NATIONAL UNIVERSITY OF SCIENCE & TECNOLOGY (NUST)
BS Mathematics Sample Admission Test 01

MATHEMATICS:

Directions: *For each question below you are given four choices. SELECT ANY ONE THAT IS MOST APPROPRIATE ANSWER*
ALL ANSWER MUST BE GIVEN ON THE ANSWER SHEET.
YOUR ANSWERS MUST BE INDICATED BY LETTERS (A, B, C, D) AND NOT BY THE WORDS THEMSELVES.

1. Which of the following lists of physical quantities consists only of vectors:
   (a) Time, temperature, velocity
   (b) Force, volume, momentum
   (c) Velocity, acceleration, mass
   (d) Force, acceleration, velocity

2. If $(\vec{a} \times \vec{b})$ points along negative z-axis, then the vectors $\vec{a}$ and $\vec{b}$ must lie in
   (a) .zx-plane
   (b) .yx-plane
   (c) .xy-plane
   (d) None of the above

3. $k \times \hat{i} = \ldots\ldots$
   (a) j
   (b) $-j$
   (c) k
   (d) $-k$

4. What must be changing when a body is accelerating uniformly along a straight path?
   (a) The force acting on the body
   (b) The velocity of the body
   (c) The mass of the body
   (d) The speed of the body

5. The horizontal range of a projectile is maximum when it is thrown at what angle with a certain velocity?
   (a) 30^0
   (b) 45^0
   (c) 60^0
   (d) 90^0

6. A paratrooper jumping out of an airplane is an example of
   (a) Equilibrium
   (b) Static Equilibrium
   (c) Dynamic Equilibrium
   (d) None

7. The torque on a body will be zero if the angle between $\vec{r}$ and F is zero or:
   (a) 90^0
   (b) 180^0
   (c) 270^0
   (d) None

8. If we go away from the surface of the earth, a distance equal to the one third of the radius of the earth, the value of g will be multiplied by?
   (a) 1/2
   (b) 9/16
   (c) 1/9
   (d) 16/9

9. For certain values F and d, work done is zero when the angle between the force and displacement is:
   (a) 0^0
   (b) 30^0
   (c) 90^0
   (d) 180^0

10. The force acting on a body in the gravitational field at any point is equal to its:
    (a) Gravitational mass
    (b) Weight
    (c) Acceleration
    (d) Inertia

11. What is kinetic energy of a body of mass 10 kg moving with velocity $1m/s^2$?
    (a) 10 Joules
    (b) 20 Joules
    (c) 5 Joules
    (d) 2.5 Joules

12. Simple harmonic motion is mathematically represented as

(a) .a α– x   (b) .a α x   (c) V α– x   (d) F α– x

13. The frequency of second pendulum is
(a) 1 hertz   (b) 2 hertz   (c) 0.5 hertz   (d) None of the above

14. A body with frequency f would complete one vibration in
(a) F seconds   (b) $\frac{1}{f}$ seconds   (c) 1 second   (d) $\frac{1}{T}$ seconds

15. The rate of evaporation depends upon:
(a) Nature of liquid   (b) The temperature of liquid and air
(c) The area of the exposed surface of the liquid   (d) All of the above

16. The saturated vapour pressure of a given liquids:
(a) Increases with rise in temperature   (b) Decreases with rise in temperature
(c) May increase or decrease with rise in temperature   (d) Remains unchanged with rise in temperature

17. Suppose the co-efficient of linear expansion of copper is 0.000156 per degree C. What will be the co-efficient of volume expansion of copper sphere per degree C?
(a) Same as that of linear expansion   (b) Two times as that of linear expansion
(c) Three times as that of linear expansion   (d) One half as that of linear expansion

18. Length of metal rod is 100 cm and co-efficient of linear expansion of metal is $0.00002K^{-1}$ By how many centimeters will it contract when cooled through 50^0 C?
(a) 1.001   (b) 0.150   (c) 0.001   (d) 0.01

