

Technical Graduates Selection Examination, 2007

Statistics Paper II: General Subject Knowledge

Marks 100

Time: 90 minutes

Part a. Tick on the box corresponding to the right answer (70 marks)

1. An example of an irrational number is

- $\sqrt{4}$
- $\sqrt{3}$
- None of the above

2. If $a < b$ and $c < 0$, then the following is true

- $ac > bc$
- $ac < bc$
- None of the above

3. Consider the set $\{x | a < x < b\}$. The set of all numbers x satisfying the continued inequality $a < x < b$ is called

- An open interval
- Closed interval
- None of the above

4. Consider the set $\{x | -7 \leq x < -2\}$. The representation of it on the interval notation is

- $(-7, -2)$
- $[-7, -2)$
- None of the above

5. If a is a real number, $|a| = a$ if

- $a < 0$

- $a \geq 0$
- None of the above

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

- $b - a$
- $a - b$
- None of the above

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

- 1
- 7
- None of the above

8. The x coordinate of the midpoint M of the line segment from A(5,-3) to B(-1,6) is

- $\frac{3}{2}$
- 2
- None of the above

9. Consider the equation $y = x^2 - 3$. The equation is

- Symmetric with respect to the y axis
- Not symmetric with respect to the y axis
- None of the above

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

- A quadratic equation
- A linear equation
- None of the above

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

$\frac{7}{5}$

$\frac{-6}{5}$

None of the above

12. 180° equals

2π rad

$\frac{\pi}{2}$ rad

None of the above

13. The characteristic roots of the second degree equation of the form $ax^2 + bx + c = 0$ is

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

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

None of the above

14. Area of a circle with radius r is equal to

r^2

πr^2

None of the above

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

bh

$\frac{1}{2}bh$

None of the above

16. The number zero is

Odd

Even

None of the above

17. The following is a factor of 12

12

5

None of the above

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

$\frac{3}{8}$

$\frac{7}{13}$

None of above (They are equal)

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

b^{10}

b^{11}

None of the above

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

$\sqrt{5}$

- $\sqrt{6}$
- None of the above

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

- Are always equal
- Cannot be determined from the information given
- None of the above

22. 11 marbles are placed in a bowl; some are red, and some are blue. If the number of red marbles is one more than the number of blue marbles, what is the probability that a marble taken from the bowl is blue?

- $\frac{5}{11}$
- $\frac{6}{11}$
- None of the above

23. $2[2b + (5b + 7b)] - (5b + 7b)$ equals

- $4b$
- $16b$
- None of the above

24. 17 is what percent of 25?

- 68
- 70
- None of the above

25. In the set $\{2, 5, 3, 7, 8, 6, 9\}$ the median is

- 7
- 6

None of the above

26. In the set $\{2, 5, 3, 7, 8, 6\}$ the median is

3

7

None of the above

27. Two samples are provided. Sample A=5,5,5 and sample B=7,0,7. The standard deviation of sample A is

Greater than B

Lesser than B

Cannot be determined from information given

28. If the mean of a set of data is 15 and the standard deviation is 5, which of the following represents the interval that is 2 standard deviations from the mean.

10 to 20

5 to 25

None of the above

29. Let $F = \{4, 2, 7, 11, 8, 9\}$. The following statement is true

The range of the set F is greater

The median of set F is greater

None of the above

30. Any four-sided figure contains

270 degrees

360 degrees

None of the above

31. The Pythagorean Theorem which states that $c^2 = a^2 + b^2$ applies only to

Equilateral triangles

Right triangles

None of the above

32. Dorji will be x years old y years from now. How old was he z years ago?

$x+y+z$

$x-y-z$

None of the above

33. If two kilograms of sugar costs 50 Ngultrums, how much would 50 kilograms cost?

1240

1250

None of the above

34. If the price of a lamp goes from \$80 to \$100, the percent increase in price is

20%

25%

None of the above

35. Last year, the ratio of the number of football games Transport United (A football club in Thimphu) won to the number of matches they lost was 12:3. What percentages of their matches did the team win?

