

**Department of Computer Science and IT**  
**Mid Term Examination**  
**[Shrawan 2078]**

**Subject: Statistics II**  
**Year/Semester: II/III**  
**Program: B.Sc. CSIT**

**F.M: 30**  
**P.M: 12**  
**Time: 1.5 hr.**

- Candidates are required to give their answers in their own words as far as practicable.
- The figures in the margin indicate **Full Marks**.

**Section A (1 \*10 =10)**

- 1) Describe sampling distribution and standard error of sample mean. Suppose a population consist of four numbers 2, 8, 9, and 5 then
- Draw all possible sample of size two with replacement.
  - Compare the population mean versus sample mean
  - Compute standard error of sample mean.

**Section B Attempt any Four question. (4 \*5=20)**

- 2) Differentiate between point and interval estimation. In a random sample of 300 households in a city 223 have computer. Set an approximate 95% and 99% limits to the true value of proportion of households with computer in the whole city.
- 3) In order to ensure efficient usage of a server, it is necessary to estimate the mean number of concurrent users. According to records, the average number of concurrent users at 100 randomly selected times is 37.7, with a sample standard deviation of 9.2. At the 1% level of significance, do these data provide considerable evidence that the mean number of concurrent users is at least 35?
- 4) 10 engineering students were selected at a big organization. They were given an IQ test immediately after selection and their scores out of 50 were noted. Two month training was arranged for them and on completion of IQ test was again given and score recorded.

Students	1	2	3	4	5	6	7	8	9	10
Score (before)	31	35	38	25	40	45	40	38	18	30
Score (after)	32	30	32	37	38	37	42	40	27	35

On the basis of these results, can it be concluded that the training has benefited the students?

- 5) Modern email servers and anti-spam filters attempt to identify spam emails and direct them to a junk folder. There are various ways to detect spam, and research still continues. In this regard, an information security officer tries to confirm that the chance for an email to be spam depends on whether it contains images or not. The following data were collected on N = 1000 random email messages

	With image	No image	total
<b>Spam</b>	160	240	400
<b>No spam</b>	140	460	600
<b>Total</b>	300	700	1000

Assess whether being spam and containing images are independent factors at 1% level of significance.

- 6) The operating time of two different brands of laptops in hour is given below

Acer	5.2	4.8	4.7	6.0	5.3	6.1
Dell	6.3	4.9	5.0	5.8	5.1	6.2

Do these data provide sufficient evidence to conclude that the operating time of Dell brand is higher than Acer? Use Mann Whitney U test.

**-- Good Luck --**