AGA KHAN UNIVERSITY EXAMINATION BOARD

HIGHER SECONDARY SCHOOL CERTIFICATE

CLASS XII

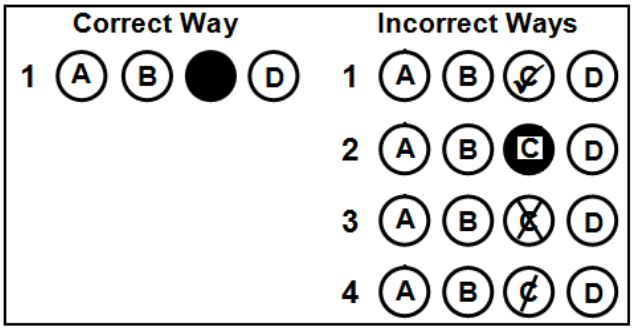
MODEL EXAMINATION PAPER 2023 AND ONWARDS

Business Statistics Paper I

Time: 55 minutes Marks: 30

INSTRUCTIONS

1. Read each question carefully.
2. Answer the questions on the separate answer sheet provided. DO NOT write your answers on the question paper.
3. There are 100 answer numbers on the answer sheet. Use answer numbers 1 to 30 only.
4. In each question there are four choices A, B, C, D. Choose ONE. On the answer grid black out the circle for your choice with a pencil as shown below.



Candidate's Signature

5. If you want to change your answer, ERASE the first answer completely with a rubber, before blacking out a new circle.
6. DO NOT write anything in the answer grid. The computer only records what is in the circles.
7. A formulae list is provided on page 2. You may refer to it during the paper, if you wish.
8. You may use a scientific calculator if you wish.

Aga Khan University Examination Board

List of Formulae for Business Statistics XII

Note:

- The symbols have their usual meanings.
- The same formulae list will be provided in annual and re-sit examinations.

Measures of Central Tendency and Quartiles

$$\overline{X} = \frac{\sum wx}{\sum w} \qquad \overline{X} = \frac{\sum x}{n} \qquad \overline{X} = \frac{\sum fx}{\sum f}$$

$$\text{Median} = l + \frac{1}{f}\left(\frac{n}{2} - c\right) \times h \qquad \text{Mode} = l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right) \times h$$

Measures of Dispersion

$$\text{variance} = \frac{\sum x^2}{n} - \left(\frac{\sum x}{n}\right)^2 \qquad \text{R} = x_{\max} - x_{\min}$$

$$\sigma^2 = \frac{\sum \left(x - \overline{X}\right)^2}{n} \qquad \sigma = \sqrt{\frac{\sum \left(x - \overline{X}\right)^2}{n}}$$

$$\sigma^2 = \frac{\sum x^2}{n} - \left(\frac{\sum x}{n}\right)^2 \qquad \sigma = \sqrt{\frac{\sum x^2}{n} - \left(\frac{\sum x}{n}\right)^2}$$

Quadratic Equation, Function and their Graph

Quadratic Formula $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Counting Techniques and Probability

$${}^{n}P_r = \frac{n!}{(n-r)!} \qquad {}^{n}C_r = \frac{n!}{(n-r)!r!}$$

$$P(A \cup B) = P(A) + P(B) - P(A \cap B) \qquad P(A \cap B) = P(A) \times P(B/A)$$

$$P(A \cap B) = P(A) \times P(B) \qquad P(A \cap B) = P(B) \times P(A/B)$$

Scatter Diagram and Correlation

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

1. A school wants to estimate the average mathematics' score of a group of 500 students for a 75 marks test. For a random sample of 50 students, the average score is 40 marks. The total number of students in the group represents a

   A. sample.
   B. statistic.
   C. parameter.
   D. population.

2. An example of discrete variable is the

   A. height of students in a class.
   B. weight of students in a class.
   C. number of students in a class.
   D. temperature of the classroom.

3. Which of the following is the characteristic of a good questionnaire?

   A. It should be lengthy.
   B. It should contain leading questions.
   C. It should eliminate less important topics.
   D. It should contain multiple topics in a certain question.

Use the given information to answer Q.4 and Q.5.

The price and the number of books sold at a bookstore in the month of June is recorded in the given table.

