

## INTI INTERNATIONAL UNIVERSITY

## FOUNDATION IN SCIENCE (CFSI)

## STA1202: STATISTICS

## FINAL EXAMINATION: MAY 2016 SESSION

**Instruction:** This paper consists of **SIX (6)** questions. Answer any **FIVE (5)** questions in the answer booklet provided. All questions carry equal marks.

**Question 1**

- (a) The average number of employees absent from a firm each day is 4%. An office within the firm has seven employees. Determine the probability that
- (i) three employees will be absent on a particular day. (2 marks)
  - (ii) less than two employees will be absent on a particular day. (2 marks)
- (b) The daily demand for *Concise course in advanced level statistics with worked examples* book in a bookshop has a Poisson distribution with mean 3.8. Find the probability that in a day,
- (i) exactly six copies are requested. (2 marks)
  - (ii) at least one copy is requested. (2 marks)
- (c) The mean mass of active material in tablets produced by a manufacturer is 5.00 g and the standard deviation of the masses is 0.036 g. In a bottle containing 100 tablets, find how many tablets are likely to have masses of
- (i) less than 4.92 g. (4 marks)
  - (ii) between 4.92 and 5.04 g. (4 marks)
  - (iii) more than 5.04 g. (4 marks)

**Question 2**

- (a) The number of components produced by a factory in a week is as shown below:

Day	Monday	Tuesday	Wednesday	Thursday	Friday
Number of Components	1580	2190	1840	2385	1280

Represent the data on a bar chart.

(4 marks)

- (b) The following data shows the weights of 60 Grouper fish measured correct to the nearest kilograms.

Class	Frequency
$0 \leq x < 10$	$k - 2$
$10 \leq x < 20$	$k^2 + 1$
$20 \leq x < 30$	$(k + 1)^2 + 1$
$30 \leq x < 40$	$2k + 2$
$40 \leq x < 50$	$k + 1$

- (i) Find the value of
- $k$
- in whole number.

(4 marks)

- (ii) Construct the cumulative frequency distribution.

(2 marks)

- (iii) Draw a cumulative frequency graph and estimate the median graphically.

(5 marks)

- (iv) Draw a histogram and estimate the mode graphically.

(5 marks)

**Question 3**

- (a) Determine the mean and standard deviation of the following set of numbers:

35, 22, 25, 23, 28, 33, 30.

(3 marks)

- (b) The table below shows the number of bouquets that were bought by a population of 80 parents during the recent convocation's day at INTI IU.

Number of Flowers	Frequency, $f$	Mid-point, $x$	$fx$	$fx^2$
$1 \leq x \leq 4$	5			
$5 \leq x \leq 8$	13			
$9 \leq x \leq 12$	31			
$13 \leq x \leq 16$	19			
$17 \leq x \leq 20$	8			
$21 \leq x \leq 24$	4			
	$\sum f = 80$		$\sum fx =$	$\sum fx^2 =$

- (i) Copy and complete the table above. (3 marks)
- (ii) Find the mean of the data. (1 mark)
- (iii) Find the median of the data using formula. (3 marks)
- (iv) Find the mode of the data using formula. (3 marks)
- (v) Find the standard deviation of the data using formula. (3 marks)
- (vi) Represent the data on a histogram. (4 marks)

**Question 4**

(a) Ten cards numbered from 11 to 20 are placed in a bag. A card is picked at random from the bag. Find the probability of picking a number that is

(i) even and divisible by 3.

(2 marks)

(ii) even or divisible by 3.

(2 marks)

(b) In a university, 20 % of the students fail the statistics test. If 20 students from the university are interviewed, find the probability of getting

(i) less than 2 students who fail the test.

(2 marks)

(ii) more than 3 students who fail the test.

(2 marks)

(c) Two six-sided dice, C and D, are used in a game. Dice C has 3 yellow sides and 3 white sides. Dice D has 4 yellow sides and 2 white sides. Both dice are thrown together. Find the probability that

(i) both dice have a yellow side facing upwards.

(2 marks)

(ii) only a dice has a yellow side facing upwards.

(2 marks)

(d) Bandora College has the following type of employees. One person from Bandora College is chosen at random.

Gender	Female	Male
Admin Staffs	30	51
Managers	12	20
Lecturers	42	38

(i) What is the probability that the person is a lecturer?

(2 marks)

(ii) What is the probability that the person is a female manager?

(2 marks)

(iii) What is the probability that the person is either a manager or an admin staff?

(2 marks)

(iv) Given that the person chosen is a male, what is the probability that he is manager?

(2 marks)

**Question 5**

(a) Two events are such as that  $P(A) = 0.58$  and  $P(B) = 0.42$ . Find  $P(A \cup B)$  if

(i) event  $A$  and  $B$  are mutually exclusive.

(2 marks)

(ii) event  $A$  and  $B$  are independent.

(2 marks)

(b)  $X$  is a discrete random variable with the following probabilities. Find

$X = x$	0	1	2	3	4	5
$P(X = x)$	$a$	0	$3a$	$4a$	$3a^2$	$7a^2 + a$

(i) the value of  $a$ .

(3 marks)

(ii)  $E(X)$ .

(2 marks)

(iii)  $P(X > 1)$ .

(2 marks)

(iv)  $Var(X)$ .

(3 marks)

(v)  $P(X \leq 2)$ .

(2 marks)

(vi)  $E(2X + 10)$ .

(2 marks)

(vii)  $Var(-3X + 10)$ .

(2 marks)

**Question 6**

(a) If the random variable  $X \sim \text{Bin}(10, 0.4)$ , find

(i)  $E(X)$ .

(2 marks)

(ii)  $\text{Var}(X)$ .

(2 marks)

(iii)  $P(X < 2)$ .

(2 marks)

(b) If the random variable  $X \sim N(40, 50^2)$ , find

(i)  $P(X < 50)$ .

(2 marks)

(ii)  $P(X > 115)$ .

(2 marks)

(c) If  $X$  is a random variable which follows a Poisson probability distribution, find

(i)  $P(X = 7)$  when  $\lambda = 5$ .

(2 marks)

(ii)  $P(2 < X \leq 4)$  when  $\lambda = 2$ .

(2 marks)

(d) In a group of teachers, the probability that a teacher owns a car is 0.6. Find the minimum number of teachers that must be chosen so that the probability of owning at least one car is more than 0.95.

(6 marks)

**--THE END--**

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