

**ROYAL CIVIL SERVICE COMMISSION
BHUTAN CIVIL SERVICE EXAMINATION (BCSE) 2015
EXAMINATION CATEGORY: TECHNICAL**

PAPER II: GENERAL SUBJECT KNOWLEDGE for **STATISTICS**

Date	: 10 October 2015
Total Marks	: 100
Examination Time	: 1 hour 30 minutes
Reading Time	: 15 Minutes

GENERAL INSTRUCTIONS

1. Write your Registration Number clearly and correctly in the Answer Booklet.
2. The first 15 minutes are to check the number of pages, printing errors, clarify doubts and to read the instructions in Question Paper. You are NOT permitted to write during this time.
3. The paper consists of **TWO Parts**, namely **Part I** and **Part II**.
Part I consists of **70 Multiple Choice Questions** of 1 (one) mark each;
Part II consists of **10 Short Answer Questions** of 3 (three) marks each.
4. **All questions are compulsory.**
5. All answers must be written in the Answer Booklet provided to you. You will not be given any marks for answers written other than in the Answer Booklet. Ask for additional Answer Booklet if required.
6. All answers should be written with correct numbering of Part, Section and Question Number in the Answer Booklet provided to you. Note that any answer written without indicating any or correct Part, Section and Question Number will NOT be evaluated and no marks would be awarded.
7. Begin each Part in a fresh page of the Answer Booklet.
8. You are not permitted to tear off any sheet(s) of the Answer Booklet as well as the Question Paper.
9. You are required to hand over the Answer Booklet to the Invigilator before leaving the examination hall.
10. This paper has **13** printed pages in all, including this Instruction Page

PART I: MULTIPLE CHOICE QUESTIONS

This part consists of 70 Multiple Choice Questions. Each question carries ONE mark. Choose the correct answer and write down the letter of the correct answer chosen in the Answer Booklet against the question number. E.g. 71(c). Any doubt writing, smudgy answer or writing more than one choice shall not be evaluated.

1. What is the relationship between the mean, the mode and the median for a standard normal distribution?

- (a) Mean = Mode = Median
- (b) Mean < Mode < Median
- (c) Mean > Mode > Median
- (d) Mean < Mode > Median

2. Many statistics use percentages. What does 'per cent' actually mean?

- (a) Per hundred
- (b) Per thousand
- (c) Per hundred thousand
- (d) Per annum

3. The bell-shaped curve is

- (a) Orthodox distribution
- (b) Normal distribution
- (c) Poisson distribution
- (d) None of the above

4. If the shopkeeper stated that maximum number of people wore shoe size 6, he meant

- (a) Mean
- (b) Median
- (c) Mode
- (d) All of the above

5. The second quartile is

- (a) Mean
- (b) Median
- (c) Mode
- (d) Standard deviation

6. Which of the following is not a measure of central tendency?

- (a) Mean
- (b) Median
- (c) Mode
- (d) Standard deviation

7. Which of the following is not true?

- (a) Mean is affected by extreme values
- (b) Extreme values do not affect the median as strongly as they do the mean

- (c) When no values repeat in the data set, the mode is every value
- (d) Median does not have a unique value

8. Which of the following can be conveniently located with the help of cumulative frequency curve or “ogive”?

- (a) Mean
- (b) Median
- (c) Mode
- (d) Standard deviation

9. Which of the following is true about Mode?

- (a) It can never be larger than the mean
- (b) It is always larger than the median
- (c) It is always larger than the mean
- (d) It can be greater than or less than mean or mode.

10. Before finding the median of a set of data, what is the crucial step that we need to do?

- (a) Arrange the data points in ascending or descending order
- (b) Check to see if there is repeating values
- (c) Multiply by a constant
- (d) Divide by a constant

11. From the frequency distribution table below, the mean monthly earning of the workers is:

Monthly wages (Nu.)	Number of workers (f)	Mid-points (x)	fx
80-100	20	90	1,800
100-120	30	110	3,300
120-140	20	130	2,600
140-160	40	150	6,000
160-180	90	170	15,300
Total	2,00		29,000

- (a) Nu. 145
- (b) Nu. 290
- (c) Nu. 1,450
- (d) Cannot be determined

12. You are given a bell-shaped Gaussian distribution graph, which is a continuous probability distribution. Where can you find the mode?

