ROYAL CIVIL SERVICE COMMISSION
CIVIL SERVICE COMMON EXAMINATION (CSCE) 2009
EXAMINATION CATEGORY: TECHNICAL

PAPER II: GENERAL SUBJECT KNOWLEDGE for STATISTICS GROUP

Date : 7/11/09
Total Marks : 100
Examination Time : $1\frac{1}{2}$ hours
Reading Time : 5 minutes

Read the following instructions carefully before answering the questions.

The general subject knowledge paper is set to test your basic scientific and technical/professional subjects. Marks will be given based on the knowledge of the subject as well as clarity and preciseness of the response.

The paper consists of two parts:

Part a: *70 multiple-choice questions of one mark each (70 marks)*
Part b: *10 short answer questions of 3 marks each (30 marks).*

All questions are compulsory. All answers are to be written in the answer sheet.

Paper II consists of 13 pages including this page.

Part a. Multiple-choice questions of one mark each (70 marks).
(In this part four choices (a,b,c & d) are provided against each question. Write the question number on the answer sheet with the corresponding answer choice. No need to copy the whole question on the answer sheet.)

1. Let f be the function defined by the equation $y = \sqrt{x-2}$. The domain of f is the interval
   a) $(-\infty, +\infty)$
   b) $[0, +\infty)$
   c) $[2, +\infty)$
   d) None of the above

2. Let f be the function defined by $y = x^2$. The range is
   a) $(-\infty, +\infty)$
   b) $[0, +\infty)$
   c) $(0, +\infty)$
   d) None of the above

3. $f = \left\{ (x, y,) \middle| y = \sqrt{x-2} \right\}$. A set of ordered pairs (x , y) for the function f is
   a) (3,1)
   b) (2,0)
   c) (6,2)
   d) All of the above are correct

4. Given that f is the function defined by $f(x) = x^2 + 3x - 4$. Then $f(0)$ is
   a) -4
   b) -2
   c) 0
   d) 4

5. Given $f(x) = \dfrac{5}{x-2}$ and g(x)=2x+1. Then $(f \circ g)(3)$ is
   a) -1
   b) 1
   c) -2
   d) 2

6. Given $f(x) = \dfrac{3}{x}$, the derivative of f is
   a) $\dfrac{3}{x}$

b) $\frac{3}{x^2}$

c) $-\frac{3}{x^2}$

d) None of the above

7. The volume of a cylinder is

a) πr^2

b) $\pi r^2 h$

c) $\frac{1}{2}bh$

d) None of the above

8. A function f is said to be one-to-one if every number in its range corresponds to

I. Exactly one number in its domain

II. Every horizontal line intersects the graph of the function in at most one point

III. Every horizontal line intersects the graph of the function at more than one point

a) I is true

b) II is true

c) III is true

d) I and II are true

9. $3^{102} + 9 * 3^{100} + 3^{\frac{103}{3}} = ?$

a) 3^{101}

b) 3^{102}

c) 3^{103}

d) 3^{104}

10. Round $(202)^2$ to the nearest hundred

a) 40,000

b) 40,800

c) 47,000

d) 48,000

11. The inequality $x^2 - 2x + 1 \leq 0$ has

a) No solutions

b) A set of solutions

c) 1 solution only

d) 2 solutions only

12. a, b, c and d are numbers of different values such that

a + b = d
a*b*c=0

Which of the four numbers must be equal to 0?

a) a
b) b
c) c
d) d

13. $10^4(5^4 - 2^4) / 21 = ?$

a) 10,000
b) 209,000
c) 289,000
d) 290000

14. For what value of k will the two equations $2x + 4 = 4(x - 2)$ and -x+k=2x-1 have the same solution?

a) 6
b) 17
c) 2
d) -1

15. An object travels at 15 feet per minute. How many feet does it travel in 24 minutes and 40 seconds?

a) 360
b) 370
c) 367.5
d) 500

16. If $f(n) = n + \sqrt{n}$, where n is a positive integer, which of the following would be a value of $f(n)$

a) 5
b) 10
c) 12
d) None of the above

17. If n is a positive integer such that $\frac{n!}{(n-2)!} = 342$, find n

a) 16
b) 17
c) 18
d) 19

18. A number is given as 987562153ab where a and b are digits. Which values of a and b, such that

$a + b = 11$ and a < b ,

would result in 987562153ab being divisible by 4?