Price Range (Rs)	Number of Books Sold	Relative Frequency (%)
150 – 199	66	13.2
200 – 249	?	30
250 – 299	159	31.8
300 – 349	?	?
350 – 399	40	8
Total	**500**	

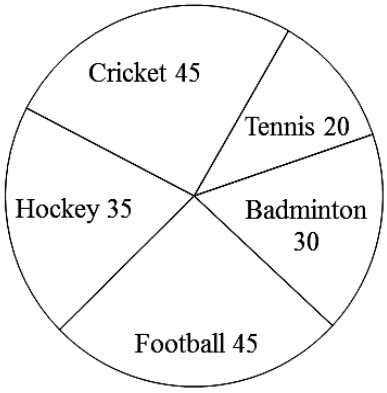
4. The percentage of books sold whose price range is from Rs 300 to 349

   A. is 10%.
   B. is 17%.
   C. is 83%.
   D. cannot be determined.

5. The number of books sold whose price range is from Rs 150 to 299

   A. is 150
   B. is 225
   C. is 375
   D. cannot be determined

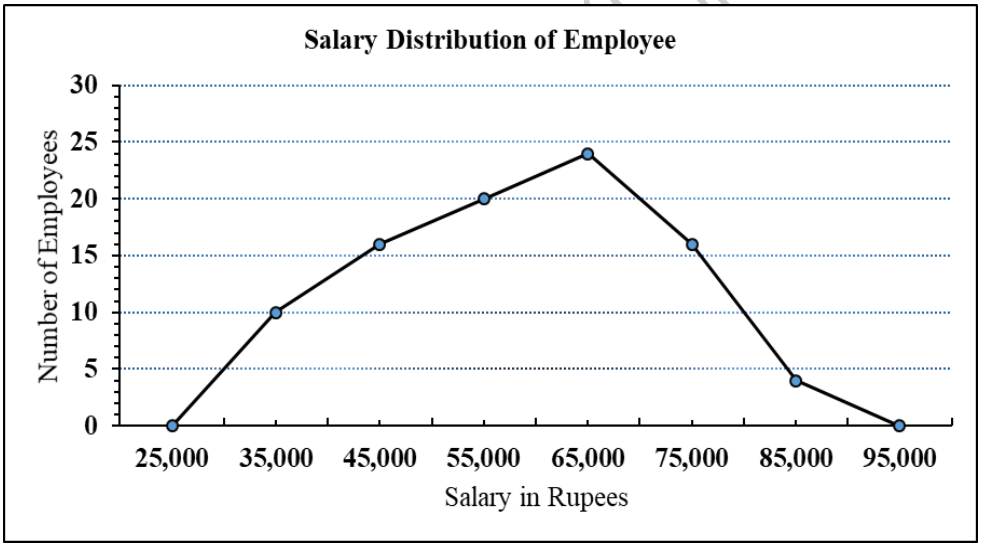
6. The given pie chart represents information about the sports festival of a school. It shows the number of students who participated in different sports. The angle of the sector representing hockey is



A. 22°.
B. 36°.
C. 72°.
D. 90°.

Use the given information to answer Q.7 and Q.8.

The given frequency polygon represents the salary distribution of employees in an organisation.



7. The number of employees, earning the maximum salary, is

A. 3
B. 4
C. 5
D. 10

8. The percentage of the employees earning more than Rs 70,000 is

A. 4.65%.
B. 18.60%.
C. 23.81%.
D. 51.16%.

9. The given table shows information about the weight of students at the Higher Secondary School Certificate (HSSC) level.

	HSSC-I	**HSSC-II**
Mean Weight (kg)	53	60
Number of Students	30	25

The total weight of all HSSC students is

A. 6,215 kg.
B. 3,125 kg.
C. 3,090 kg.
D. 113 kg.

10. The mean weight of twenty objects was calculated to be 196 grams. However, it was found later that due to an error in the weighing machine, the weight of each object had been recorded with an increase of 3 grams.

The CORRECT mean weight of twenty objects, therefore, will be

A. 136 grams.
B. 193 grams.
C. 196 grams.
D. 199 grams.

11. The given table shows information about the heights of 120 buildings in a locality.

Height (ft)	**Number of Buildings**
26 – 35	9
36 – 45	17
46 – 55	30
56 – 65	40
66 – 75	14
76 – 85	10

The frequency of the median class is

A. 96
B. 56
C. 40
D. 30

12. The arithmetic mean of a, b, c, d and e is 23. If $a+b+c=90$, then $d+e$ is equal to

A. 23
B. 25
C. 44
D. 67

13. The following table shows the heights of 25 students of a class.

Height (cm)	Number of Students
156 – 160	7
161 – 165	5
166 – 170	9
171 – 175	2
176 – 180	2