- (a) Left tail of the graph
- (b) Right tail of the graph
- (c) First quadrant of the graph
- (d) Peak of the graph

13. Which of the following is not a measure of spread?

- (a) Range
- (b) Variance
- (c) Standard deviation
- (d) Kurtosis

14. Square root of variance is

- (a) Standard deviation
- (b) Mean
- (c) Inter-quartile
- (d) Median

15. A sample is a

- (a) Portion of the population
- (b) Totality of things under consideration
- (c) Summary measure
- (d) Population

16. Given that mean=2, variance =100, the coefficient of variation (CV) is

- (a) 50%
- (b) 25%
- (c) 7.07%
- (d) 5%

17. When the data are skewed to the right, the measure of Skewness will be

- (a) Negative
- (b) Zero
- (c) Positive
- (d) None of the above

18. If A,B,C are three arbitrary events, then the expression for “Both A and B but with C occur” is

- (a) $A \cap B' \cap C'$
- (b) $A \cap B' \cap C$
- (c) $A \cap B \cap C'$
- (d) $A' \cap B' \cap C'$

19. If event $A=\{1,3,5\}$, event $B=\{2,4,6\}$, and event $C=\{3,6\}$, which of the following is true?

- (a) A and B are mutually exclusive events
- (b) A and C are mutually exclusive events
- (c) B and C are mutually exclusive events
- (d) A, B and C are all mutually exclusive events

20. A die is thrown. What is the probability of getting a prime number?
- (a) 1
 - (b) $\frac{1}{2}$
 - (c) $\frac{1}{3}$
 - (d) $\frac{1}{6}$
21. If two events, A and B, are independent, then $P(A \text{ and } B) =$
- (a) $P(A) \times P(B)$
 - (b) $P(A) + P(B)$
 - (c) $P(A) - P(B)$
 - (d) $P(A) \div P(B)$
22. Which of the following is not true?
- (a) Correlation coefficient is independent of change of origin
 - (b) Correlation coefficient is independent of change of scale
 - (c) Regression coefficient is independent of change of origin
 - (d) Regression coefficient is independent of change of scale
23. If x and y are independent variables, what is the value of regression coefficient of y on x?
- (a) 0
 - (b) 1
 - (c) -1
 - (d) ∞
24. In how many ways can 5 persons occupy 3 vacant seats?
- (a) 15
 - (b) 30
 - (c) 60
 - (d) 120
25. The geometric mean of 6 and 24 is
- (a) 6
 - (b) 12
 - (c) 15
 - (d) None of the above
26. The value of ${}^{15}C_0$ is
- (a) 0
 - (b) 1
 - (c) 15
 - (d) 30

27. $\int \cos x \, dx =$

- (a) $\tan x$
- (b) $\sin x$
- (c) $\sec x$
- (d) $\sin^{-1} x$

28. The equation of the line which has y-intercept 2 and slope 7, is

- (a) $y = 7x + 2$
- (b) $y = 2x + 7$
- (c) $y = 7x - 2$
- (d) $y = 2x - 7$

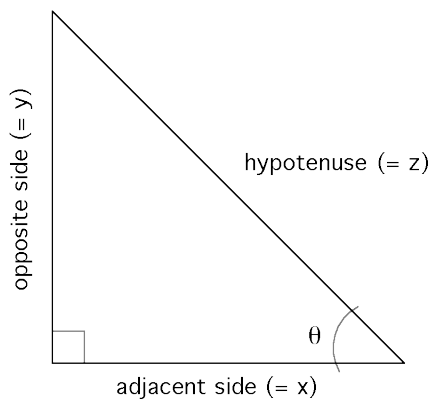
29. Interquartile range is

- (a) $Q_3 - Q_1$
- (b) $Q_3 - Q_2$
- (c) $Q_3 + Q_2$
- (d) None of the above

30. In the quadratic equation: $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$, the expression $b^2 - 4ac$ is called

- (a) Determinant
- (b) Discriminant
- (c) Quadratic
- (d) None of the above

31. In the right angled triangle below, the values of x and y are 3 and 4 respectively. What is the value of z^2 ?



- (a) 1
- (b) 5
- (c) 7
- (d) 25

32. The sequence: 2,6,10,14.... is an example of

- (a) Arithmetic Progression
- (b) Geometric Progression

- (c) Hyper-geometric Progression
- (d) None of the above

33. Which of the following is true about sample statistic?

- (a) It can be smaller than the population parameter
- (b) It can be equal to the population parameter
- (c) It can be zero
- (d) All of the above

34. Which of the following is true about sample mean?

- (a) It is always equal to the mean of the population
- (b) It is always smaller than the mean of the population
- (c) It is computed by summing the data values and dividing the sum by $(n - 1)$
- (d) None of the above

35. Which of the following variables is qualitative?

- (a) Height of a person
- (b) Distance to school
- (c) Exam score
- (d) Zip code

36. Statistics are typically used to describe a

- (a) Sample
- (b) Population
- (c) Graph
- (d) Picture

37. Data that has been collected from a population is called a

- (a) Population
- (b) Sample
- (c) Statistics
- (d) Graph

38. A Thimphu grocery store recorded the age of a sample of 40 customers who purchased groceries at their store. What data is being collected in this study?

