NATIONAL UNIVERSITY OF SCIENCE & TECNOLOGY (NUST)

BS Physics Admission Test 01

PHYSICS:

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. Einstein explained the photo-electric effect making the following assumption as a basis that,

(a) The mass of the electrons increases (b) Light consists the photons or quanta
(c) The energy of light increases with speed (d) The photo-electrons are identical with atomic electrons

2. An elevator initially accerlerates upward from rest and ascends with uniform speed. Time period of a simple pendulum in the elevator will,

(a) Increase and then decrease (b) Decrease and then increase (c) Increase (d) Decrease

3. A simple arrangement by means of which e.m.f,s. are compared is known

(a) Voltmeter (b) *Potentiometer* (c) Ammeter (d) None of the above

4. The physics underlying the operation of a refrigerator most closely resembles the physics underlying,

(a) The freezing of water (b) The melting of ice (c) The evaporation of water (d) A heat engine

5. Let a certain body of mass 'm' placed on a horizontal surface move down the inclined plane then downward component of weight is

(a) .mgCosθ (b) .mgSinθ (c) .mg Tanθ (d) None

6. The plane faces of two identical plano convex lens, each having focal length 40 cm are pressed against each other to form a usual convex lens. The distance from this lens at which an object must be placed to obtain a real, inverted image with magnification one is.

(a) 40 cm (b) 80 cm (c) 20 cm (d) 60 cm

7. The law which gives definition of force is

(a) Newton's law of gravitation (b) Third law of motion
(c) Second law of motion (d) First law of motion

8. Hygrometer is an instrument used for measuring

(a) The compression of water vapour with temperature (b) The amount of water vapour in the atmosphere
(c) Specific gravity of air (d) The density of air

9. An inertial frame of reference is one whose:
(a) Acceleration is zero (b) Velocity is changing with time
(c) Acceleration is uniform (d) Inertia is not zero

10. A moving car whose engine is switched off. comes to rest after some time due to:
(a) Inertia (b) Its mass (c) Friction (d) Earth's gravitation

11.
(a) When two bodies separate instantaneously after collision, the collision is said to be perfectly elastic.
(b) When to bodies separate instantaneously after collision, the collision is said to be perfectly inelastic

12. According to the second law of motion, acceleration is proportional to:
(a) Fores (b) Time (c) Mass (d) Distance

13. When the object is placed at 2f of convex lens then the image formed behind the lens will be
A) At the focus B) At 2f C) Beyond 2f D) Between f and 2f

14. When the object is placed at principal focus of a convex lens then the image is formed at
A) Same distance B) Infinity C) Same side of lens D) Centre of curvature

15. Which one of the following cannot measure wavelength of X-rays in any way
A) Bragg's law B) Diffraction grating C) Compton effect D) Photo electric effect

16. Which one of the following properties is not found in both sound and light
A) Interference B) Diffraction C) Polarization D) Reflection

17. The relation between time period T and angular velocity ω is given by
(a) $T = 2\ \pi\omega$ (b) $T = \omega/2\pi$ (c) $T = 2\pi / \omega$ (d) $T = v\ \omega$

18. When a body moves in a circle, the angle between its linear velocity v and angular velocity ω is
(a) 0^0 (b) 45^0 (c) 90^0 (d) 180^0

19. Π radians =
(a) 90^0 (b) 180^0 (c) 60^0 (d) 30^0

20. In racing car moving along a circular path the friction at the wheels and banking of roads provides the
(a) Centripetal Force (b) Centripetal Acceleration (c) Centre of Mass (d) Centrifugal Force

21. The time period is defined as the time required to traverse ……. by a revolving body.
(a) One radian (b) 180 degrees (c) One revolution (d) 90 degrees

22. Which of the following particles can induce artificial radio-activity in certain nuclei?
(a) α-particle (b) β-particle (c) γ-particle (d) All of the above

23. Identify the alpha-particle?
(a) $_1H^1$ (b) $_1H^2$ (c) $_1H^3$ (d) $_2He^4$

24. Which of the following particles move with velocity of light?

(a) α-particle (b) β-particle (c) γ-particle (d) All of the above

25. 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

26. What is kinetic energy of a body of mass 10 kg moving with velocity $1 m/s^2$?

a. 10 Joules b. 20 Joules c. 5 Joules d. 2.5 Joules

27. 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

28. If two forces each of magnitude 5N act along the same line on a body, then the magnitude of their resultant will be

a. 5N b. 10N c. 20N d. 30N

29. Applied force F on a body of mass m, moving with acceleration a is

a. m/a b. a/m c. ma d. m : a

30. The first frontier in fundamental sciences is

A) World of extremely small bodies
B) World of extremely large bodies
C) World of middle-sized things
D) All of them

31. The third frontier in fundamental sciences is

A) World of extremely small bodies
B) World of extremely large bodies
C) World of middle-sized things
D) All of them

32. The branch of physics which deals with the atomic nuclei is called

A) Nuclear physics
B) Atomic physics
C) Particle physics
D) Modern physics

33. The branch of physics in which we study the structure and properties of solids is called

A) Nuclear physics
B) Modern physics
C) Particle physics
D) Solid state physics

34. The quantities which cannot be defined in terms of other physical quantities are called

A) Scalar quantities
B) Vector quantities
C) Base quantities
D) Derived quantities

35. Graphically a vector is represented by an arrow head with a directed line according to a chosen scale which represents

