

**ROYAL CIVIL SERVICE COMMISSION  
BHUTAN CIVIL SERVICE EXAMINATION (BCSE) 2013  
EXAMINATION CATEGORY: TECHNICAL**

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

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<b>Date</b>	: 13 October 2013
<b>Total Marks</b>	: 100
<b>Examination Time</b>	: 90 minutes (1.5 hours)
<b>Reading Time</b>	: 15 minutes (prior to examination time)

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**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. This 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 **14** printed pages in all, including this Instruction Page.

**GOOD LUCK!**

**PART I : MULTIPLE CHOICE QUESTIONS**

**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). Each question carries ONE mark. Any double writing, smudgy answers or writing more than one choice shall not be evaluated.**

1. In the relation  $x = y^2 + 3$ , can  $y$  be represented as a mathematical function of  $x$ ?
  - a) Yes,  $y$  can be represented as a function of  $x$
  - b) No,  $y$  cannot be represented as a function of  $x$
  - c) None of the above are correct
  - d) Both are correct
  
2. The value of  $y$  is always four more than twice  $x$ . Is  $y$  a function of  $x$ ?
  - a)  $y$  is a function of  $x$
  - b)  $y$  is not a function of  $x$
  - c) None of the above are correct
  - d) Both are correct
  
3. Sonam drove her car 245 kilometers and used 10 liters of fuel. She wants to know how far she can drive with 5 liters of fuel with the same fuel efficiency. Select the statement that is correct.
  - a)  $\frac{5}{x} = \frac{245}{10}$
  - b)  $\frac{10}{5} = \frac{245}{x}$
  - c) None of the above are correct
  - d) Both are correct
  
4.  $\text{Log}_{100}(1) = ?$ 
  - a) 100
  - b) 1
  - c) 0
  - d) None of the above
  
5.  $\text{Log}_2\left(\frac{1}{8}\right) = ?$ 
  - a) 3
  - b) -3
  - c) 0
  - d) None of the above

6. Given the function  $g(x) = \begin{cases} x^2, & x \neq 2 \\ 1, & x = 2 \end{cases}$ , what is the  $\lim g(x)$  as  $x$  approaches 2
- 1
  - 0
  - 4
  - None of the above
7.  $J$  is the set of all integers,  $C$  is the set of counting numbers,  $N$  is the set of natural numbers,  $R$  is the set of real numbers and  $Q$  is the set of rational numbers. Which of the following statement is true?
- $C \subset J \subset N \subset Q \subset R$
  - $J \subset N \subset C \subset Q \subset R$
  - $N \subset C \subset J \subset Q \subset R$
  - None of the above
8. The statement  $a > b$  and  $b > c$  imply  $a > c$  is true is because of which property?
- Transitive
  - Reflexive
  - Symmetric
  - None of the above
9. The new government has announced that it will focus on Multidimensional Poverty Index. It would mean focusing on which of the following?
- Income poverty
  - Living standard, education and health
  - Housing
  - None of the above
10. How many domains are there in Bhutan's GNH Index?
- 8
  - 9
  - 4
  - None of the above
11. How many pillars are there in Bhutan's GNH Index?
- 8
  - 9
  - 4
  - None of the above
12. The Millennium Development Goals are targeted to be attained by countries by which year?
- 2013
  - 2014

- c) 2015  
d) None of the above
13. How many Millennium Development Goals were established which all United Nations member states have agreed to achieve?  
a) 8  
b) 9  
c) 4  
d) None of the above
14. How many member countries does SAARC have?  
a) 6  
b) 7  
c) 8  
d) None of the above
15. The SAARC Secretariat is based in which country?  
a) India  
b) Pakistan  
c) Bangladesh  
d) Nepal
16. Given the polynomial  $3x^2 - 8x + 7$ , which of the following identifies all exponents?  
a) 2,1,0  
b) 2,1  
c) 2  
d) None of the above
17. Which of the following is not a polynomial?  
a)  $x^2 + 1$   
b)  $x^{-\frac{1}{2}} + 1$   
c)  $4x^3 - 2x^2 + 7$   
d) All of the above
18. If  $S(n)$  = Sum of all positive integers including n, What is  $S(100)$ ?  
a) 5049  
b) 5050  
c) 5051  
d) None of the above
19. The series defined by  $a_n = -5 + 2(n - 1)$  is an example of which series?  
a) Arithmetic series  
b) Geometric series  
c) Harmonic series  
d) None of the above