a) a=0, b=8
b) a=5, b=6
c) a=3, b=4
d) a=7, b=8

19. The sum of two numbers is 20. The larger number is 4 less than twice the smaller number. What are the 2 numbers?

a) 8 and 12
b) 9 and 12
c) 10 and 13
d) 11 and 13

20. The circumference of a circle is equal to 72π . What is the radius of this circle?

a) 24
b) 36
c) 42
d) 59

21. For data entry, which software is most suitable and widely used?

a) SPSS
b) SAS
c) Stata
d) CSPro

22. For census data analysis which software is most suitable and widely used?

a) SPSS
b) SAS
c) Stata
d) CSPro

23. For sampling purposes which software is most suitable and widely used?

a) SPSS
b) SAS
c) Stata
d) CSPro

24. For poverty analysis and small area estimation which software is most suitable and widely used?

a) SPSS
b) SAS
c) Stata
d) CSPro

25. In descriptive statistics our main objective is to

a) Describe the population
b) Describe the data we collected
c) Infer something about the population
d) Compute an average

26. Which level of measurement is required for the mode?

a) Nominal
b) Ordinal
c) Interval
d) Ratio

27. A disadvantage of the range is?

a) Only two values are used in its calculation
b) It is in different units than the mean
c) It does not exists for some data sets
d) All of the above

28. The variance is

a) Found by dividing N by the mean
b) In the same units as the original data
c) Found by squaring the standard deviation
d) All of the above

29. Which of the following statements is true regarding the standard deviation?

a) It cannot assume a negative value
b) If it is zero, then all the data values are the same
c) It is in the same units as the mean
d) All of the above are correct

30. In a symmetric distribution

a) The mean, median and the mode are equal
b) The mean is the largest measure of location
c) The median is the largest measure of location
d) The standard deviation is the largest value

31. When we find the probability of an event happening by subtracting the probability of the event not happening from 1, we are using

a) Subjective probability

b) The complement rule
c) The general rule of addition
d) The special rule of multiplication

32. In a continuous probability distribution
a) Only certain outcomes are possible
b) All the values within a certain range are possible
c) The sum of the outcomes is greater than 1
d) None of the above

33. Which of the following is *not* a reason for sampling?
a) The destructive nature of certain tests
b) The physical impossibility of checking all the items in the population
c) The adequacy of sample results
d) All of the above are reasons for sampling

34. A point estimate is
a) Always an estimate of the population mean
b) Always equal to the population value
c) An estimate of the population parameter
d) None of the above

35. For an index number the base period
a) Appears in the numerator
b) Cannot be less than 100
c) Appears in the denominator
d) Must be after the year 2000

36. The difference between the sample mean and the population mean is called the
a) Sampling error
b) Standard error of the mean
c) Population standard deviation
d) Population mean

37. Which of the following statements is correct regarding the standard normal distribution?
a) It is also called the z distribution
b) Any normal distribution can be converted to the standard normal distribution
c) The mean is 0 and the standard deviation is 1
d) All of the above are correct

38. In a positively skewed distribution

a) The mean, median, and the mode are all equal
b) The mean is larger than the median
c) The median is larger than the mean

d) The standard deviation must be larger than the mean or the median

39. The variance is
    a) Found by dividing N by the mean
    b) In the same units as the original data
    c) Found by squaring the standard deviation
    d) All of the above

40. The standard deviation is
    a) Based on squared deviations from the mean
    b) In the same units as the mean
    c) Uses all the observations in its calculations
    d) All of the above

41. An example of an irrational number is

    a) $\sqrt{4}$
    b) $\sqrt{3}$
    c) $\sqrt{8}$
    d) None of the above

42. If $a < b$ and $c < 0$, then the following is true
    a) $ac > bc$
    b) $ac < bc$
    c) ac=bc
    d) None of the above

43. Consider the set $\{x | a < x < b\}$. The set of all numbers x satisfying the continued inequality $a < x < b$ is called
    a) An open interval
    b) Closed interval
    c) Half closed interval
    d) None of the above

44. Consider the set $\{x | -7 \le x < -2\}$. The representation of it on the interval notation is
    a) $(-7, -2)$
    b) $[-7, -2)$
    c) $[-7, -2]$
    d) None of the above

45. If a is a real number, $|a| = a$ if
    a) $a < 0$
    b) $a \ge 0$

c) $a > 0$
d) None of the above

46. If $a < b$, then $|a-b|$ is equal to

a) $b-a$
b) $a-b$
c) $a-a$
d) None of the above

47. If $a = 3$ and $b = -4$ then $|a+b|$ equals

a) 1
b) 7
c) -1
d) None of the above

48. Consider the equation $y = 0.75x + 310$. The equation is

a) A quadratic equation
b) A linear equation
c) A cubic equation
d) None of the above