- (a) The number of customers who enter the grocery store
- (b) The age of the customers
- (c) The type of groceries they bought
- (d) How much money they spent on groceries

39. Statistics is best defined as

- (a) The Science of collecting data
- (b) The science of describing data
- (c) The science of interpreting data
- (d) All of the above

40. A population is defined as
- (a) A sample of the individuals or objects that are of interest
 - (b) A planned activity whose results yield a set of a data
 - (c) The complete collection of individuals or objects that are of interest
 - (d) A characteristic of an individual element
41. Which of the following is not true?
- (a) A variable is a characteristic of interest about each individual element of a population or sample
 - (b) A statistic is a numerical value summarizing the population data
 - (c) A parameter is a numerical value summarizing all the data of an entire population
 - (d) For every parameter there is a corresponding sample statistics
42. Bhutan conducted its first Population & Housing Census in 2005. Which of the following is not true regarding a census?
- (a) A census is relatively inexpensive
 - (b) A census is a 100% survey
 - (c) A census is a measure of the population
 - (d) A census is seldom used
43. Where can you find statistics being reported?
- (a) In a newspaper
 - (b) In a classroom
 - (c) On the television
 - (d) All of the above
44. Given the data: 3,5,8,5,2,34,8,9,16,21, what type of graphical representation would be best to display the outliers and the mean?
- (a) Line graph
 - (b) Bar graph
 - (c) Stem and leaf plot
 - (d) Line plot
45. Given that in an Exam, Sonam got 70 marks, Dorji got 52 marks, Nima got 60 marks and Kinley got 30 marks. You want to show a comparison between who got the most and who got least marks. What type of graphical representation would be best to display the data?
- (a) Line graph
 - (b) Bar graph
 - (c) Stem and leaf plot
 - (d) Line plot

46. There are 250 students in a class and 60% of them plan to go to college. Of those with plans to go to college, 40% plan to go to a college abroad. How many students plan to attend the in-country college?

- (a) 60
- (b) 90
- (c) 100
- (d) 150

47. Sonam is conducting a probability experiment. He randomly selects a ball from a set of balls that are numbered from 1 to 100 and then returns the ball to the set. He is trying to draw a ball that matches his favorite number, 21. He has not matched his number after 99 draws. What are the chances he will match his number on the 100th draw?

- (a) 1 out of 100
- (b) 99 out of 100
- (c) 1 out of 1
- (d) 1 out of 2

48. The city would like to conduct a study of its residents. Since it would be too costly to call every person listed in the phone book they decide to call every 10th phone number. What type of sample would this represent?

- (a) A simple random sample
- (b) A systematic sample
- (c) A judgment sample
- (d) None of the above

49. The determinant of the matrix $\begin{bmatrix} 3 & -1 \\ 5 & 2 \end{bmatrix}$ is

- (a) 1
- (b) -1
- (c) 11
- (d) -11

50. If A and B are mutually exclusive events, then $P(A \cap B)$ equals to

- (a) 0
- (b) 1
- (c) ∞
- (d) None of the above

51. The value of $\frac{4!}{2!2!}$ is

- (a) 1
- (b) 3
- (c) 6
- (d) 12

52. If matrix $A = \begin{bmatrix} 5 & 4 \\ 1 & 2 \end{bmatrix}$ and matrix $B = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$, if you compute AB , the answer is
- (a) A
 - (b) B
 - (c) 0
 - (d) None of the above
53. In statistics, the mean is the sum of all the observations divided by the number of observations. In other words, the mean is the average value of a set of data. The mean of a set that consists of five data points is 20. You are also given that three of the five data points are 5, 15 and 30. The remaining two numbers share the same value, which is
- (a) 50
 - (b) 75
 - (c) 25
 - (d) 100
54. In statistics, the mode refers to the value which occurs with the highest frequency in a set of data. For example, 2 is the mode for the set of data points 1, 1, 2, 2, 2, 2, 2, 3, since 2 occurs most frequently. Now, if we have a set of data which consists of 1, 1, 1, 2, 2, 2, 3, what is (are) the mode(s)?
- (a) Both 1 and 2
 - (b) 1
 - (c) 1.5
 - (d) No mode
55. In mathematics, there is a statistical measure of the magnitude of a quantity, which can take both positive and negative values. This measure is very useful for data points, which are obtained from trigonometric functions. Its abbreviation is RMS. What does it stand for?
- (a) Root mean square
 - (b) Relative mean square
 - (c) Root mean summation
 - (d) Relative mean summation
56. A very common statistical measure used to indicate a country's overall health involves determining, on average, how long someone born in a particular year is likely to live. What is this called?
- (a) Life expectancy
 - (b) Quality of life
 - (c) Quantity of life
 - (d) Life course
57. Statisticians can also look at possible future events to determine what changes are likely to a particular population. What are these predictions called?
- (a) Regression
 - (b) Rejection

- (c) Projection
- (d) Progression

58. Two words you'll hear quite often in statistics are 'incidence' and 'prevalence'. Are they different words for the same concept?

