NITESHPHYZICS

Nitesh Phyzics

CUET 2018

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CUET Entrance in Physics
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PART-A

1. *As* he is ill, he cannot go to office. The underlined word is an example of

(A) Noun (B) Conjunction (C) Pronoun (D) Adjective

2. Which of the following is correctly spelt?

(A) Weird (B) Weired (C) Wiered (D) Weird

3. Which of the alternatives is correct, if the following sentence is changed into passive voice? Who called you at night?

(A) Who was called? (B) Who was called you at night?

(C) Were you called? (D) By whom were you called at night?

4. Which of the following sentences is correct?

(A) The teacher has examined the third and the fourth class.

(B) The teacher has examined the third and fourth class.

(C) The teacher has examined the third and the fourth classes.

(D) The teacher has examined third and the fourth class.

5. Which of the following sentences contains error?

(A) The lion is the king of beasts. (B) The white flower is very beautiful.

(C) The doctor calls here twice month. (D) Birds of a feather flock together.

6. Which of the following best expresses the meaning of 'Abdicate'?

(A) Kidnap (B) Curtail

(C) Resign (D) Collect

7. Which of the following is opposite in meaning to the word 'Sedate'?

(A) Excited (B) Serene

(C) Sober (D) Placid

8. Which of the alternatives is to be replaced with the underlined phrase in the following sentence? Transfer this sum to the next page.

(A) Carry out (B) Carry on

(C) Carry off (D) Carry over

9. The students should be assiduous_____ their studies.

(A) At (B) With

(C) Of (D) In

10. Rinku's conduct is subversive _____All discipline.

(A) For (B) Of

(C) To (D) Against

11. Read the following information carefully and answer the questions given below. Six persons-Ankita, Bijay, Chintu, Deb, Elina, and Faiza-are sitting in two rows, three in each. Elina is not at the end of any row. Deb is second to the left of Faiza. Chintu, the neighbor of Elina, is sitting diagonally opposite to Deb. Bijay is the neighbour of Faiza. Which of the following are sitting diagonally opposite to each other?

(A) Faiza and Chintu (B) Deb and Ankita

(C) Ankita and Chintu (D) Ankita and Faiza

12. *Vedas* point out features and development of different dynasties. Which of the following vedas deals about Archery and known as "The first testament of mankind"?

(A) Samaveda
(B) Yajurveda
(C) Atharvaveda
(D) Rigveda

13. 'Barabati Stadium' is a sport stadium situated in

(A) Kochi, Kerala
(B) Guwahati, Assam
(C) Hyderabad, Telangana
(D) Cuttack, Odisha

14. What does RAM stand for?

(A) Read Access Memory
(B) Random Access Memory
(C) Random Assess Memory
(D) Read Assess Memory

15. Which of the following features of the Indian Constitution has been borrowed from UK?

(A) Post of Prime Minister
(B) Fundamental duties
(C) Supreme Court
(D) Concept of Directive Principles of State's Policy

16. "As a consumer consumes more and more units of a specific commodity, the utility from the successive units goes on diminishing". This is known as

(A) Debilitating Marginal Utility
(B) Decreasing Marginal Utility
(C) Diminishing Marginal Utility
(D) Declining Marginal Utility

17. The chief instrument through which Lord Dalhousie implemented his policy of annexation was the

(A) Treaty of Indian Allies
(B) Doctrine of Lapse
(C) Modernizing Indian Society
(D) Treaty of Perpetual Friendship

18. Which is the longest river of the peninsular India?

(A) Ganga (B) Godavari

(C) Brahmaputra (D) Mahanadi

19. According to which of the Articles in the Constitution of India, the President has a power to confer or proclaim a state of emergency in the whole or part of India if he/she feels that a grave situation has arisen, in which the security of India or part of its territory might get threatened by war, external aggression, or rebellion?

(A) Article 352 (B) Article 354

(C) Article 356 (D) Article 360

20. Akash lent Rs. 180 to Bikash for 10 years and Rs. 200 to Chand for 2 years at simple interest, the rate of interest being same in both the cases. He received Rs. 220 as total interest. Find out the rate of interest.

