MT-2005: Probability & Statistics
BS(CS) All Sections

Saturday, 25th February, 2023

Course Instructors:

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Serial No:

Sessional - I Exam
Total Time: 1 Hour
Total Marks: 60

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Signature of Invigilator

_____   _____   _____   _____
Student Name   Roll No.   Course Section   Student Signature

DO NOT OPEN THE QUESTION BOOK OR START UNTIL INSTRUCTED.

Instructions:

1. Attempt on question paper. Attempt all of them. Read the question carefully, understand the question, and then attempt it.
2. No additional sheet will be provided for rough work. Use the back of the last page for rough work.
3. If you need more space write on the back side of the paper and clearly mark question and part number etc.
4. After asked to commence the exam, please verify that you have **Seven (07)** different printed pages including this title page. There are a total of **Five (05) questions**.
5. Calculator sharing is strictly prohibited.
6. Use permanent ink pens only. Any part done using soft pencil will not be marked and cannot be claimed for rechecking.

	Q-1	Q-2	Q-3	Q-4	Q-5	Total
Marks Obtained						
Total Marks	15	10	15	08	12	60

National University of Computer and Emerging Sciences

FAST School of Computing   **Spring-2023**   **Islamabad Campus**

Question#1 [10+05=15 Marks]

The data displayed below represents the cost of renting an apartment, in dollars, during December 2020 for a random sample of 40 one bed apartments in a large city.

222	195	223	216	188	180	220	201	199	181
213	198	186	185	215	195	216	200	210	209
189	216	213	196	193	222	198	186	195	216
188	195	208	220	215	194	190	203	191	210

(a): Construct a frequency distribution by taking class interval of 9 and starting class as 180-188.

(b): Use the frequency distribution constructed in part (a) of the Q#1, find the cumulative relative frequency column.
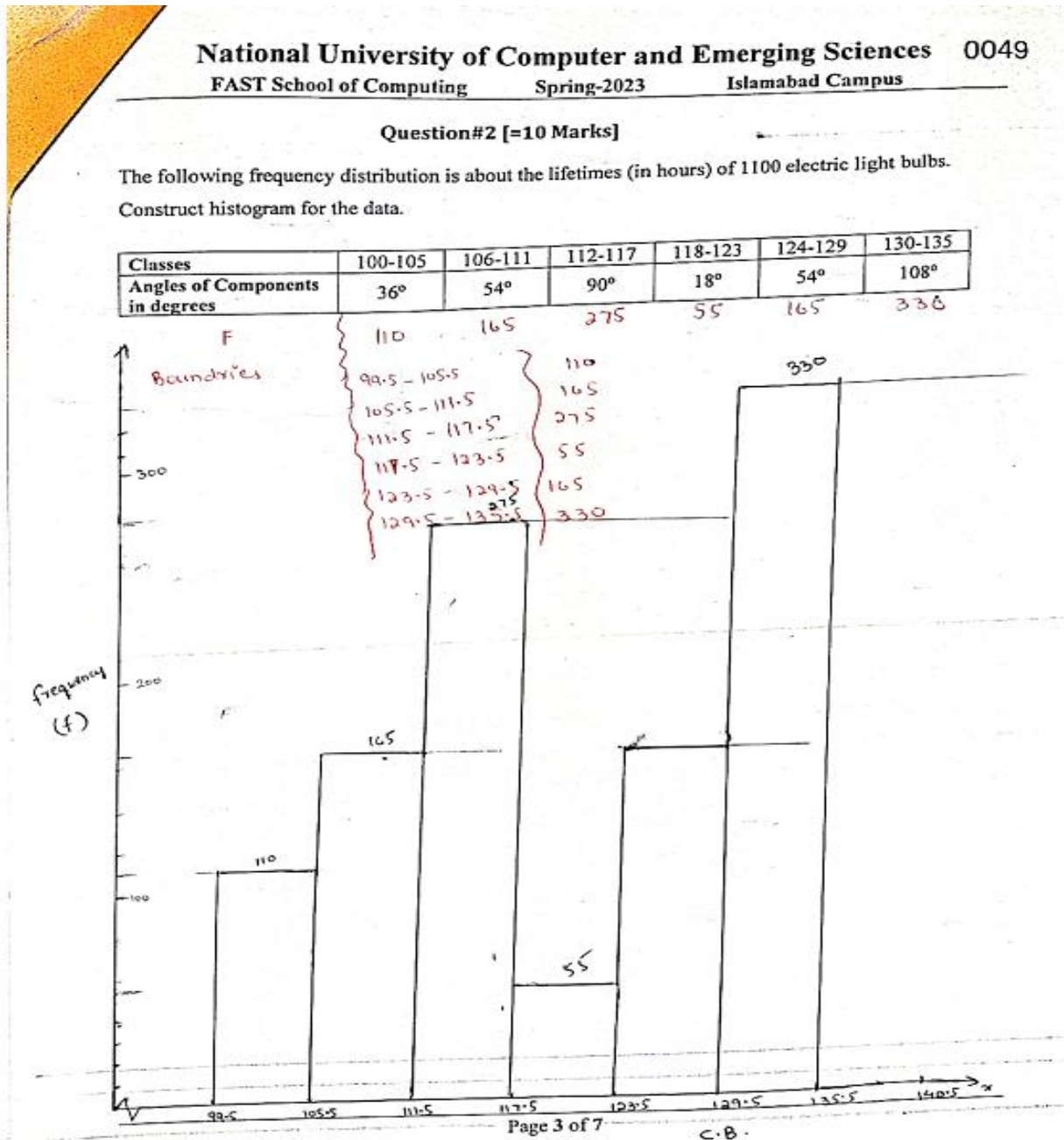
Solution Part (a):