19. The Coulomb force in a medium of relative permittivity ε_r is given by:
(a) $F^{/} = \frac{\varepsilon_r}{F}$ (b) $F^{/} = \frac{F}{\varepsilon_r}$ (c) $F^{/} = F_{\varepsilon_r}$ (d) $F^{/} = \frac{F}{\varepsilon_0 \varepsilon_r}$

20. Capacity of a capacitor depends upon.
(a) The distance between the plates   (b) The nature of the dielectric between the plates
(c) The size of the plates   (d) All of the above

21. The magnetic force F_m acting on charge q when it moves with a velocity v through a magnetic field B is given by
(a) $F_m = q\ v \times B$ (b) $F_m = q\ v^2 \times B$ (c) $F_m = q\ v^3 \times B$ (d) $F_m = q\ v^4 \times B$

22. A substance which behaves like a magnet in the presence of a strong magnetic field is called
(a) Magnets   (b) Ferro magnets   (c) Electromagnets   (d) None of the above

23. In a circuit , if a resistance of the conductor is increased then current in the circuit will:
(a) Increase   (b) Decrease   (c) Remain the same   (d) First increase and then decrease

24. The phenomenon that the resistance of a metal falls exactly to zero at a few degrees above absolute zero is called:
(a) Conductivity   (b) Low conductivity   (c) Super-conductivity   (d) Low resistivity

25. Why should a resistance be introduced in a circuit in series deliberately?

(a)	To increase current and decrease Voltage	(b)	To decrease current and voltage	(c)	To make current zero	(d)	To make voltage zero

26. In a house circuit, all electrical appliances are connected in parallel to each other between the line and neutral wires to get:
- (a) Same current and different voltage
- (b) Same current and same potential difference
- (c) Different current but same potential difference
- (d) Difference current and different potential difference

27. Power dissipated in a circuit in the form of 'V' and 'R' can be determine as:
- (a) $P = \dfrac{V}{I}$
- (b) $P = \dfrac{V^2}{R}$
- (c) $P = \dfrac{R}{V^2}$
- (d) $P = \dfrac{I}{V^2}$

28. Lyman series lies in
- (a) Visible region
- (b) Ultra violet region
- (c) Infra red region
- (d) Far-infra red region

29. According to Bohr's theory of hydrogen atom, an electron can revolve around a proton indefinitely if its path is
- (a) A spiral of increasing radius
- (b) A circle of constantly decreasing radius
- (c) A circle of an allowed radius
- (d) An ellipse

30. According to Bohr's theory of hydrogen atom, the radii R_n of stationary electron is given by the equation
- (a) $R_n = \dfrac{ke^2}{mv_n^3}$
- (b) $R_n = \dfrac{ke^2}{mv_n^2}$
- (c) $R_n = \dfrac{e^2}{mv_n^2}$
- (d) $R_n = \dfrac{he^2}{mv_n^2}$

31. An interesting application of laser is the production of three dimensional images called
- (a) Polygons
- (b) Holograms
- (c) Ovals
- (d) None of the above

32. The laser device used to fragment gallstones and kidney stones is called
- (a) Laser beam
- (b) Laser scanner
- (c) Laser lithotropter
- (d) Ruby laser

33. Product of x-rays is a reverse phenomenon of
- (a) Photoelectric Effect
- (b) Compton Effect
- (c) Pair Production
- (d) Annihilation of matter

34. The nucleus of hydrogen with symbol $_1H^3$ is called
- (a) Proton
- (b) Deuteeron
- (c) Triton
- (d) All of the above

35. Elements with atomic number Z > 82 are
- (a) Stable
- (b) Unstable
- (c) Small
- (d) None of the above

36. Which of the following particles has very low penetration power?
- (a) α-particle
- (b) β-particle
- (c) γ-particle
- (d) All of the above

37. Which of the following particles move with velocity of light?
- (a) α-particle
- (b) β-particle
- (c) γ-particle
- (d) All of the above