(A) 5 % (B) 10 % (C) 8 % (D) 9 %

21. A cistern is filled in 8 hours, but takes 2 hours longer to fill because of a leak in its bottom. If the cistern is filled, the leak will empty it in

(A) 40 hrs (B) 20 hrs (C) 10 hrs (D) 15 hrs

22. The average age of 8 men is increased by 2 years, if one of them whose age is 24 years, is replaced by a fresh man. Find is the age of the fresh man.

(A) 24 years (B) 26 years (C) 40 years (D) 51 years

23. A sum of Rs.12,500 amounts to Rs.15,500 in four years at the rate of simple interest. What is the rate of interest?

(A) 5 % (B) 6 % (C) 5.5 % (D) 7 %

24. If A, B, C, and D are four consecutive even numbers and their average is 181, what is the product of B and C ?

(A) 33860 (B) 32760 (C) 34567 (D) 33670

25. The ratio of length to the breadth of a rectangle plot is 9: 8. The perimeter of the plot is 408 meters. What is the area of the plot?

(A) 10863 m^2 (B) 10368 m^2 (C) 19435 m^2 (D) 13680 m^2

PART-B

26. The electric field associated with an electromagnetic wave propagating in free space is given as:

$\vec{E} = E\,o\cos(kz - \omega t)\hat{\imath} + Eo\cos(kz + \omega t)\,i$

The energy carried by this wave will be:

(A) $1/2\boldsymbol{\varepsilon}_o E^2$ (B) Zero (C) 100 Joules (D) $1B^2/2\mu$

27. The capacitance of two concentric spherical metal shells, with radii a and b will be:

(A) $4\pi\varepsilon o\,\frac{ab}{b-a}$ (B) $2\pi\varepsilon o\,\frac{ab}{b-a}$ (C) $4\pi\varepsilon o\,\frac{ab}{b+a}$ (D) $2\pi\varepsilon o\,\frac{ab}{b+a}$

28. The change in phase of an electromagnetic wave reflecting from the surface of a denser medium is:

(A) 0 (B) 90º (C) 180º (D) 270º

29. A plane electromagnetic wave is propagating in a lossless dielectric. The electric field is given as $E\,(x, y, z, t) = Eo\,(\,x + A\hat{z}\,)\exp[ikD\{-ct + (x + \sqrt{3}z)\}]$, where c is the speed of light in vacuum, Eo, A and ko are constants and $\hat{x}$ and $\hat{z}$ are unit vectors along the x and z axes. The relative dielectric constant of the medium, εr and the constant A will be:

(A) $\varepsilon_r = 4$ and A = $-\frac{1}{\sqrt{3}}$ (B) $\varepsilon_r = 4$ and A = $\frac{1}{\sqrt{3}}$

(C) $\varepsilon_r = 2$ and A = $\sqrt{3}$ (D) $\varepsilon_r = 2$ and A = $-\sqrt{3}$

30. Two water molecules, each having a dipole moment 6.2×10^{-30} coulomb meters, point in the same direction along the line joining their centres. The potential energy due to their dipole-dipole interaction when their centres are 3.1×10^{-10} meters apart will be:

(A) - 0.0145 eV (B) + 0.0145 eV (C) -0.0290 eV (D) +0.0290 eV

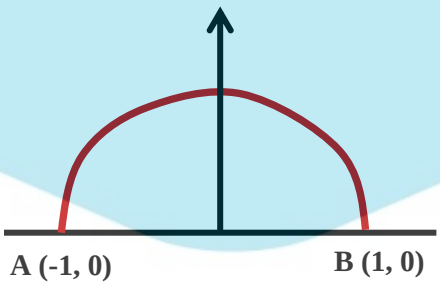
31. The value of $\sqrt{i} + \sqrt{-i}$, where $i = \sqrt{-i}$, is

(A) 0 (B) $\frac{1}{\sqrt{2}}$ (C) $\sqrt{2}$ (D) None of these

32. The trace of a 2 × 2 matrix is 4 and its determinant is 8. If one of the eigenvalue is 2 (1 + i), the other eigenvalue is

(A) is 2 (1 - i) (B) 2 (1 + i) (C) (1 + 2i) (D) (1 – 2 i)