The third quartile of the data lies in the class interval

A. 176 – 180
B. 171 – 175
C. 166 – 170
D. 161 – 165

14. If the mean of a variable X is 24, then mean of variable $Y = \frac{X}{3} - 5$ will be

A. 24
B. 19
C. 8
D. 3

15. If the median of the values 2, 5, 7, x, $2x$, $2x + 2$, 25, 50 is 13.5, then the value of x will be

A. 7
B. 9
C. 18
D. 24

16. $\text{Var}(5aX)$, where a is a constant, is equal to

A. $5a\,\text{Var}(X)$.
B. $25a\,\text{Var}(X)$.
C. $5a^2\,\text{Var}(X)$.
D. $25a^2\,\text{Var}(X)$.

17. If the standard deviation of a, b, c, d and e is 4, then the standard deviation of $2a-5, 2b-5, 2c-5, 2d-5, 2e-5$ will be

A. 3
B. 4
C. 8
D. 16

18. The sum of deviation of a data set about its mean is

A. zero.
B. negative.
C. variance.
D. standard deviation.

19. A data set consists of ten numbers. If the sum of these numbers is 55 and sum of square of these numbers is 385, then the variance in the data set will be

A. 2.87
B. 8.25
C. 8.30
D. 68.75

20. The given table shows the train fare from Karachi to Lahore of the economy class for a certain train.

Year	Price (Rs)
2010	2,900
2011	3,100
2012	3,250
2013	3,500
2014	3,800

Taking 2010 as the base period, the price index of year 2013 indicates that the train fare is increased by

A. 17.14%.
B. 20.69%.
C. 82.86%.
D. 120.69%.

21. The given table provides information about the prices of two commodities and their quantities sold in 2017 and 2018, respectively.

Commodity	2017			2018		
	Price (P_o) (Rs)	**Quantity (Q_o) (kg)**	P_oQ_o	**Price (P_1) (Rs)**	**Quantity (Q_1) (kg)**	P_1Q_0
P	1	3	3	3	2	9
Q	2	3	6	4	3	12
Total	**3**	**6**	**9**	**7**	**5**	**21**

For the given data, the Laspeyre's weighted index will be

A. 42.86
B. 83.33
C. 120.00
D. 233.33

22. The number of possible ways to choose 3 students from a class of 18 will be

A. 54
B. 816
C. 5,832
D. 4,896

23. Aleem and Sara are interested in buying a computer. They have the following options to choose from

- 3 types of keyboards
- 5 types of monitors
- 5 types of desktops
- 2 types of mouse

The number of possible choices for them to buy a computer is

A. 15
B. 15!
C. 150
D. 150!

24. A box contains 10 slips of identical size. The slips are numbered from 1 to 10.
If a slip is drawn at random from the box, then the probability of getting a slip containing a number that is even and a multiple of three will be

A. 0
B. $\frac{1}{10}$
C. $\frac{5}{10}$
D. $\frac{6}{10}$

25. If $P(A \cup B) = P(A)$, then $P(A \cap B)$ is equal to

I. 0
II. $P(A)$
III. $P(B)$

A. I only.
B. II only.
C. I and III.
D. II and III.

26. A box contains 5 red, 7 black and 8 white balls. Two balls are drawn at random with replacement from the box. What is the probability that both the balls are black?

A. $\frac{1}{7} \times \frac{1}{7}$.
B. $\frac{1}{7} \times \frac{1}{6}$.
C. $\frac{7}{20} \times \frac{6}{19}$.
D. $\frac{7}{20} \times \frac{7}{20}$.

27. There are 10 boys and 18 girls in a class. If two students are selected at random, then the probability that both are boys will be

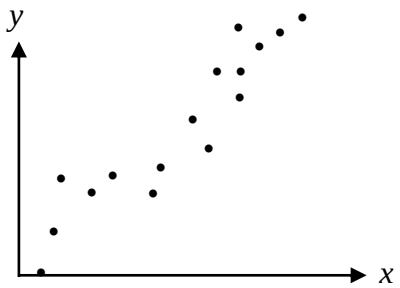
A. $\frac{10}{28} \times \frac{10}{28}$.
B. $\frac{10}{28} \times \frac{10}{27}$.
C. $\frac{10}{28} \times \frac{9}{28}$.
D. $\frac{10}{28} \times \frac{9}{27}$.

28. $\frac{{}^5P_2}{{}^5C_2}$ is equal to

A. 1
B. 2
C. 4
D. 5

29. For the given scatter diagram, the linear correlation between x and y could be

A. 0
B. 0.4
C. 0.8
D. 1



30. The coefficient of correlation between two variables X and Y is 0.8 and if all the values of X and Y are divided by 2, then the coefficient of correlation will be

A. 0.2
B. 0.4
C. 0.8
D. 1.0

END OF PAPER

Please use this page for rough work

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