

**ROYAL CIVIL SERVICE COMMISSION
BHUTAN CIVIL SERVICE EXAMINATION (BCSE) 2012
EXAMINATION CATEGORY: TECHNICAL**

PAPER III: SUBJECT SPECIALIZATION PAPER for STATISTICS

Date	: 14 October 2012
Total Marks	: 100
Examination Time	: 150 minutes (2.5 hours)
Reading Time	: 15 Minutes (prior to examination time)

READ THE FOLLOWING INSTRUCTIONS CAREFULLY:

1. Write your Roll Number clearly on the Answer Booklet in the space provided.
2. The first 15 minutes is being provided to check the number of pages, printing errors, clarify doubts and to read the instructions. You are NOT PERMITTED TO WRITE during this time.
3. Use either Blue or Black ink pen or ball point pen for the written part and Pencils for the sketches and drawings.
4. All answers should be written on the Answer Booklet provided. Candidates are not allowed to write anything on the question paper or any other materials.
5. All answers must be labeled with appropriate question numbers (Section, Question and sub-Question Numbers wherever applicable). Unlabelled answers will not be assessed.
6. This paper is divided into two sections-namely SECTION A and SECTION B.
7. SECTION A consists of two parts: Part I and Part II.

Part I consists of 30 Multiple-Choice Questions carrying one (1) mark each and is compulsory. The answer of your choice should be clearly written in whole along with the question and option number on your answer booklet. Eg. 31(c).

Part II consists of four (4) short answer questions of five (5) marks each and all questions are compulsory.
8. SECTION B consists of two Case Studies. Choose only ONE case study and answer the questions under your choice. Each case study carries fifty (50) marks in total.
9. This Paper consists of SEVEN (7) pages including this Instruction page.

SECTION A

PART I - Multiple Choice Questions (30 Marks)

Choose the correct answer and write down the letter of the correct answer chosen in the Answer Sheet against the question number. E.g. 31 (c). Each question carries ONE mark.

1. Consider the weighted mean and mean with respective representation

Weighted mean: $x_w = \frac{\sum_{i=1}^n w_i x_i}{\sum w_i}$ and mean: $x = \frac{\sum_{i=1}^n x_i}{n}$

- a) Mean takes into account of observed values according to their relative importance
 - b) Weighted mean takes into account of observed values according to their relative importance
 - c) Both take into account observed values according to their relative importance
 - d) None of them take account of observed values according to their relative importance
2. Measure of the height of a person is an example of
- a) Discrete variable
 - b) Continuous variable
 - c) Ordinal variable
 - d) Categorical variable
3. In conducting surveys which of the following statement is true?
- a) Sample size is determined first
 - b) Domain identification is determined first
 - c) Sample allocation is determined first
 - d) Stratification is determined first
4. Coefficient of Variation
- a) Has a unit of measurement
 - b) Is expressed always as a percent
 - c) Both of the above are true
 - d) None of the above are true
5. For a bell-shaped distribution the following statement is true
- a) 68% of the observation lie within three standard deviations of the mean
 - b) 95% of the observations lie within three standard deviations of the mean
 - c) 99.7% of the observations lie within three standard deviations of the mean
 - d) None of the above

6. If the mean is greater than the median, the distribution is said to be
- Normally distributed
 - Negatively skewed
 - Positively skewed
 - None of the above
7. $p(x) = \frac{e^{-u} u^x}{x!}$ is the distribution function of
- Binomial Distribution
 - Hypergeometric Distribution
 - Trinomial Distribution
 - Poisson Distribution
8. In the design of questionnaire, the following statement is true
- Use simple and direct language
 - Make items as brief as possible
 - Do not use uncommon words or long sentences
 - All of the above
9. The question “How old is Sangay as of last birthday and what is his marital status” is an example of
- Leading question
 - Double-barreled question
 - None of the above
 - Both the above
10. Format of responses to a survey question can be of how many types?
- 1 type
 - 2 types
 - More than two types
 - None of the above
11. The GDP of a country can be estimated by which of the following?
- Production approach
 - Income approach
 - Expenditure approach
 - All of the above
12. The budget of a survey depends largely on
- Survey design
 - Precision required
 - Geographical coverage
 - All of the above