33. The line integral $\int_A^B \vec{R}.\overrightarrow{dl}$ where $F = \frac{x}{\sqrt{x^2+y^2}}\hat{x} + \frac{y}{\sqrt{x^2+y^2}}\hat{y}$, along the semicircular path as shown in the figure below is:



(A) -2 (B) 0 (C) 2 (D) 3

34. Given that (1) = 1, f' (1) = 1 and f''(1) = 1, the value of f(3/2) will be

(A) 5/8 (B) 0 (C) 7/8 (D) 13/8

35. A vector perpendicular to any vector that lies on the plane defined by $x + y + z = 5$, is

(A) $\hat{\imath} + \hat{\jmath}$ (B) $\hat{\imath} + \hat{\jmath} + \hat{k}$ (C) $\hat{\jmath} + \hat{k}$ (D) $2\hat{\imath} + \hat{\jmath} + 3\hat{k}$

36. A 2 × 2 matrix A has eigenvalues $e^{i\pi/5}$ and $e^{i\pi/6}$. The smallest value of 'n' such that $A^n = 1$ is

(A) 20 (B) 30 (C) 60 (D) 120

37. A rigid triangular molecule consists of three non-collinear atoms joined by rigid rods. The constant pressure molar molecular specific heat (CP) of an ideal gas consisting of such molecules is:

(A) 6R (B) 5R (C) 4R (D) 3R

38. Consider the differential equation $dy/dx = xy$. If $y = 2$ at $x = 0$ then the value of y at $x = \pi$ will be

(A) 2 exp $(\frac{\pi^2}{2})$ (B) 2π exp $(\frac{\pi^2}{2})$ (C) exp $(\frac{\pi}{2})$ (D) π exp $(\frac{\pi}{2})$

39. A cylindrical resonance tube, open at both ends has a fundamental frequency 'f' in air. If half of the length is dipped vertically in water, the fundamental frequency of the air column will be

(A) 3f/2 (B) 2f (C) f (D) f/2

40. A source of sound is travelling with a velocity 40km/h towards an observer and emits sound of frequency 2000Hz. If the velocity of sound is 1220Km/h, then the apparent frequency heard by an observer is

(A) 1980 Hz (B) 1950 Hz (C) 208 Hz (D) 2080 Hz

41. A particle is executive SHM, its maximum acceleration is α and maximum velocity is β, its time period of vibration will be

(A) $\frac{2\pi\beta}{\alpha}$ (B) $\frac{\beta^2}{\alpha^2}$ (C) $\frac{\alpha}{\beta}$ (D) $\frac{\beta^2}{\alpha}$

42. The value of the integral $\oint \frac{e^2 \sin(z)}{z^2}\ dz$ where the contour C is the unit circle: $|z - 2| = 1$, is

(A) 2πi (B) 4πi (C) πi (D) Zero

43. The solution of the differential equation for $d^2y/dt^2 - y = 2\cosh(t)$: ,subject to the initial conditions y(0) = 0 and dy/dx at | $(t = 0) = 0$ is

(A) ½ cosh t + t sinh t (B) – sinh t + t cosh t (C) t cosh t (D) t sinh t

44. The solutions to the differential equation dy/dx = $-x/(y+1)$ are a family of

(A) Circle with different radii

(B) Circles with different centers

(C) Straight lines with different slopes

(D) Straight lines with different intercepts on the y-axis

45. A particle of mass $\frac{0.5\ MeV}{c^2}$ has a kinetic energy 100eV. Its deBroglie wavelength will be

(A) 0.124nm (B) 0.248nm (C) 0.062nm (D) 0.031nm

46. An electron has a speed of 4.8×10^5 m/s accurate to 0.012%. With what accuracy the position of electron can be located

(A) 10^{-6} m (B) 10^{-5} m (C) 10^{-7} m (D) 10^{-4} m

47. The position and momentum of 1 keV electron are simultaneously determined and if its position is located within 1 Å the percentage uncertainty in its momentum is:

(A) 2.1 % (B) 1.1 % (C) 3.1 % (D) 4.1 %

48. Radiation from the big bang has been Doppler shifted to longer wavelengths by the expansion of the universe and today has a spectrum corresponding to that of a blackbody at 2.7K The wavelength at which the energy density of this radiation is maximum is:

(A) 100 nm (B) 200 nm (C) 2.3 nm (D) 1.1 nm

49. The relaxation time for damped harmonic oscillator is 50s . Time in which the amplitude and energy of the oscillator falls to 1/e of its initial value is

(A) 50 s (B) 100s (C) 200 s (D) 150 s

50. The capacitance to produce ultrasonic waves of 106Hz with an inductance of 1 Henry is

(A) 0.0254 pF (B) 0.0154 pF (C) 0.0354 pF (D) 0.01 pF

51. The quartz crystal of thickness 1mm is vibrating at resonance. The fundamental frequency of the quartz crystal is (Young's modulus of quartz = 7.9×10^{10} N/m^2 and density (ρ) for quartz = 2650 kg/m^3) is

(A) 1.73 MHz (B) 2.73 MHz (C) 1.54 MHz (D) 2.54 MHz

52. The vector field given by $A = yz\hat{\imath} + xz\hat{\jmath} + xy\hat{k}$ is

(A) Solenoidal

(B) Irrotational

(C) Both Solenoidal and Irrotational

(D) Neither Solenoidal nor Irrotational

53. Gas LED = 1.43eV operates at 1.5 V and 5 mA in forward bias. Assuming 80 % external efficiency of the LED, number of photons emitted per second is

(A) 5×10^{16} (B) 1.5×10^{16} (C) 0.8×10^{16} (D) 2.5×10^{16}

54. In the radiation emitted by a blackbody, the ratio of the spectral densities at frequencies 2 ν and ν will vary with ν as

(A) $\frac{1}{e^{\frac{h\nu}{KBT}}-1}$ (B) $\frac{1}{e^{\frac{h\nu}{KBT}}+1}$ (C) $e^{\frac{h\nu}{KBT}}$ - 1 (D) $e^{\frac{h\nu}{KBT}}$ + 1

55. If U, F, H and G represent internal energy, Helmholtz free energy, enthalpy and Gibbs free energy respectively, then which one of the following is a correct thermodynamic relation?

(A) dU = PdV - TdS (B) dH = VdP + TdS

(C) dF = -PdV + SdT (D) dG = VdP + SdT

56. If f(x) is a periodic function of x with a period of 2π and in the interval $-\pi < x < \pi$, f(x) is given by $f(x) = \{0$ for $-\pi < x < 0$ and sinx for $0 < x < \pi$ Then in the expansion of f(x) as a Fourier series of sine and cosine functions, the coefficients of cos $(2x)$ is

(A) $\frac{3}{2\pi}$ (B) $\frac{1}{\pi}$ (C) 0 (D) $-\frac{2}{3\pi}$

57. A matrix is given by = $\frac{1}{\sqrt{2}}\begin{vmatrix} i & 1 \\ 1 & i \end{vmatrix}$. The eigen values of the M are

(A) 0.05 (B) 0.01 (C) 0.10 (D) 0.15

58. In a semiconductor, the temperature coefficient of resistance is

(A) Positive

(B) Negative

(C) Zero

(D) Can be positive and negative both

59. The leakage current in a pn junction is of the order of

(A) A (B) mA (C) kA (D) μA

60. At absolute zero temperature, conduction band of an intrinsic semiconductor has

(A) Few free electrons (B) Many holes

(C) Many free electrons (D) Neither holes nor electrons

61. The phase difference between the input and output voltages of a transistor connected in common collector configuration is

(A) 180^o (B) 0^o (C) 90^o (D) 270^o

62. The value of β for a transistor is generally

(A) 1 (B) Less than 1

(C) Between 20 and 500 (D) 0

63. If the voltage gain of an amplifier without feedback is 20 and with negative voltage feedback it is 12 , Then feedback fraction is

