AGA KHAN UNIVERSITY EXAMINATION BOARD

HIGHER SECONDARY SCHOOL CERTIFICATE

CLASS XI

Statistics Paper II

Time: 2 hours 15 minutes Marks: 55

INSTRUCTIONS

Please read the following instructions carefully.

1. Check your name and school information. Sign if it is accurate.

I agree that this is my name and school. **Candidate's Signature**

RUBRIC

2. There are NINE questions. Answer ALL questions. Choices are specified inside the paper.

3. When answering the questions:

   Read each question carefully.
   Use a black pointer to write your answers. DO NOT write your answers in pencil.
   Use a black pencil for diagrams. DO NOT use coloured pencils.
   DO NOT use staples, paper clips, glue, correcting fluid or ink erasers.
   Complete your answer in the allocated space only. DO NOT write outside the answer box.

4. The marks for the questions are shown in brackets ( ).

5. You may use a scientific calculator if you wish.

Q.1. (Total 4 Marks)

a. Differentiate between quantitative and qualitative variables. (2 Marks)

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b. Give TWO examples each of quantitative and qualitative variables. (2 Marks)

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Q.2. (Total 4 Marks)

A survey was conducted in a certain town. In a sample of 25 households, respondents were asked about the consumption of milk per month (in litres). The responses were recorded as follows.

25, 26, 30, 30, 32, 40, 43, 44, 42, 20, 24, 25, 28, 35, 36, 38, 40, 42, 43, 36, 28, 24, 32, 24, 28

For the given data, complete the following table.

Consumption of Milk (litres)	**Tally Mark**	**Number of Household**	**Class Boundary**	**Class Mark**
20 – 24				
25 – 29				
30 – 34				
35 – 39				
40 – 44				

(ATTEMPT EITHER PART a OR PART b OF Q.3.)

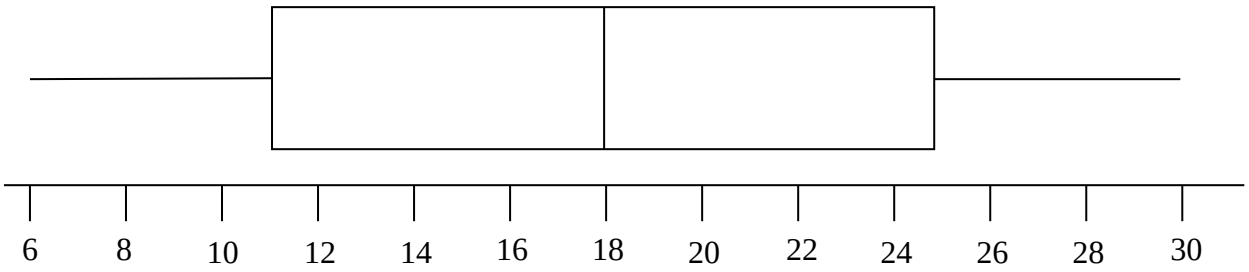
Q.3. (Total 6 Marks)

a. At a hockey club, all the participants are required to fill a registration form that contains name, father's name, contact details and age. The ages of the participants are recorded and tabulated in the following frequency distribution.

Complete the table to find mode and the third quartile (Q_3) of the ages of the participants.

Age of Participants (years)	**Number of Participants**		
10 – 14	25		
15 – 19	30		
20 – 24	32		
25 – 29	18		
30 – 34	15		

b. For the given box and whisker plot find



i. the range of the data. (2 Marks)

ii. interpret the median of the data. (2 Marks)

iii. the semi inter-quartile range. (2 Marks)

(ATTEMPT ANY TWO PARTS FROM a, b AND c OF Q.4.)

Q.4. (Total 12 Marks)

a.

i. For a certain data, mean is 10.833, median is 10.5 and standard deviation is 3.236. Use the given information to find the coefficient of

I. variation and interpret its meaning.

(**Note**: Write your answer to two decimal places.) (3 Marks)

II. skewness by using Karl Pearson's formula, and interpret its meaning. (3 Marks)

(ATTEMPT ANY TWO PARTS FROM a, b AND c OF Q.4.)

b. Ten students appeared in a test of mathematics. Their scores out of 20 are as follows.

11, 9, 15, 6, 10, 10, 13, 12, 18, 7

Find the

i. mean deviation of their scores. (5 Marks)

ii. range of their scores. (1 Mark)

c. Fill the following table to calculate measure of skewness using the formula $b_1 = \frac{m_3^{\,2}}{m_2^{\,3}}$. Where m_3 is the 3rd moment about mean and m_2 is the 2nd moment about mean. (6 Marks)

S.No	x_i	$x_i - \bar{x}$	$\left(x_i - \bar{x}\right)^2$	$\left(x_i - \bar{x}\right)^3$
1	7			
2	5			
3	7			
4	20			
5	11			
6	12			
7	13			
8	17			
9	20			
10	8			
Total	120			

Q.5. (Total 5 Marks)

The prices (in Rs) and quantities consumed of five fruits for the years 2010 and 2015 are given in the table.