38. A carbon nucleus emits a particle x and changes into nitrogen according to the equation
$_6C^{14} + _7N^{14} \rightarrow x$ What is x?
   (a)   An electron   (b)   A proton   (c)   An α-particle   (d)   A neutron

39. During Pair-Production which particles are produced?
   (a)   Proton & Electron   (b)   Electron & Neutron   (c)   Electron & Positron   (d)   Proton & Neutron

40. The Solid-State Detector is basically
   (a)   A forward biased PN-junction   (b)   A reversed biased PN-junction
   (c)   A forward biased transistor   (d)   A Photocell

41. $\sqrt{35}$ is -------
   A)   A prime number   B)   An integer
   C)   A whole number   D)   An irrational number

42. $\forall$ a, b, ϵ R a . b = b•a is called
   A)   Closure law of addition   B)   Associative law of addition
   C)   Commutative law of multiplication   D)   Associative law of multiplication

43. In R, the multiplicative identity is
   A)   0   B)   1
   C)   -1   D)   None

44. The additive inverse of $\dfrac{2}{3}$ is
   A) $\dfrac{3}{2}$ B) $-\dfrac{2}{3}$
   C) $-\dfrac{3}{2}$ D)   0

45. The multiplication inverse of 0 is
   A)   1   B)   -1
   C)   0   D)   Does not exist

46. The value of i^7 is
   A)   1   B)   -1
   C)   i   D)   -i

47. If z = 2 + 3i then z^{-1} is
   A) $\dfrac{1}{2} + \dfrac{1}{3}i$ B) $2 + \dfrac{1}{3}i$
   C) $\dfrac{2}{13} + \dfrac{3}{13}i$ D) $\dfrac{2}{13} - \dfrac{3}{13}i$

48. The modulus of 3 is
   A)   0   B)   9
   C)   -3   D)   3

49. The multiplicative inverse of 1 – 2i is
   A) $\dfrac{1}{5} + \dfrac{2}{5}i$ B) $-\dfrac{1}{5} + \dfrac{2}{5}i$

C) $\dfrac{1}{5} - \dfrac{2}{5}i$

D) $-\dfrac{1}{5} - \dfrac{2}{5}i$

50. The set of integers is a subset of
- A) The set of natural numbers
- B) The set of whole numbers
- C) The set of prime numbers
- D) The set of rational numbers

51. {1,2,3,} is --------
- A) An infinite set
- B) A finite set
- C) A singleton set
- D) Universal set

52. The sets {1,2,4} and {4,6,8,10} are
- A) Equal sets
- B) Equivalent sets
- C) Disjoint sets
- D) Over lapping sets

53. Write down the power set of {9,11}
- A) {{9},{11}}
- B) {Φ,{9},{11}}
- C) {{9},{11},{9,11}}
- D) {Φ,{9},{11},{9,11}}

54. Φ` = -------
- A) A
- B) Φ
- C) A`
- D) U

55. If p and q are two statements then their biconditional 'p iff q' is denoted by
- A) P Λ q
- B) P v q
- C) P → q
- D) P ↔ q

56. The number of subsets of a set having three elements is
- A) 4
- B) 6
- C) 8
- D) None of these

57. If A = {1,2,3} and B= {a,b} then a function from A to B is
- A) {(1, a), (2, b), (3, a)}
- B) {(1, a), (2, B)}
- C) {(a, 1), (b, 2)}
- D) {(1, 1), (2, 2)}

58. A matrix with a single row is called a
- A) Column matrix
- B) Row matrix
- C) Null matrix
- D) Identity matrix

59. A square matrix all of whose elements except the main diagonal are zeros is called a
- A) Null matrix
- B) Singular matrix
- C) Symmetric matrix
- D) Diagonal matrix

60. A square matrix A for which $A^t = A$ is called a
- A) Column matrix
- B) Symmetric matrix
- C) Skew-symmetric matrix
- D) Row matrix

61. Two matrices A and B are conformable for the product AB if
- A) Both A and B are square
- B) Both A and B are symmetric
- C) Number of rows of A = number of columns of B
- D) Number of columns of A = number of rows of B