85%

80%

None of the above

36. If $\frac{b}{9} = \frac{10}{2b}$, what is the value of b^2

45

$3\sqrt{5}$

None of the above

37. Three fair coins are flipped. The probability of getting more heads than tails is

Greater

Lesser

None of the above

38. A function is a set of ordered pairs of numbers (x, y) in which

Two distinct ordered pairs can have the same first number

No two distinct ordered pairs have the same first number

None of the above

39. Let $f(x) = \sqrt{x}$. The domain of the function is

$-\infty < x < \infty$

$x \geq 0$

None of the above

40. $\lim_{x \rightarrow 5} 7$ is

5

7

None of the above

41. The domain of the natural logarithmic function, $\ln x$ is

$x > 0$

$x \geq 0$

None of the above

42. If a and b are any real numbers, then $e^a \cdot e^b$ is equal to

- e^{ab}
- e^{a+b}
- None of the above

43. $\lim_{x \rightarrow 2} (3x + 5)$ is equal to

- 11
- 12
- None of the above

44. The average of 5, 10, 15 and z is 20. What is z ?

- 45
- 50
- None of the above

45. What fractional part of a week is 98 hours?

- $\frac{7}{24}$
- $\frac{7}{12}$
- None of the above

46. Interquartile range is the difference between

- $\frac{1}{4}$ highest and Lowest
- $\frac{3}{4}$ and highest and $\frac{1}{4}$
- None of the above

47. The "Inconvenient Truth" is a documentary film on

- World trade

Global warming

None of the above

48. The "Asian Tsunami" which affected several countries throughout South and Southeast Asia occurred in the year

December 2004

January 2005

None of the above

49. The term carbon neutral means

Not releasing carbon dioxide into the atmosphere

Removing as much carbon dioxide from the atmosphere as we put in

None of the above

50. One Gigabyte is equal to

1024 Megabytes

1000 Megabytes

None of the above

51. Spontaneous movement of solvent particles from a dilute solution or a pure solvent towards concentrated solution through a semipermeable membrane is known as

Osmosis

Reverse osmosis

None of the above

52. The term radioactivity is coined by

Pierre Curie

Madam Curie

Rutherford

53. The atoms of same elements having same atomic number but different mass numbers is called

- Isobars
- Isomers
- Isotopes

54. The current flowing through a conductor is directly proportional to the potential difference is applied across the ends of the conductor is

- Kohlrausch' Law
- Ohm's Law
- Faraday's Law

55. The organic compound (C_4H_{10}) is an example of

- Chain Isomerism
- Position Isomerism
- Functional Isomerism

56. The solubility of a gas in liquid increases with

- Increase in pressure
- Increase in temperature
- Increase in pressure and temperature

57. Solutions which resist change of pH value on the addition of small amounts of acid or alkali are called

- Isohydric solutions
- Buffer solutions
- None of the above

58. The phenomenon by which a substance exists in two or more different crystalline form is called

- Polymorphism

- Isomerism
- None of the above

59. A colourless and poisonous gas, which is heavier than air and has a rotten egg smell is

- Hydrogen peroxide
- Hydrogen sulphide
- Flourine

60. The number of moles of solute present in one litre of solution is called

- Molality
- Molarity
- Normality

61. The SI unit of heat is

- Calories
- Joule
- None of the above

62. An electric charge in uniform motion produces

- An electric field only
- A magnetic field only
- Both electric and magnetic fields

63. To obtain data or information about certain parts on the earth through satellite is

- Aerial photography
- Remote sensing
- Aerial photography and Remote sensing fields

64. Which of the three layers of the earth is nearest to the earth surface

- Stratosphere

Troposphere

Ionosphere

65. Loss of free electrons from any conductor gives it a

Positive charge

Negative charge

None of the above

66. An atom consists of three elementary particles: electron, proton and neutron. The electrons on the periphery of the atom are

More than the number of protons in the nucleus

Equal to the number of protons in the nucleus

Less than the protons in the nucleus

67. The materials which offer very less resistivity to current are called

Conductors

Semi-conductors

Insulators

68. The device used to measure the current in any circuit is

Potentiometer

An Ammeter

Voltmeter

69. The layer of the atmosphere which protects all living animals and plants from ultraviolet rays is

Troposphere

Ozone

Stratosphere

Ionosphere

70. Which of the following require a medium for propagation

Electronic waves

Mechanical waves

Part b. Answer the following questions (30 marks)

1. What is the value of $2x^2 - 5$ when $x = -4$
2. The sum of x distinct integers greater than zero is less than 75. What is the greatest possible value of x ?
3. Three fair coins are flipped. What is the probability of getting one head?
4. To join a certain club, a person must either be a statistician or a mathematician or both. Of the 25 members in this club, 19 are statisticians and 16 are mathematicians. How many are both mathematician and statistician?
5. List down all the statistical software you are familiar with.
6. If a is any positive number and x is any real number, show that $\ln a^x = x \ln a$

7. Show that $\sum_{i=1}^n i = \frac{n(n+1)}{2}$

8. Solve the following
 $\lim_{x \rightarrow 4} [x(2x+1)]$

9. If the cost of a one-hour telephone call is Nu 7.20, what would the cost of a ten-minute telephone call at the same rate?

10. What are the adverse effects of global warming on Bhutan?