- (a) Incidence is the measure of a particular phenomenon over a particular time period. Prevalence, on the other hand, is the measure of a phenomenon at any given time
- (b) Incidence is the measure of a particular phenomenon at any given time. Prevalence, on the other hand, is the measure of a phenomenon over a particular time period
- (c) Both Incidence and prevalence mean same thing
- (d) None of the above

59. Which scientist, more famously known as an astronomer than a statistician, put forward the suggestion in the 16th Century that we should "Measure what can be measured, and make measurable what cannot be measured"?

- (a) R.S Fisher
- (b) Galileo Galilei
- (c) Isaac Newton
- (d) None of the above

60. If you find a statistical correlation between two events A and B, what does it mean?

- (a) B was caused by A
- (b) A was caused by B
- (c) Does not prove that one is caused by another
- (d) None of the above

61. On a regular six-sided die, what is the probability that you will roll an even number if you throw the die?

- (a) 1
- (b) $\frac{1}{2}$
- (c) $\frac{1}{3}$
- (d) $\frac{1}{6}$

62. How can ${}^n C_r$ be represented in factorial form?

- (a) $\frac{n!}{(n-1)!r!}$
- (b) $\frac{n!}{(n-r)!}$
- (c) $\frac{n!}{(n+1)!r!}$
- (d) $\frac{n!}{(n+r)!}$

63. Given that the probability of an event A is 9 over 13, what are odds in favour of A?

- (a) 9:22
- (b) 9:13

- (c) 13:4
- (d) 9:4

64. In how many ways can four people be seated around a circular table?

- (a) 3
- (b) 4
- (c) 5
- (d) 6

65. A student counted the number of people who crossed an intersection in a one-hour period. She found that 12 people crossed the road during the one-hour period. She is interested in the number of people that would typically cross this intersection in a 12-hour day. Which of the following statements is true?

- (a) The population is the 12-hour day.
- (b) The sample consists of all the people who cross the road in a 12-hour day
- (c) The sample consists of the 12 people who she observed crossing the road in a one-hour period.
- (d) The population consists of the 12 people who crossed the road in the 12-hour period.

66. Inferential statistics refers to which of the following?

- (a) The collection of sample data
- (b) The interpretation of the data to make decisions about the population
- (c) The description of sample data
- (d) The presentation of sample data.

67. Which of the following is not a statistical software?

- (a) SPSS
- (b) Stata
- (c) Shazam
- (d) PHP

68. In Physics, a mass is defined by

- (a) How much something weighs
- (b) How hard something pushes on the ground
- (c) Resistance of an object to acceleration if it is otherwise able to freely move
- (d) None of the above

69. The temperature at which a substance changes from a liquid to a gas is

- (a) Freezing point
- (b) Melting point
- (c) Boiling point
- (d) Condensation point

70. Which subatomic particle is located outside of the nucleus?

- (a) Electron
- (b) Proton
- (c) Neutron
- (d) All of the above

PART II: SHORT ANSWER QUESTIONS

This part consists of 10 Short Answer Questions. Answer all questions. Each question carries THREE marks. For those with sub-questions, corresponding marks are specified in brackets.

1. “Statistics are like clay of which you can make a God or Devil as you please.” In the light of this statement mention three limitations of statistics?
2. Among different charts you know mention three of them and their uses.
3. Mention two objectives of studying averages.
4. Mention three limitations of Median.
5. After collection and editing of data, an important step towards processing the data is classification. Mention three types of data classification.
6. Differentiate between survey and census with an example.
7. Consider the result of a fictional exam taken by 120 students, as given in the following frequency distribution to answer 7a and 7b.

Grade	Less than 50	50-59	60-69	70-79	80-89	90-100
Cumulative Percentage	15%	25%	55%	80%	95%	100%

- 7a. How many students score at least 70% on this exam? [1.5 marks]
- 7b. How many students score less than 70% on this exam? [1.5 marks]
8. Question 8 consists of two parts, 8a and 8b. Answer both.
 - 8a. Suppose a manufacturer conducts a study to determine the average retail price being charged for his product in a particular market area. Is such a variable discrete or continuous? [1.5 marks]
 - 8b. If the manufacturer also wants to determine the number of units sold in the area during a popular festive, is the variable discrete or continuous? [1.5 marks]
9. Bhutan’s current population is estimated around 766,000 people. Do you think it is high or low? Justify.
10. Suppose that a literacy survey reveals that Dzonkhag A has 80% literate persons while Dzonkhag B has 78% literate persons. As a Statistician, can you say that Dzonkhag A has significantly higher literate persons compared to Dzonkhag B? Justify.

