(5)

Program : BScTE, 4th Semester
Semester : Summer

Date : 29 May 2024, Wednesday
Time : 10.00 am to 1.00 pm, Morning

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

Examination : Semester Final
Course No : TVE 4237
Course Title : Educational Measurement and Statistics

Academic Year : 2022-2023
Full Marks : 150
Duration : 3.00 hours

There are six (6) questions. Answer all of them.

Figures in the right margin indicate marks of the questions. The symbols have their usual meanings.

1. a) In a perfectly symmetrical distribution, when would the mode be different from the mean and median? (5) CO2, CO3

b) Jesse was ranked 37th in his graduating class of 180 students. At what percentile is Jesse's ranking? (10)

c) One hundred teachers attended a seminar on mathematical problem solving. The attitudes of a representative sample of 12 of the teachers were measured before and after the seminar. A positive number for change in attitude indicates that a teacher's attitude toward math became more positive. The 12 change scores are as follows: 3; 8; –1; 2; 0; 5; –3; 1; –1; 6; 5; –2 (10)

i) What is the *mean* of the changes in attitude score?
ii) What is the standard deviation for this population?
iii) What is the median of the changes in attitude score?
iv) Find the attitude change score that is 2.2 standard deviations below the mean.

2. a) Three students were applying to the same graduate school. They came from different schools with different grading systems. (10) CO2, CO3

Student	GPA/ Score	School Average GPA/ Score	School Standard Deviation
Student 1	2.7	3.2	0.8
Student 2	87	75	20
Student 3	8.6	8	0.4

Which student had the best GPA/ Score when compared to other students at his school? Explain how you determined your answer.

b) To say, "This value is 25% greater than that value," requires which type of measurement scale? (5)

c) If A, B, C, D, and F grades are used for statistical purposes, the letters are converted to 4, 3, 2, 1, and 0. Does this represent a ratio scale? Justify your answer. (10)

3. a) Think of a distribution of scores for which the mean is 65.5, the median is 64, and the mode is 60. Suppose you later learn that one of the scores is in error. Instead of 70, the score should have been 90. Which measure of central tendency will certainly change? Justify it. (5) CO2, CO3

b) State the likely relative positions of the mean, median, and mode for the following distributions: (10)

i) family income in a large city
ii) scores on a very easy exam
iii) heights of a large group of students studying at grad 10.
iv) the number of classes skipped during the year for a large group of undergraduate students (10)

c) An achievement test designed to measure the level of arithmetic achievement among students in the middle of the third grade is administered to three classes of equal size: one first-grade class, one third-grade class, and one fifth-grade class. The test is administered in the middle of the school year. Other things being equal, what sort of distribution would you predict for each of the three classes? Sketch a distribution of the shape you would expect for each grade. On each of your three sketches, indicate the probable location of the three measures of central tendency.

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4. a) What is variance? Why is the variance little used as a descriptive measure? (5) CO2,
   b) Which measure of variability—the range, semi-interquartile range, or the standard deviation—is (10) CO3
      i) best for open-ended distributions?
      ii) calculated by using only two scores?
      iii) calculated by taking the sum of squared deviations from the mean?
      iv) not responsive to scores in the middle of the distribution?
      v) best for very skewed distributions?
      vi) responsive to the exact position of every score in the distribution?
      vii) related to the median in its properties?
   c) The following are the means and standard deviations of some well-known standardized tests, referred to as Test A, Test B, and Test C. All three yield normal distributions. (10)

Test	*Mean*	*Standard Deviation*
Test A	500	100
Test B	100	15
Test C	60	10

      i) A score of 325 on Test A corresponds to what score on Test C? A score of 640 on Test A corresponds to what score on Test B?
      ii) The teacher told a student that he had scored so high on Test A that only 2 people out of 100 would score higher. What was the student's score on Test A?

5 a) A student could have a very low percentile rank, but still meet the criterion for proficiency in a subject. Justify the case of this student with necessary examples and illustrations. (15) CO1
   b) Discuss the disadvantages of norm-reference test. (10)

6 a) Differentiate between the complex performance and fixed-choice tests. (10) CO1
   b) Discuss the different assessment procedures with examples in terms of their functional role in classroom instruction. (15)

Some useful formulas

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

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