62. The transpose of a square matrix is a
- A) Row matrix
- B) Column matrix
- C) Square matrix
- D) Null matrix

63. If A is any matrix then its additive inverse is
- A) A
- B) A^{-1}
- C) A^t
- D) -A

64. $\begin{bmatrix} 300 \\ 030 \\ 003 \end{bmatrix}$ is a -------

- A) Diagonal matrix
- B) Scalar matrix
- C) Triangular matrix
- D) Identity matrix

65. If A is singular then $|A| = $ -----

- A) 1
- B) 2
- C) 0
- D) None of these

66. If A and B are non singular matrices then $(AB)^{-1} = $ -------

- A) A^{-1}
- B) B^{-1}
- C) $A^{-1}B^{-1}$
- D) $B^{-1}A^{-1}$

67. The transpose of a column matrix is a ------

- A) Zero matrix
- B) Diagonal matrix
- C) Column matrix
- D) Row matrix

68. The transpose of a zero matrix is a --------

- A) Column matrix
- B) Zero matrix
- C) Row matrix
- D) Scalar matrix

69. Roots of the equation $x^2 - 7x + 10 = 0$ are

- A) $\{2, -5\}$
- B) $\{-2, 5\}$
- C) $\{2, 5\}$
- D) $\{-2, -5\}$

70. $4^{1+x} + 4^{1-x} = 10$ is called ------

- A) Reciprocal equation
- B) Exponential equation
- C) Radical equation
- D) None of these

71. $W^{15} = $ -------

- A) 0
- B) 1
- C) w
- D) W^2

72. The quadratic formula is

- A) $X = \dfrac{b \pm \sqrt{b^2 - 4ac}}{2a}$
- B) $X = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{a}$
- C) $X = \dfrac{-b \pm \sqrt{b^2 + 4ac}}{2a}$
- D) $X = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

73. The roots of the equation $ax^2 + Bx + c = 0$ are real and equal if

- A) $B^2 - 4ac < 0$
- B) $B^2 - 4ac = 0$
- C) $B^2 - 4ac \geq 0$
- D) None of these

74. Roots of the equation $x^2 + 5x - 1 = 0$ are

- A) Rational
- B) Irrational
- C) Complex
- D) None of these

75. The sum of the four fourth roots of unity is

- A) 4
- B) 3
- C) 1
- D) 0

76. The polynomial $x - a$ is a factor of the polynomial $f(x)$ if and only if

- A) F(a) is positive
- B) F(a) is negative

C)   F(a) = 0

D)   None of these

77. If ω is complex cube root of unity then $\omega^2 = $ -------

A)   0

B)   1

C) ω^3

D) ω^{-1}

78. If α , β are roots of $2x^2 - 4x + 5 = 0$ then $\alpha^2 \beta + \alpha\beta^2 = $ ------

A)   1

B)   -1

C)   5

D)   2

79. $X^3 + 2x^2 - 3x + 5$ is ------

A)   A Quadratic equation

B)   A polynomial

C)   Proper rational fractions

D)   Improper rational fraction

80. A fraction in which the degree of the numerator is less than the degree of the denominator is called

A)   Polynomial

B)   Equation

C)   Proper fraction

D)   Improper fraction

81. The fifth term of the sequence $a_n = 2n - 3$ is_____ .

A)   13

B)   -13

C)   7

D)   -7

82. The harmonic mean between a and b is

A) $\dfrac{a+b}{2}$

B) $\pm\sqrt{ab}$

C) $\dfrac{a-b}{2}$

D) $\dfrac{2ab}{a+b}$

83. $\dfrac{8!}{6!} = $_____ .

A)   8

B) $\dfrac{1}{56}$

C)   56

D)   None of these

84. $^{16}C_{11} + {}^{16}C_{10} = $_____.