(A) $\frac{5}{3}$ (B) $\frac{3}{5}$ (C) $\frac{1}{5}$ (D) 0.033

64. An oscillator differs from an amplifier because it

(A) Has more (B) Requires no input signal

(C) Requires no dc supply (D) Always has the same input

65. A certain inverting amplifier has a closed loop voltage gain of 25. The op-amp has an open loop voltage gain of 100,000. If an op-amp with an open loop voltage gain of 200,000 is substituted in the arrangement, the closed loop gain

(A) Doubles (B) Drops to 12.5

(C) Remain at 25 (D) Increase slightly

66. The universal gate is

(A) NAND (B) OR (C) AND (D) NOT

67. After simplifying the Boolean expression Y = (A + B + C) · (A + B) we get Y equal to

(A) A + B (B) A (C) A.B (D) B

68. The *X*-ray of wavelength $\lambda = a$, is reflected from (1 11) plane of a simple cubic lattice. If the lattice constant is a, the corresponding Bragg angle in radian is

(A) $\pi/6$ (B) $\pi/4$ (C) $\pi/3$ (D) $\pi/8$

69. A solid metallic cube of capacity S is at temperature 300K. It is brought in contact with a reservoir at 600K. If the heat transfer takes place only between the reservoir and the cube, the entropy change of the universe after reaching the thermal equilibrium is

(A) 0.69s (B) 0.54s (C) 0.27s (D) 0.19s

70. The moment of inertia of a disc about one of its diameters is $\mathbf{I}_M$. The mass per unit area of the disc is proportional to the distance from its centre. If the radius of the disc is R and its mass is M, the value of $\mathbf{I}_M$ is

(A) $\frac{1}{2}$ MR^2 (B) $\frac{2}{5}$ MR^2 (C) $\frac{3}{10}$ MR^2 (D) $\frac{3}{5}$ MR^2

71. If a, $\vec{b}$, and c are the primitive vectors of the lattice, the Miller indices of a set of planes which make intercepts in the ratio of a: 2 b on the x and y axis and are parallel to z axis are

(A) (1 2 0) (B) (2 1 0) (C) (0 1 2) (D) (0 2 1)

72. The coordination number for fcc structure is

(A) 8 (B) 4 (C) 12 (D) 2

73. In a body centred cubic lattice with lattice constant a the atomic radius is

(A) $\frac{a}{2}$ (B) $\frac{\sqrt{3}}{4}$ a (C) $\frac{\sqrt{2}}{4}$ a (D) $\frac{\sqrt{3}}{8}$ a

74. In a lightly doped n -type semiconductor the Fermi level lies

(A) Above the top of the valence band

(B) Below the bottom of the conduction band

(C) In the middle of the forbidden band gap

(D) In the valence band

75. When an ideal monoatomic gas is expanded adiabatically from an initial volume Vo to 3Vo, its temperature changes from To to T. Then the ratio T/To is

(A) $\frac{1}{3}$ (B) $(\frac{1}{3})^{2/3}$ (C) $(\frac{1}{3})^{1/3}$ (D) 3

76. Two lumps of clay, each of mass m, collide head-on at $\frac{3}{5}$ c. They stick together. The mass of the final composite lump is

(A) 2m (B) 5m (C) 2.5m (D) 3m

77. In a biprism experiment, the eye piece was placed at a distance of 120cm from the source. If the eye required to move a distance of 1.9cm for 20 fringes and distance between two slits is 0.06cm the wavelength of light is

(A) 589 nm (B) 589.6nm (C) 475nm (D) 580nm

78. In which of the following the interference is produced by the division of amplitude

(A) Lloyd's mirror (B) Newton's rings

(C) Young's double slit experiment (D) Fresnel's biprism

79. A parallel beam of sodium light is normally incident on a plane transmission grating having 4250 lines per *cm* and a second order spectral line is observed at an angle of 30°. The wavelength of light is

(A) 589nm (B) 589.3nm (C) 589.6nm (D) 588.2nm

80. In a grating spectrum, which spectral line in 4^{th} order overlap with 3^{rd} order line of 546.1nm

(A) 409.6nm (B) 480.3nm (C) 530nm (D) 583.5nm

81. The resolving limit of normal eye is

(A) $(1/60)^o$ (B) $(1/45)^o$ (C) $(1/30)^o$ (D) $(1/20)^o$

82. What happens to *o* and *e* rays if they travel along the optic axis

(A) Both rays travel with same velocity

(B) *o* ray travels faster than e ray

(C) *e* ray travels faster than o ray

(D) None of the above

83. Two Nicol prisms are so arranged that the amount of light transmitted through them is maximum. The percentage reduction in the intensity of the incident light when the analyser is rotated through 30^o