20. The circumference of a circle is equal to  $60\pi$ . What is the radius of this circle?
- a) 3600
  - b) 60
  - c) 30
  - d) None of the above
21. The population of Bhutan has been forecast till 2030 by the National Statistics Bureau. This technique is called?
- a) Inductive reasoning
  - b) Deductive reasoning
  - c) None of the above
  - d) Both the above
22. Which of Newton's Laws explains why satellites need very little fuel to stay in orbit?
- a) First Law
  - b) Second Law
  - c) Third Law
  - d) None of the above
23. When an object is stationary, all of the forces acting on it are balanced. This is deduced from which law of Newton?
- a) First Law
  - b) Second Law
  - c) Third Law
  - d) None of the above
24. Force is
- a) A scalar quantity
  - b) A vector quantity
  - c) None of the above
  - d) Both the above
25. Which best explains why we are able to accelerate forward when starting to run.
- a) The foot not touching the ground propels the entire body as it swings forward
  - b) The runner's upper body quickly leans forward causing the entire body to begin accelerating forward
  - c) No acceleration takes place. Runners are always at a fixed velocity.
  - d) The striking foot pushes backwards against the ground. The friction with the ground provides an equal and opposite force forwards.

26. A horse pulls forward on a carriage with a given force. By Newton's Third Law, the carriage must be pulling on the horse backward with an equal and opposite force. Given this, what explains why the horse and carriage can move forward?

- a) There is a brief moment where the horse pulls before the reaction force kicks in
- b) The forward force of the horse is just big enough to overcome the backward force of the cart and start the cart forward
- c) The cart's force is only in reaction to the horse's force so it does not define direction of movement
- d) The cart is rolling on wheels while the horse's hooves have traction with the ground

27. You and a friend are pulling on a rope in opposite directions as hard as you can. What is the "equal and opposite force" to the force of your hand pulling on the rope described by Newton's Third Law?

- a) The force of the rope pulling on your hand in the opposite direction
- b) The force of your friend pulling on the rope in the opposite direction
- c) The force of the rope pulling your friend's hand
- d) The force of friction between the ground and your shoes

28. A 2 Newton upward net force is being applied to a 10 kg object. What is the magnitude of the upward acceleration on the object (in  $\frac{m}{s^2}$ )?

- a)  $5 \frac{m}{s^2}$
- b)  $0.2 \frac{m}{s^2}$
- c)  $10 \frac{m}{s^2}$
- d) None of the above

29. The unit of work is?

- a) Newton
- b) Amperes
- c) Joules
- d) None of the above

30. An object has been moved 5 meters to the right. Is it a scalar quantity or vector quantity?

- a) Scalar
- b) Vector
- c) None of the above
- d) Both the above

31. An object has moved 5 meters to the right in 2 minutes. Are we talking about speed or velocity?

- a) Speed
- b) Velocity
- c) None of the above
- d) Both the above

32. The speed of a person travelling is given as 5 kilometers in a hour. What is the person's speed in meters per second?

