded out signal is 3.59. Find the probability that the density of a randomly selected signal will be **(i)** more than 4, and **(ii)** less than 3. **5**

**b)** The average time needed to get service in a bank is 5 minutes. Find the probability that a random client will be served **(i)** within 4 to 7 minutes, and **(ii)** after 6 minutes. **5**

|  |  |
| --- | --- |
| **List of formulas** | |
|  |  |
|  |  |
| = Antilog () |  |
| Me = | Mo = |
| SK = mean – median | SK = mean – mode |
| MD | 2 = |
| CV x 100% | MD |
| 2 = |  |
|  |  |
|  | *dx* |
| *dx* |  |
|  | P(⎪E) = = |
|  |  |
|  |  |
|  | *1* |
|  | *1* |
|  |  |