(A) 25% (B) 50% (C) 75% (D) 100%

84. If the plane of polarisation is turned through 26.4^o, traversing 20cm length of a 20% sugar solution, the specific rotation of the solution will be:

(A) 65^o (B) 66^o (C) 63^o (D) 60^o

85. At what velocity the kinetic energy of a body is equal to its rest mass energy:

(A) $\frac{\sqrt{3}}{2}$ c (B) $\frac{c}{2}$ (C) $\frac{c}{3}$ (D) $\sqrt{2}$ c

86. Apparent length of a meter rod moving parallel to its length with velocity 0.6c will be

(A) 0.8 m (B) 0.6 m (C) 1 m (D) 1.2 m

87. X-rays of wavelength 10.0 pm are scattered from a target. The wavelength of X -rays scattered through 45° will be

(A) 10.7pm (B) 14.9pm (C) 2426pm (D) 10pm

88. A positronium atom is a system that consists of a positron and an electron that orbit each other. The wavelengths of spectral lines of the positronium will be

(A) Equal to the hydrogen spectral lines

(B) Twice to the hydrogen spectral lines

(C) Half to the hydrogen spectral lines

(D) Three times to the hydrogen spectral lines

89. A particle limited to the x axis has a wave function $\Psi = ax$ between x = and $x = 1$; $\Psi\mu = 0$ elsewhere. The expectation value (x) of the particle's position is

(A) $a^2/4$ (B) $a^2/2$ (C) 0 (D) a

90. Nuclear magnetron μ_N is given by

(A) $eh/2m_e$ (B) $ch/2m_p$

(C) $eh/2m_n$ (D) None of the above

91. Radius of a nucleus depends on its mass number A and it is proportional to

(A) A (B) $A^{1/2}$ (C) $A^{3/2}$ (D) A

92. Parity is not conserved in

(A) α decay (B) β decay

(C) γ decay (D) All the decays

93. The half life of ^{198}Au is 2.70 days. The probability that any ^{198}Au Au nucleus will decay in one second

(A) 2.70 (B) 2.97×10^{-6} (C) 2.97×10^{-5} (D) 0.693

94. Half-life of a radioactive isotope is 4×10^8 years. If there are 10^3 radioactive nuclei in a sample today, the number of such nuclei in the sample $4 \times 10_9$ years ago were

(A) 128×10^3 (B) 256×10^3 (C) 512×10^3 (D) 1024×10^3

95 Rayleigh Jeans law is deduced from the Planck's radiation formula under the condition of

(A) Large wavelength and high temperature

(B) Small wavelength and low temperature

(C) Small wavelength and high temperature

(D) Large wavelength and low temperature

96. The 4n radioactive decay series begins with $^{232}_{90}Th$ and ends at $^{208}_{82}Pb$. Number of alpha and beta particles emitted in the chain are respectively

(A) 2,4 (B) 8,2 (C) 6,8 (D) 6,4

97. In photoelectric effect the kinetic energy of the emitted electrons depends on

(A) Intensity of the incident radiation

(B) Amplitude of the incident radiation

(C) Time of exposure of the incident radiation

(D) Frequency of the incident radiation

98. Displacement current appears because of

(A) Time varying electric fields

(B) Time varying magnetic fields

(C) Positive charges only

(D) Negative charges only

99. A choking coil of resistance 5Ω and inductance 0.6H is in series with a capacitance of 10μF. If a voltage of 200V is applied and the frequency is adjusted to resonance, current in the circuit will be

(A) 20A (B) 30A (C) 25A (D) 40A

100. For air glass (refractive index 1.5) interface, the reflection and transmission coefficients respectively for an electromagnetic wave falling normally on the interface is
(A) 0.5,0.5 (B) 0.96,0.04 (C) 0.04,0.96 (D) 0.4,0.6