Fruit	2010		2015					
	Price p_o	Quantity q_o	Price p_n	Quantity q_n				
Banana (Dozen)	40	50	60	45				
Apple (kg)	80	60	100	50				
Mango (kg)	65	70	80	75				
Orange (Dozen)	85	30	100	25				
Grapes (kg)	100	15	160	20				
Total	-	-	-	-				

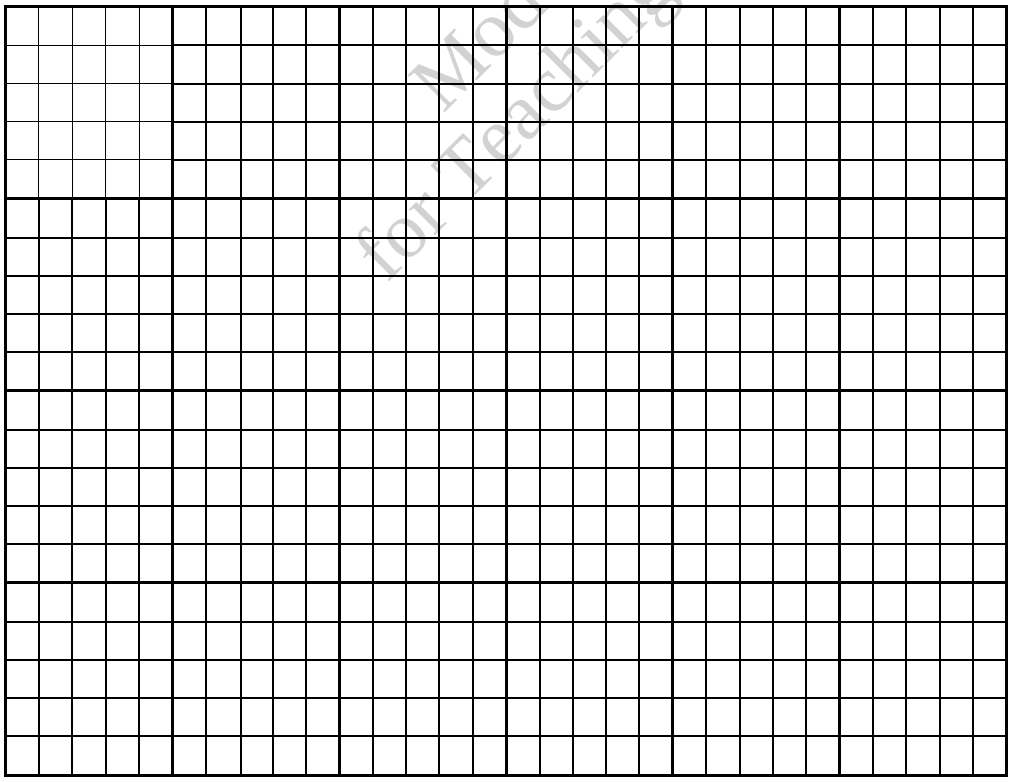
Complete the given table to find the Fisher Index, using 2010 as the base year.

Q.6. (Total 8 Marks)

The following data shows the height (in centimetres) and weight (in kilograms) of 10 infants at a children hospital.

S. No.	Height (cm)	Weight (kg)
1	45	2.3
2	47	2.8
3	48	2.5
4	52	3
5	49	2.8
6	50	3
7	51	3.2
8	53	3.1
9	55	3.5
10	46	2.5

a. Draw the scatter plot by taking height along *x*-axis and weight along *y*-axis. (2 Marks)



b.

i. Complete the given table to find Pearson's coefficient of correlation using the following formula. (5 Marks)

$$r = \frac{n\sum XY - \left(\sum X\right)\left(\sum Y\right)}{\sqrt{\left[n\sum X^2 - \left(\sum X\right)^2\right]\left[n\sum Y^2 - \left(\sum Y\right)^2\right]}}.$$

S. No.	Height (cm)	Weight (kg)			
1	45	2.3			
2	47	2.8			
3	48	2.5			
4	52	3			
5	49	2.8			
6	50	3			
7	51	3.2			
8	53	3.1			
9	55	3.5			
10	46	2.5			

ii. Interpret the value of correlation coefficient. (1 Mark)

Q.7. (Total 6 Marks)

The yearly sales at a departmental store are recorded in the given table. The sales are recorded at the end of each year.

Year	**Sales (*Y*) (Rs, in millions)**	**Time Coding (*X*)**		
2011	5.5			
2012	6			
2013	6.5			
2014	8			
2015	12			
2016	13			
2017	10			
Total	61			

Fit a linear trend line to the data. Predict the sales for the year 2020.

Q.8. (Total 4 Marks)

The following table shows some vital events of a certain town in the year 2015.

Total Population	Number of Deaths	Number of Infant Deaths	Number of Live Births
350,000	1,235	220	2,500

i. From the given information, find the following rates.

I. Crude death rate (2 Marks)

II. Infant mortality rate (2 Marks)

Q.9. (Total 6 Marks)

The given table shows the values of $f(x)$ at different values of x.

x	5	10	15	20
$f(x)$	30	105	230	405

Using Newton's forward difference formula, complete the following table. Interpolate the value of the function $f(x)$ at $x = 12.5$ and $x = 13$.

x_i	f_i	Δf_i	$\Delta^2 f_i$	$\Delta^3 f_i$

END OF PAPER

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Please use this page for rough work