Classes	Frequency
180—188	7
189—197	10
198—206	6
207—215	8
216—224	9

Solution Part (b):

Classes	Cumulative Relative Frequency
180—188	7/40
189—197	17/40
198—206	23/40
207—215	31/40
216—224	40/40

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Question#2 [=10 Marks]

The following frequency distribution is about the lifetimes (in hours) of 1100 electric light bulbs. Construct histogram for the data.

Classes	100-105	106-111	112-117	118-123	124-129	130-135
Angles of Components in degrees	36°	54°	90°	18°	54°	108°

Boundaries
- 99.5 – 105.5 → 110
- 105.5 – 111.5 → 165
- 111.5 – 117.5 → 275
- 117.5 – 123.5 → 55
- 123.5 – 129.5 → 165
- 129.5 – 135.5 → 330

C.B.

Question#3 [03+01+02+04+05=15 Marks]

a) A person computed arithmetic mean (AM), geometric mean (GM) and harmonic mean (HM) of a data set representing distance covered daily. He recorded them without any order as: 125.2, 127.3 and 115.9. Identify the values of AM, GM and HM.

Solution:

AM = 127.3   GM = 125.2   HM = 115.90

b) What is the mode of the following data set: 10, 10, 10, 10, 10, 10

Solution: No Mode

c) For a certain distribution the sum of deviations are given below, what would be the value of arithmetic mean?

$$\sum(x - 20) = 19 , \sum(x - 7) = 0 , \sum(x - 12) = 8$$

Solution: Mean = 7

d) The mean of 15 numbers is 891.2. If one new observation is included in the data set then the new mean becomes 893.0. Find the new value added.

Solution:
$$891.2 = \frac{\sum_{i=1}^{15} x_i}{15}$$

$$\sum_{i=1}^{15} x_i = 13368$$

$$893.0 = \frac{\sum_{i=1}^{15} x_i + x_{16}}{16}$$

$$893.0 = \frac{13368 + x_{16}}{16}$$

$$x_{16} = 920$$

e) From the following frequency distribution find the missing frequency if mean of the following frequency distribution is 15.40

Mid Point	10	12	14	16	18	20
Number of employees	7	3	?	10	15	2

Solution:

$$\bar{X} = \frac{\sum fx}{\sum f} = \frac{10(7) + 12(3) + 14f + 16(10) + 18(15) + 10(2)}{7 + 3 + f + 10 + 15 + 2}$$

$$15.4 = \frac{576 + 14f}{37 + f}$$

$$f = 4.42 \approx 4$$

Question#4 [06+02=08 Marks]

The manager of a certain NADRA registration center in a large city is concerned about the amount of waiting time for an applicant before being treated. The following data of waiting time (in minutes) were collected on a particular day:

Waiting Time (in minutes)	30—40	40—60	60—75	75—80	80—95	95—120
Number of Applicants	35	80	130	62	37	16

(a): Find the time limit for which more than 62 % applicants have to wait for their turn.

Solution:

$$P_{38} = lb + \frac{h}{f}\left(38\,\frac{\Sigma f}{100} - c\right)$$

$$= 60 + \frac{15}{130}(136.8 - 115)$$

$$= 62.50 \approx 63 \text{ Minutes}$$

(b): How many applicants have to wait less than 75 minutes for their turn?

Solution: 245 Applicants

Question#5 [03*4=12 Marks]

The following distribution relates to the number of the assistants in 50 retails establishments.

No. of Assistants	0	1	2	3	4	5	6	7	8	9
Frequency	3	4	6	7	10	6	5	5	3	1

Calculate
    a) Upper Quartile

Solution:

$$Q_3 = 3\left(\frac{\sum f + 1}{4}\right)^{th} = 38.25^{th}$$

$$Q_3 = 5$$

    b) D_4

Solution:

$$D_4 = 4\left(\frac{\sum f + 1}{10}\right)^{th} = 20.40^{th}$$

$$D_4 = 4$$

    c) P_{92}

Solution:

$$P_{92} = 92\left(\frac{\sum f + 1}{100}\right)^{th} = 46.92^{th}$$

$$P_{92} = 8$$

    d) Mode
    Solution:
    Mode = 4 Because of most repeated value

Good Luck