49. The slope of the line having the equation $5y = -6x + 7$ is

a) $\frac{7}{5}$
b) $\frac{-6}{5}$
c) $\frac{-5}{6}$
d) None of the above

50. 180^0 equals

a) 2π rad
b) $\frac{\pi}{2}$ rad
c) $\frac{\pi}{4}$
d) None of the above

51. Area of a rectangle with base b and height h is equal to

a) bh

b) $\frac{1}{2}bh$

c) $\frac{1}{2}bh^2$

d) None of the above

52. The number zero is

a) Odd

b) Even

c) Not an integer

d) None of the above

53. Of the two fractions $\frac{3}{8}$ and $\frac{7}{13}$, which is true?

a) $\frac{3}{8} > \frac{7}{13}$

b) $\frac{7}{13} > \frac{3}{8}$

c) $\frac{7}{13} = \frac{3}{8}$

d) None of above

54. If $b \neq 0$, then $\frac{(b^5)^3}{b^2.b}$ is equal to

a) b^{10}

b) b^{11}

c) b^{12}

d) None of the above

55. $\sqrt{2}+\sqrt{3}$ is equal to

a) $\sqrt{5}$

b) $\sqrt{6}$

c) $\sqrt{1}$

d) None of the above

56. Let $z^2 = 16$. Then z and $\sqrt{16}$ are

a) Are always equal

b) Cannot be determined from the information given

c) Always not equal

d) None of the above

57. $2[2b+(5b+7b)]-(5b+7b)$ equals

a) 4b
b) 6b
c) 8b
d) None of the above

58. 17 is what percent of 25?
a) 68
b) 70
c) 75
d) None of the above

59. In the set $\{2,5,3,7,8,6\}$ the median is
a) 3
b) 7
c) 6
d) None of the above

60. Two samples are provided. Sample A=5,5,5 and sample B=7,0,7. The standard deviation of sample A is
a) Greater than B
b) Lesser than B
c) Equal to B
d) Cannot be determined from information given

61. The first Population and Housing Census of Bhutan was conducted in
a) 1907
b) 1968
c) 2000
d) 2005

62. What will be Bhutan's projected population in 2030?
a) 880,000
b) 886,523
c) 900,523
d) 1000,000

63. How many Dungkhags are there in Bhutan?
a) 6
b) 10
c) 14
d) 20

64. When did Non-Formal Education (NFE) formally establish in Bhutan?
    a) 1982
    b) 1985
    c) 1992
    d) 2000

65. The poverty rate in Bhutan as per the latest available official statistics is
    a) 32.6
    b) 29.6
    c) 23.2
    d) 25.2

66. The Dzongkhag which had 5 constituencies in 2008 parliamentary elections
    a) Samtse
    b) Mongar
    c) Trashigang
    d) Wangdi Phodrang

67. Our fifth king was born in
    a) 1978
    b) 1980
    c) 1982
    d) 1984

68. The National Assembly of Bhutan was established in
    a) 1950
    b) 1953
    c) 1956
    d) 1958

69. The two Dzongkhags with the lowest number of Geogs are
    a) Gasa and Bumtang
    b) Gasa and Dagana
    c) Bumtang and Dagana
    d) Trongsa and Bumtang

70. How many members are their in the parliament?
    a) 47
    b) 25
    c) 72
    d) 75

Part b. Ten short answer questions of three marks each (30 marks)
(Attempt all questions. Write the answers in the answer sheet provided)

1. What is the nature of the distribution if variance is zero?

2. Calculate the mean and variance of the following distribution
   10, 8, 6, 4, 1, 9, 2, 2, 8, 0

3. Explain in your own words the meaning of correlation.

4. Explain the difference between $r = +0.76$ and $r = -0.76$ in the correlation coefficient values.

5. What is vital statistics? State its uses and methods of collection.

6. Suppose a coin is flipped once. What is the probability of
   a) A Head
   b) A Tail

7. A standard deck is shuffled and a card is drawn. The card is noted and then replaced into the deck. The deck is re-shuffled and a second card is drawn. What is the probability of
   a) A duce on the first draw and a seven on the second?
   b) A duce on the first draw and a red card on the second?

8. Suppose that in town A the mean yearly income is Nu.80,000, the median income is Nu.80,000 and the modal income is Nu.80,000. Lets say that in a nearby town B the mean income is Nu.85,000, the median income is Nu.70,000 and modal income is Nu.50,000.

In which town is wealth most evenly distributed? Why?

9. Find two numbers whose sum is 26 and whose product is 165

10. A rectangular field has a length 10 feet more than its width. If the area of the field is 264, what are the dimensions of the rectangular field?