- a)  $2.5 \frac{m}{s}$
- b)  $3 \frac{m}{s}$
- c)  $1.39 \frac{m}{s}$
- d) None of the above

33. A car is advertised as being able to go from 0 to 60 miles per hour in 3 seconds. What is its acceleration?

- a)  $20 \frac{\text{miles}}{\text{hour second}}$
- b)  $\frac{1 \text{ miles}}{180 \text{ second}}$
- c) None of the above
- d) Both the above

34. In fluids, Pressure input=Pressure output is

- a) Archimedes principle
- b) Pascal's principle
- c) Boyle's law
- d) None of the above

35. Product of pressure and volume is a constant for a given mass of confined gas as long as the temperature is constant is

- a) Archimedes principle
- b) Pascal's principle
- c) Boyle's law
- d) None of the above

36. The upward buoyant force that is exerted on a body immersed in a fluid, whether fully or partially submerged, is equal to the weight of the fluid that the body displaces is

- a) Archimedes principle
- b) Pascal's principle

- c) Boyle's law
  - d) None of the above
37. An element is defined by
- a) Electrons
  - b) Protons
  - c) Neutrons
  - d) None of the above
38. The atomic number is defined by
- a) No of electrons
  - b) No of protons
  - c) No of neutrons
  - d) None of the above
39. Isotope is same element with different number of
- a) Electrons
  - b) Protons
  - c) Neutrons
  - d) None of the above
40. Joules is the unit used to measure
- a) Potential energy
  - b) Heat
  - c) Enthalpy
  - d) All of the above
41. When an Alpha decay occurs
- a) The original element remains as it is
  - b) The original element changes into another element
  - c) None of the above
  - d) Both the above
42. When Gamma decay occurs
- a) Electron is released
  - b) Proton is released
  - c) Neutron is released
  - d) None of the above
43. When an electron is released
- a) Alpha decay occurs
  - b) Beta decay occurs
  - c) Gamma decay occurs
  - d) None of the above



44. Say that there are 80 grams of an element, and its half life is given as 2 years. The same element was found to weigh 10 grams after some time had elapsed. Calculate the time that has gone by.
- a) 4 Years
  - b) 5 years
  - c) 6 years
  - d) None of the above
45. Evolution in biology means
- a) Adapting to the environment by design
  - b) Natural selection
  - c) None of the above
  - d) Both the above
46. If we identify the number of people who use each of several brands of toothpaste, the data generated is an example of
- a) Discrete variable
  - b) Continuous variable
  - c) None of the above
  - d) Both the above
47. The mode of the following sample 14,19,16,21,18,19,24,15 and 19 is
- a) 18
  - b) 21
  - c) 19
  - d) 15
48. A family had eight children. The ages are 9, 11, 8, 15, 14, 12, 17 and 14. Find the range of the data.
- a) 12.5
  - b) 8
  - c) 17
  - d) 9
49. From the sample of data 5, 8, 2 and 1, compute the standard deviation of the sample.
- a) 7
  - b) 3.74
  - c) 2.74
  - d) None of the above
50. What is the probability of throwing a “six” with a single die?
- a) 1
  - b)  $\frac{1}{3}$

- c)  $\frac{1}{6}$
- d) None of the above

51. Find the probability of drawing a black card in a single random draw from a well-shuffled deck of ordinary playing cards.

- a)  $\frac{1}{26}$
- b)  $\frac{1}{52}$
- c)  $\frac{1}{2}$
- d) None of the above

52. Bhutan National Bank asked questions to 100 of their clients to find the satisfaction level of their service users. The 100 clients in this survey are an example of

- a) Parameter
- b) Statistic
- c) Sample
- d) Population

53. Which of the following is a measure of central tendency?

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

54. An extremely large value in a data set affects which of the measures the most?

- a) Mean
- b) Median
- c) Mode
- d) Frequency

55. A single numerical value used to describe a characteristic of a sample data set, such as the sample mean, is referred as a