A) The direction
B) Orientation
C) Magnitude
D) All of them

36. In Cartesian co-ordinate system, usually the x-axis is taken as the (1) vertical axis (11) horizontal axis

A) A only
B) B only
C) A & B only
D) All of them

37. Sum of the magnitudes of y-components of two vectors which are to be added is equal to the

A) x- component of the resultant
B) y-component of the resultant

C) Both of them D) None of them

38. The cross product between two vectors will be maximum if the two vectors are

A) Perpendicular to each other B) Parallel to each other

C) Both of them D) None of them

39. The perpendicular distance from the line of action of force to the pivot point is called

A) Couple arm B) Angular distance

C) Moment arm D) None of them

40. A body is said to be in a state of complete equilibrium if

A) Its translational acceleration is zero B) Its rotational acceleration is zero

C) Its rotational as well as translational acceleration is zero D) Its angular momentum is zero

41. A change in position of a body from its initial position to its final position is known is known as

A) Relative motion B) Displacement

C) distance D) Acceleration

42. Velocity is a

A) Scalar quantity B) Vector quantity

C) Constant quantity D) None of them

43. The velocity of a body at any instant of its motion is known as

A) Average velocity B) Instantaneous velocity

C) Uniform velocity D) None of them

44. The velocity-time graph of a car is a straight line which rises the same height for equal intervals, of time, if it moves with

A) Zero velocity B) Constant velocity

C) Zero acceleration D) Constant acceleration

45. A frame of reference stationed on Earth is approximately an example of

A) Non- inertial frame B) Inertial frame

C) Accelerating frame D) None of them

MATHEMATICS:

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

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YOUR ANSWERS MUST BE INDICATED BY LETTERS (A, B, C, D) AND NOT BY THE WORDS THEMSELVES.

46. 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

47. 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

48. $k \times \hat{i} =$……

(a) j (b) $-j$ (c) k (d) $-k$

49. 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

50. 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

51. A paratrooper jumping out of an airplane is an example of

(a) Equilibrium (b) Static Equilibrium (c) Dynamic Equilibrium (d) None

52. 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

53. 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

54. 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

55. 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

56. What is kinetic energy of a body of mass 10 kg moving with velocity $1 m/s^2$?

(a) 10 Joules (b) 20 Joules (c) 5 Joules (d) 2.5 Joules

57. Simple harmonic motion is mathematically represented as

(a) $a \alpha - x$ (b) $a \alpha x$ (c) $V \alpha - x$ (d) $F \alpha - x$

58. The frequency of second pendulum is

(a) 1 hertz (b) 2 hertz (c) 0.5 hertz (d) None of the above

59. 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

60. 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

61. 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

62. 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

63. 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

64. 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) $F' = \frac{F}{\varepsilon_0 \varepsilon_r}$

65. 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

66. 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) $F_m = q\ v^4 \times B$

67. 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

68. 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

69. 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

70. 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

71. 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

72. Power dissipated in a circuit in the form of 'V' and 'R' can be determine as:

(a) $P = \frac{V}{I}$ (b) $P = \frac{V^2}{R}$ (c) $P = \frac{R}{V^2}$ (d) $P = \frac{I}{V^2}$

73. Lyman series lies in

(a) Visible region (b) Ultra violet region (c) Infra red region (d) Far-infra red region

74. 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

75. According to Bohr's theory of hydrogen atom, the radii R_n of stationary electron is given by the equation

(a) $R_n = \frac{ke^2}{mv_n^3}$ (b) $R_n = \frac{ke^2}{mv_n^2}$ (c) $R_n = \frac{e^2}{mv_n^2}$ (d) $R_n = \frac{he^2}{mv_n^2}$

76. An interesting application of laser is the production of three dimensional images called

(a) Polygons (b) Holograms (c) Ovals (d) None of the above

77. The laser device used to fragment gallstones and kidney stones is called

(a) Laser beam (b) Laser scanner (c) Laser lithotropter (d) Ruby laser

78. Product of x-rays is a reverse phenomenon of

(a) Photoelectric Effect (b) Compton Effect (c) Pair Production (d) Annihilation of matter

79. The nucleus of hydrogen with symbol $_1H^3$ is called

(a) Proton (b) Deuteeron (c) Triton (d) All of the above

80. Elements with atomic number Z > 82 are

(a) Stable (b) Unstable (c) Small (d) None of the above

81. Which of the following particles has very low penetration power?

(a) α-particle (b) β-particle (c) γ-particle (d) All of the above

82. Which of the following particles move with velocity of light?

(a) α-particle (b) β-particle (c) γ-particle (d) All of the above

83. 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

84. During Pair-Production which particles are produced?

(a) Proton & Electron (b) Electron & Neutron (c) Electron & Positron (d) Proton & Neutron

85. 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

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. When such_____remarks are circulated, we can only blame and despise those who produce them.
A. adulatory
B. Chance
C. reprehensible
D. redundant

87. The stereotypical image of masculinity assumes that weeping is_____" unmanly" behaviour, and not simply a human reaction which may be_____by either sex.
A. Inexplicably. repented
B. Excessively…discerned
C. Essentially…defined
D. Inherently…adopted

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 opposite in meaning to the capitalized word.

90. NOCTURNAL:

(A) Patrolling (B) Daily (C) Harsh (D) Marauding

91. OBDURATE:

(A) Fleeting (B) Finite (C) Yielding (D) Permanent

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*

96. Look at this series: 31, 29, 24, 22, and 17, What number should come next?

A. 15
B. 14
C. 13
D. 12

97. A man is facing west. He turns 45 degree in the clockwise direction and then another 180 degree in the same direction and then 270 degree in the anticlockwise direction. Find which direction he is facing now ?

A. South-West
B. West
C. South
D. East-South

98. A man is facing north. He turns 45 degree in the clockwise direction and then another 180 degree in the same direction and then 45 degree in the anticlockwise direction. Find which direction he is facing now ?

A. North
B. East
C. West
D South
.

99. The earth consists of three main zones; hydrosphere; lithosphere and

A) Atmosphere B) Ionosphere C) Photosphere D) None of these

100. 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