(2)

ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)
ORGANISATION OF ISLAMIC COOPERATION (OIC)
DEPARTMENT OF TECHNICAL AND VOCATIONAL EDUCATION (TVE)

Semester Final Examination — Summer Semester (2021-2022)
Course No: TVE 4237 — Time: 3 hours
Course Title: Educational Measurement and Statistics — Full Marks: 150

There are seven (7) questions. Answer any six (6) of them.
Figures in the right margin indicate marks of the questions. The symbols have their usual meanings.

1. a) Suppose that the academic standings of students in a programming competition in your investigation is as follows: freshman, n = 25; junior, n = 20; sophomore, n = 22; senior, n = 15; graduate, n = 10. (10) CO2, CO3
   i) Construct a frequency distribution for these data.
   ii) On what measurement scale are these observations?
   iii) Does it matter in what order we arrange the categories?

b) Imagine that you want to compare the frequency distributions for males and females separately (on some variable), and there are considerably more females than males. Which would you concentrate on—the original frequencies or the relative frequencies? Why? Provide an illustration to support your reasoning. (5)

c) What is percentile and percentile rank? Based on the notion of percentile and percentile rank- (10)
   i) Can a percentile have the value of 517? Explain.
   ii) Can a percentile have the value −5.8? Explain.
   iii) Can a percentile rank have the value 517? Explain.
   iv) Can a percentile rank have the value −5.8? Explain.

2. a) From the table shown in the right: (10) CO2, CO3
   i) Find the real limits of each class intervals.
   ii) Construct the cumulative frequencies.
   iii) Construct the cumulative percentages frequencies.
   iv) Find P_{20} and P_{35}.

APPARENT LIMITS	f
96–98	1
93–95	0
90–92	2
87–89	7
84–86	10
81–83	6
78–80	8
75–77	4
72–74	3
69–71	4
66–68	3
63–65	0
60–62	2
57–59	
54–56	
Totals	50

b) Describe the similarities and differences between a bar chart and a histogram. (5)

c) Indicate the probable shape of each of the following distributions: (10)
   i) Heights of a large sample of 25-year-olds
   ii) Scores on the same math test taken by 30 fifth graders and 30 ninth graders (combined into a single frequency distribution)
   iii) Verbal aptitude of high school students
   iv) SAT scores for students admitted to a very selective university.
   v) Ages of first year students in Bangladeshi universities

3. a) Explain how a distribution can be perfectly symmetrical but have different values for the mode and the median. Will the mean in this case equal the mode, the median, or something else? (6) CO2, CO3

b) What is meant by the "balance point" of a distribution of scores? How is the expression, $\sum(\bar{X} - X) = 0$, relevant to this concept? Explain it with an example. (7)

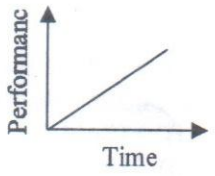
c) $\bar{X} = 23$, $M_{dn} = 28$, mode = 31 for a particular distribution of 25 scores. It was subsequently found that a scoring mistake had been made: one score of 43 should have been a 34. (8)
   i) What is the correct value for $\bar{X}$?
   ii) How would the M_{dn} and mode be affected by this error?

d) Suppose you were a school psychologist and were interested only in improving the median self-esteem score of children in your school. Explain, on which of the following students would you work the hardest: (4)
   i) Those with the lowest self-esteem scores

ii) Those with the highest
iii) Those just below the median
iv) Those just above the median

4. a) Explain with an example, why a variability measure is necessary. (5)
   b) Each of five raw scores is converted to a deviation score. The values for four of the deviation scores are as follows: -4, +2, +3, -6. What is the value of the remaining deviation score? (5)
   c) Why is the variance little used as a descriptive measure? (5)
   d) A student obtains 80 marks in Math and 50 in English. If the mean and SD for the scores in Math are 70 and 20 and for the scores in English are 30 and 10, find out in which subject, Math, or English, he did better? (10)

5 a) Why is the linear learning curve (shown in the figure) not suitable to explain the growth reference test? Discuss.



   b) Describe <u>two testing situations</u> for which you would want to use a norm-referenced test and <u>two situations</u> in which you would want to use a criterion-referenced test.
   c) Identify the appropriate frames of references to interpret students' following classroom performances:
      (i) Mary's math score placed her near the bottom of the class.
      (ii) Chan defined 90% of the engineering terms correctly in the class.
      (iii) Mike can identify all the parts of an engine.
      (iv) Katie surpassed 85% of the 3rd year students on the c programming test.

6 a) Show with an illustration how assessment, measurement, test, and evaluation are interconnected. (5)
   b) How is the process of evaluation different from the process of measurement? (10)
   c) Give an example of a measure of maximum performance and a measure of typical performance. Of what value is this distinction? (10)

7 a) Explain the difference between ordinal and interval scale with an example. (5)
   b) Identify the type of scales of measure used in each of the following situations and justify by mentioning the properties of measurement scales: (20)
      (i) As you leave a restaurant, you are asked to answer a few questions regarding what you thought about the service you received.
      (ii) When you join a weight loss group, they ask that you keep a dairy book noting your weight each week.
      (iii) As part of a research study, you are asked to record your positive and negative emotions ranging from -10 to +10 value.
      (iv) When you visit your career services office, they give you a test that indicates professions to which you are best suited.

<u>Some useful formulas</u>

$$\mathbf{M} = \frac{\Sigma fX}{N} \; ; \; M_d = \left(\frac{N+1}{2}\right) th \; ; \; \boldsymbol{M_d} = L + \left[\frac{(N/2)-F}{f}\right] \times i \; ; \; \boldsymbol{SD} = \sqrt{\frac{\Sigma X^2}{N}} \; ; \; \boldsymbol{SD} = \sqrt{\frac{\Sigma fX^2}{N}}$$

$$\boldsymbol{PR} = \frac{100}{N}\left[F + \left(\frac{X-L}{i}\right) \times f\right] ; \; \boldsymbol{z} = \frac{X-M}{\sigma}$$