A) $^{16}C_{10}$

B) $^{15}C_{11}$

C) $^{17}C_{10}$

D) $^{17}C_{11}$

85. In the expansion of $(a+ x)^n$ the sum of exponents of a and x in each term of the expansion is

A)   N + 1

B)   n-1

C)   N

D)   2n

ENGLISH:

Directions: *For each question below you are given choices. SELECT ANY ONE THAT IS MOST APPROPRIATE ANSWER*

SENTENCE COMPLETION
Directions
Each sentence below has one or two blanks, each blank indicating that something has been omitted. Beneath in sentence are five lettered words or sets of words. Choose the word or set of words that best fits the meaning of the sentence as a whole.

86.   Miss Watson termed Hock's behavior _____ because in her opinion noting could excuse his deliberate disregard of her commands.
   A.   devious   B.   intolerant
   C.   Irrevocable   D.   indefensible
   E.   Boisterous

87.   Either the surfing at Maui is_____, or I went there on an off day.
   A.   Consistent   B.   Thrilling
   C.   Invigorating   D.   Overrated
   E.   Scenic

ANALOGIES
Direction: Each question below consists of a related pairs of words or phrases, followed by five lettered pairs of words or phrases, Select the lettered pair that best expresses a relationship similar to that expressed in the original pair.

88. DEGREE : TEMPERATURE ::
   (a) ounce : weight
   (b) fathom : volume
   (c) mass : energy
   (d) time : length
   (e) light : heat
89. PICK : GUITAR ::
   (a) peg : ukelele
   (b) string : banjo
   (c) pipe : organ
   (d) bow : violin
   (e) head : tambourine

ANTONYM
Direction: In each of the following antonym questions, a word printed in capital letters precedes five lettered words or phrases. From these five lettered words or phrases, pick the one most nearly <u>opposite</u> in meaning to the capitalized word.
90.   OMNIPOTENT:
   (A)   Weak   (B)   Strong   (C)   Sour   (D)   Safe
91.   NERVOUS:
   (A)   Courageous (B)   Puzzle   (C)   Bold   (D)   Trainee

READING COMPREHENSION
Direction: Please read the passage below and answer the questions on the basis of what is stated or implied.

Passage:

To be happy and really safe, one ought to have at least two or three hobbies and they must all be real. It is no use starting late in life to say "I will take an interest in this or that". A man may acquire great knowledge of topics unconnected with his daily work and yet hardly get any benefit or relief.

QUESTIONS

92. The writer argues that for real happiness
   A) More than one hobbies are preferable
   B) Two or three hobbies are essential
   C) Hobbies are quite important
   D) Hobbies should be interesting

93. The phrase 'ought to' in the first sentence suggests
   A) Liking
   B) Likelihood
   C) Compulsion
   D) Preference

94. The words 'this or that' in the second sentence refer to
   A) Hobbies
   B) Topics
   C) Daily work
   D) None of the above

95. Select the choice closest in meaning to the word 'hardly' in the last sentence
   A) Rarely
   B) Never
   C) Infrequently
   D) Scarcely

INTELLIGENCE:

Directions: For each question below you are given choices. SELECT ANY ONE THAT IS MOST APPROPRIATE ANSWER

196. Look at this series: 2, 1, (1/2), (1/4), ... What number should come next?
   A. (1/3)
   B. (1/8)
   C. (2/8)
   D. (1/16)

197. The earth consists of three main zones; hydrosphere; lithosphere and
   A) Atmosphere   B) Ionosphere   C) Photosphere   D) None of these

198. What is called flow of a body of water, air, of heat, moving in a definite direction?
   A) Mantel   B) Current   C) Core   D) Crater

199. By which name Lahore is famous?
   A) City of Market   B) City of people   C) City of Colleges   D) None of these

200. In a certain case GIGANTIC is written as GIGTANCI. How is MIRACLES written in that code?
   A. MIRLCAES
   B. MIRLACSE
   C. RIMCALSE
   D RIMLCAES

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END OF TEST

For Answer Key: www.entrytest.com/testprep/answers.aspx