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13. Cost consideration in a survey arise at which level?
- a) Planning phase
 - b) Monitoring of survey costs
 - c) Reallocation of resources
 - d) All of the above
14. Which of the following is not an advantage of household surveys compared to censuses
- a) Lower cost
 - b) Greater scope and flexibility
 - c) Large number of questions can be accommodated
 - d) Unaffected by sampling error
15. Small area estimation has to be carried out usually for
- a) Census data
 - b) Survey data
 - c) Both of above
 - d) None of the above
16. Personal interview method is commonly used in developing countries in data collection due to
- a) High response rates
 - b) High illiteracy rates
 - c) Both of the above
 - d) None of the above
17. In the conduct of a survey, the tabulation plan should be ideally made
- a) Before field work
 - b) After field work
 - c) Before analysis
 - d) None of the above
18. BBS conducts instant polls during its shows through sms. This is an example of
- a) Probability sampling
 - b) Judgmental sampling
 - c) Quota sampling
 - d) Convenience sampling
19. Which of the following is a property of a sampling frame
- a) Complete
 - b) Accurate
 - c) Up-to-date
 - d) All of the above

20. In a positively skewed distribution
- a) The mean, median and mode are all equal
 - b) The mean is larger than the median
 - c) The median is larger than the mean
 - d) None of the above
21. A random sample refers to
- a) A sample drawn in such a way that each element of the population have equal chance of being selected
 - b) A sample drawn randomly from the population based on the researchers judgment
 - c) A sample drawn based on a quota system
 - d) None of the above
22. The difference between model error term ε and the residual e is
- a) Residual error term is known
 - b) Model error term is known
 - c) Residual error term is Unknown
 - d) None of the above
23. Which of the following is not a measure of central tendency
- a) Mode
 - b) Variance
 - c) Median
 - d) Mean
24. Which of the following is not a possible value of the correlation coefficient?
- a) -1
 - b) +1
 - c) 0.01
 - d) 1.1
25. An enumerator's manual contains
- a) Detailed instructions for filling-up the questionnaires
 - b) Concepts and definitions of terms used
 - c) Both the above
 - d) None of the above
26. A pre-test of the survey is conducted as
- a) Mock interview
 - b) Field Practice

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- c) Correct the questionnaire of flaws
 - d) Enumerator recruitment
27. Problems encountered during enumeration are
- a) Accidents and injuries
 - b) Lack of forms
 - c) Non-response
 - d) All of the above
28. Post enumeration activities include
- a) General screening
 - b) Editing and coding
 - c) General review
 - d) All of the above
29. Micro data can be accessed through
- a) Public Use Files
 - b) Contract
 - c) Request processing
 - d) All of the above
30. Population in statistics refers to
- a) All people whose characteristics are being studied
 - b) All elements whose characteristics are being studied
 - c) A sample of elements whose characteristics are being studied
 - d) None of the above

PART – II : Short Answer Questions (20 marks)

Answer ALL the questions. Each question carries 5 marks.

1. Find the Coefficient of Variation of the sample of measurements 3,10,10,11,15,15,25 and 30.
2. In how many ways may 3 books be placed next to each other on a shelf?
3. Explain in your own words the difference between point estimate and interval estimate
4. If a random variable X is normally distributed with a mean of 118 and a standard deviation of 11, what Z-score correspond to raw score 99

SECTION B : Case Study

Choose either Case 1 or Case 2 from this Section. Each Case carries 50 marks.

CASE 1

The United Nations has declared March 20 as the International Day of Happiness on 28th June, 2012. This declaration was because of the effort and input by the Royal Government of Bhutan. You are asked to design a survey on Happiness to reflect the state of happiness of the Bhutanese populace. How would you go about designing the survey? Please discuss all the phases.

- (a) Target Population
- (b) Domains
- (c) Sampling strategy
- (d) Sample size
- (e) Stratification
- (f) Scope
- (g) Questionnaire design
- (h) Data collection
- (i) Tabulation plan
- (j) Analysis
- (k) publication
- (l) Dissemination in detail.

CASE 2

The following data is provided on fertilizer and corn yield.

X	Fertilizer	.3	.6	.9	1.2	1.5	1.8	2.1	2.4
Y	Corn yield	10	15	30	35	25	30	50	45

- a) Plot the dependent variable against the independent variable
- b) Find the least squares line for this data
- c) What is the Y-intercept
- d) If 3.0 units of fertilizer were used what would be a good guess as to the resultant corn yield.

Hint: General equation of any line is $Y = a + bX$