- a) Parameter
- b) Statistic
- c) Sample mean
- d) None of the above

56. The median is the
- 25<sup>th</sup> Percentile
  - 50<sup>th</sup> percentile
  - 75<sup>th</sup> percentile
  - None of the above
57. Which of the following is not a possible value of correlation coefficient?
- +1
  - 1
  - 0.011
  - None of the above
58. If the median age of civil servants is 27 years old, which of the following is the correct interpretation?
- Majority of civil servants are 27 years old
  - 50 % of the civil servants are less than 27 years
  - None of the above
  - Both the above
59. Which of the following is a sampling method?
- SRS
  - Linear Systematic
  - Cluster
  - All of the above
60. In statistics population refers to
- People in the whole country
  - Whole elements of interest of study
  - None of the above
  - Both the above
61. The first Population and Housing Census of Bhutan was conducted in
- 2000
  - 2005
  - 2008
  - 2010
62. If the stunting rate among children is reported as 5%, if you are to report per 1000 children, the stunting rate is
- 0.25 per 1000 children
  - 0.5 per 1000 children
  - 50 per 1000 children
  - 500 per 1000 children

63. The proportion of poor people in 2012 was estimated at 12%. It is roughly equivalent to
- a) One out of every five persons
  - b) One out of every ten persons
  - c) Twenty out of every hundred persons
  - d) None of the above
64. The world statistics day is observed on
- a) December 20
  - b) November 20
  - c) October 20
  - d) September 20
65.  $1!$  is equal to 1.  $0!$  Is equal to
- a) 0
  - b) 1
  - c) 0.1
  - d) None of the above
66. Humane Development Index of the UN is a composite index and the main components are
- a) Housing condition, education and income
  - b) Life expectancy, education and income
  - c) Safe water, education and income
  - d) None of the above
67. There are various UN agencies in Bhutan. Which agency is mainly mandated with looking after women and children?
- a) UNDP
  - b) UNFPA
  - c) UNICEF
  - d) FAO
68. UNDP currently assists Bhutan in the fields of poverty alleviation, realization of MDGs and supporting the government's 11<sup>th</sup> five year plan. When did its support to Bhutan start?
- a) 1961
  - b) 1973
  - c) 1976
  - d) 1980
69. Which UN agency in Bhutan mainly focuses its activities on population?
- a) UNDP
  - b) UNFPA
  - c) UNICEF
  - d) FAO

70. Which of the following is mainly used for disseminating information?
- a) PHStat
  - b) CSPro
  - c) DevInfo
  - d) Stata

## **PART II : SHORT ANSWER QUESTIONS**

**Write short answers corresponding to the questions in the Answer Booklet against the question number. Each question carries total of THREE marks.**

1. There are 66 students in a class. If the ratio of boys: girls is 4:7; How many girls do I need to add for the ratio to become 1: 2?
  
2. At a large high school it is estimated that two out of every three students have a cell phone, and one in five of all students have a cell phone that is one year old or less. Out of the students who own a cell phone, what proportion owns a phone that is more than one year old?
  
3. Given the equation  $x^2 - 15x + 50 = 0$ ; solve for x.
  
4. Simplify  $\frac{25(a^3)^3 b^2}{5a^2 b(b^2)}$
  
5. Multiply and simplify  $5\sqrt[3]{2x^2} \cdot 3\sqrt[3]{4x^4}$
  
6. Simplify  $(a + b)^4$  using the Binomial Theorem.
  
7. An object with mass one kilogram is moved ten meters upwards. The potential energy created is 100 Joules. When the object is released, what is the velocity it attains right before it hits the ground?

8. The IQ scores for a sample of 24 students who are entering their first year of high school are provided as follows:

115, 121, 97, 108, 106, 141, 119, 128, 108, 110, 142, 151, 119, 128, 98, 111, 143, 125, 134, 152, 130, 122, 140 and 126.

9. A motor car travelled 3 consecutive miles, the first mile at  $x_1 = 35$  miles per hour., the second at  $x_2 = 48$  miles per hour and the third at  $x_3 = 40$  miles per hour. Find average speed of the car in miles per hour.

10. A wheat researcher is studying the yield of a certain variety of wheat in Bumtang. He has at his disposal five farms scattered throughout Bumtang on which he can plant the wheat and observe the yield. Describe the sampled population and the target population. Under what conditions will this be a random sample?