JULY 2022
EBS 351SW
MATHEMATICS
(STATISTICS & PROBABILITY II)
1 HOUR 30 MINUTES

Candidate's Index Number
Signature:

UNIVERSITY OF CAPE COAST
COLLEGE OF EDUCATION STUDIES
SCHOOL OF EDUCATIONAL DEVELOPMENT AND OUTREACH
INSTITUTE OF EDUCATION

COLLEGES OF EDUCATION
THREE-SEMESTER BACHELOR OF EDUCATION
COHORTS I & II
LEVEL 300, SECOND SEMESTER RESIT EXAMINATION – JUNE/JULY 2022

JULY 16, 2022 **MATHEMATICS** **12:00 PM – 12:40 PM**
(STATISTICS & PROBABILITY II)

This paper consists of two sections, A and B. Answer ALL the questions in section A and TWO questions from Section B. Section A will be collected after the first 40 minutes.

SECTION A
[20 MARKS]

Answer ALL questions in this section.

For items 1 to 20, each stem is followed by four options lettered A to D. Read each item carefully and circle the letter of the correct or best option.

A, continuous random variable x has a probability density function (p.d.f) defined as

$$f(x) = kx^2 \; for \; 0 \leq x \leq 4.$$

Use this information to answer questions 1 and 2.

1. Find the value of k.
   A. $\frac{1}{64}$
   B. $\frac{3}{64}$
   C. $\frac{7}{64}$
   D. $\frac{9}{64}$

2. Find: $P(1 \leq x \leq 3)$.
   A. 0.40
   B. 0.41
   C. 0.42
   D. 0.43

3. In this sampling procedure, individuals are chosen in such a way that each has an equal chance of being selected. This is .....
   A. Cluster sampling.
   B. Random sampling.
   C. Stratified sampling.
   D. Systematic random sampling.

4. The mean age of two boys is 10 years and the mean age of three girls is 15 years. Calculate the mean age of the five children.
   A. 10 years
   B. 11 years
   C. 12 years
   D. 13 years

5. The probability that Kwame passes a certain examination is $\frac{2}{3}$ and the probability that his sister Adjo passes the same examination is $\frac{3}{5}$. Find the probability that only one of them passes the examination.
   A. $\frac{2}{15}$
   B. $\frac{4}{15}$
   C. $\frac{7}{15}$
   D. $\frac{14}{15}$

6. The mean age of three students was calculated to be 17 years. When a fourth student's age was added, the mean age reduced to 16.5 years. How old is the fourth student?
   A. 16 years
   B. 15 years
   C. 14 years
   D. 13 years

7. Two events A and B are such that P(A) = 0.3, P(B) = 0.6, and P(A $\cap$ B) = 0.18. Calculate p(A $\cup$ B)
   A. 0.62
   B. 0.72
   C. 0.82
   D. 0.90

8. The arithmetic mean of six consecutive odd numbers is 18. Find the least number.
   A. 17
   B. 15
   C. 13
   D. 11

9. Determine the inter-quartile range of the following numbers:
   23, 45, 24, 41, 32, 15, 52, 29, 30, and 34.
   A. 21
   B. 24
   C. 32
   D. 45

10. Out of 70 schools, 42 of them are attended by boys only and 35 are attended by girls only. If a student is selected at random from these schools, find the probability that, the student selected is from a mixed school.
    A. $\frac{1}{11}$
    B. $\frac{1}{5}$
    C. $\frac{1}{6}$
    D. $\frac{1}{10}$

11. If A and B are two events such that p(A) = 0.3, p(B) = 0.6 and p(A $\cup$ B) = 0.72, determine whether or not A and B are independent events.
    A. Dependent.
    B. Difficult to determine.
    C. Independent.
    D. Stochastics.

12. Enumeration gives rise to ..... data.
    A. categorical
    B. categorical
    C. continuous
    D. discrete

13. Data about ranks in the Ghana Education Service (like Superintendent, Senior Superintendent, Assistant Director, etc.) are an example of the ..... scale.
    A. interval
    B. nominal
    C. ordinal
    D. ratio

14. Find the ratio of the mode to the median of the following distribution;
    2, 2, 2, 2, 2, 3, 3, 4, 4, 4, 4, 5, 5.
    A. 2:3
    B. 3:2
    C. 4:5
    D. 5:4

15. The mean of seven numbers is 4, if each of the seven numbers is increased by 2, what would be the new mean?
    A. 2
    B. 4
    C. 6
    D. 8

16. Calculate the standard deviation of 4, 4, 6,, and 6.
    A. 1.0
    B. 1.5
    C. 2.0
    D. 2.5

17. The standard deviation of a set of numbers is 2.5. If each number is increased by 3the new standard deviation would be .....
    A. 0.5
    B. 2.5
    C. 3.5
    D. 5.5

18. Given that the third quartile (Q_3) of a data set is 20 and the interquartile range is 8, find the value of the first quartile (Q_1).
    A. 8
    B. 10
    C. 12
    D. 18

19. In an income study of wage earners in a community, it is advisable to use ..... sample.
    A. cluster
    B. simple random
    C. stratified
    D. systematic

20. All these are true about the arithmetic mean **except** .....
    A. In its calculation, all values are used.
    B. it is affected by extreme values.
    C. It is the most representative of all the measures of central tendency
    D. It is the most typical of all the measures of central tendency.

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SECTION B
[40 MARKS]

Answer only TWO questions from this section.

1. a. The deviations of a set of numbers from 45 are –5, –3, –1, 0, 1, 3, 5 and 7. Calculate the:
   i. mean of the numbers;
   ii. variance of the numbers.

   b. The probabilities that three girls win their respective races are $\frac{1}{3}$, $\frac{3}{5}$ and m. If the probability that only one of them wins her race is $\frac{1}{3}$, find the value of m.

2. a. An automobile manufacturer claims that its new car will average 20 km per litre of fuel. Suppose that 100 of such cars driven under specified road-conditions with a litre of fuel averaged 19 km per litre with standard deviation of 4 km

   Test the company's claim Using a significance level of $\underline{\alpha = 0.05}$

   b. A fair coin is tossed three times. Find the probability of obtaining
   i. three heads or three tails;
   ii. a head and two tails.

3. a. A box contains 60 balls of which x are blue and the rest are green. If the probability of selecting a green ball is $\frac{3}{5}$, find the value of x.

   b. In a certain examination, the probability that Kofi, Ama and Yaw would pass are $\frac{1}{3}$, $\frac{2}{3}$ and $\frac{3}{4}$ respectively. Calculate the probability that:
   i. none of them would pass;
   ii. only one of them would pass.