NITESHPHYZICS

Nitesh Phyzics

CUET 2021

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CUET Entrance in Physics
Physical Sciences
New Delhi

CUET – 2021 (Physics)

PART-A

Q1. If a+b=5 and 3a + 2b = 20, then (3a + b) will be:

(1) 10

(2) 15

(3) 20

(4) 25

Q2. Identify the meaning of the expression below from the options given:

ex officio

(1) Unofficial

(2) as a result of one's status make public

(3) a retired official

(4) make public

Q3. Which of following committees is related to Personal Data Protection?

(1) B. N. Srikrishna Committe

(2) C. Rangarajan Committee

(3) Bimal Jalan Committee

(4) Bhurelal Committee

Q4. The India Energy Outlook 2021 is a new special report from the

(1) NITI Aayog

(2) Ministry of Power

(3) International Energy Agency

(4) Ministry of New and Renewable Energy

Q5. If Atul finds that he is twelfth from the right in a line of boys and fourth from the left, how many boys should be added to the line such that there are 25 boys in the line?

(1)12

(2) 13

(3) 14

(4) 20

Q6. If PALE is coded as 2134. EARTH is coded as 41590, how is PEARL coded in that

(1) 20630

(2) 24153

(3) 25413

(4) 25430

Q7. Choose the number which is different from others in the group.

(1) 8314

(2) 2709

(3) 1315

(4) 2518

Q8. Identify the meaning of the idiom from the options given:

A bird's-eye view

(1) without care

(2) within the walls

(3) an overall view

(4) out of place

Q9. Choose the word which is least like the other words in the group:

(1) Geometry

(2) Algebra

(3) Trigonometry

(4) Mathematics

Q10. The H.C.F. (Highest Common Factor) of 3556 and 3444 is:

(1) 23

(2) 25

(3) 26

(4) 28

Q11. Identify the meaning of the underlined word:

Confidence in government hospitals has **eroded** considerably in the past decade.

(1) gradually destroyed

(2) been reimposed

(3) corroded

(4) withered

Q12. 88% of 370+ 24% of 210-? = 118

(1) 256

(2) 258

(3) 208

(4) 358

Q13. From the choices given below, select the pair which exhibits the same relationship as the one in capitalized pair of words:

HERBS: MEDICINE

(1) books: knowledge

(2) sound: radio

(3) time: watch

(4) juice: orange

Q14. Rahul told Anand. Yesterday I defeated the only brother of the daughter of my grandmother." Whom did Rahul defeat?

(1) Son

(2) Father

(3) Brother

(4) Father-in-law

Q15. Select the correct word that can best complete the given sentence:

A well-balanced diet can be a/an _____ for stress.

(1) spirit

(2) buffer

(3) antidote

(4) medicine

Q16. Select the most suitable synonym:

ADEPT

(1) devious

(2) wily

(3) clumsy

(4) dexterous

Q17. Arrange the given words in alphabetical order and choose the one that comes first

(1) Science

(2) Scrutiny

(3) Scripture

(4) Scramble

Q18. Select the correct word from the answer:

Farmers know that changing winds _____ rain or drought.

(1) bring

(2) create

(3) form

(4) present

Q19. Who among the following wrote the famous book titled “We, the people”

(1) T. N. Seshan

(2) Kiran Bedi

(3) Nanabhoy Palkhivala

(4) Khushwant Singh

Q20. Select the most suitable antonym:

ERRATIC

(1) Loose

(2) Faulty

(3) Regular

(4) Brave

Q21. Choose the correct alternative based on relationship:

Tractor: Trailer :: Horse: ?

(1) Stable

(2) Cart

(3) Saddle

(4) Engine

Q22. Identify the part of the body with which the disease is associated:

Hepatitis

(1) gall bladder

(2) diaphragm

(3) stomach

(4) liver

Q23. Galathea National Park is located in

(1) Andaman and Nicobar

(2) Lakshadweep

(3) Coromandel Coast

(4) Konkan Coast

Q24. If the sum of a number and its square is 182, what is the number?

(1) 15

(2) 26

(3) 28

(4) None of these

Q25. Identify the meaning of the phrase below from the options given:

A person who helps others specially those who are poor or in trouble.

(1) philhellene

(2) philadelphus

(3) Philanderer

(4) philanthropist

PART B – PHYSICS

Q26. A scalar potential field is given by: $V= -6x+8y-12xy^2+7y^2-5y^2$ joule/coulomb

The force on a 4 coulomb charge, placed at origin (0,0,0) will be

(1) 20 Newton

(2) 40 Newton

(3) 60 Newton

(4) 10 Newton

Q27. A ball is tied to a chord and set in rotation in a vertical circle. The tension in the chord at the lowest point exceeds that at the highest point by:

(1) Two time the weight of the body

(2) Three times the weight of the body

(3) Four times the weight of the body

(4) Six times the weight of the body

Q28. A particle of mass my moving with velocity, collides elastically with another particle of mass me at rest. After collision, the two particles move with equal speeds in opposite directions. The two masses are related as:

(1) $m_2 = m_1$

(2) $m_2 = 2m_1$

(3) $m_2 = 3m_1$

(4) $m_2 = 4m_1$

Q29. A string under tension carries transverse waves travelling at speed *v*. If the tension in the string is halved and the linear density of the string is doubled, the wave speed

(1) is unchanged

(2) is halved

(3) is quadrupled

(4) decreases to about 71% of *v*

Q30. The relaxation time of a damped harmonic oscillator is 30 seconds. The time in which the energy of the oscillator falls to l/e times its initial value will be

(1) 50 seconds

(2) 100 seconds

(3) Infinite

(4) 0.001 seconds

Q31. When two mutually perpendicular simple harmonic motions of same frequency, amplitude and phase are superimposed:

(1) The resulting motion is uniform circular motion

(2) The resulting motion is a linear SHM along straight line inclined equally to the straight lines of the motion of the components ones

(3) Resulting motion is an elliptical motion, symmetrical about the lines of motion of the components

(4) The two SHMs will cancel each other

Q32. A particle of mass 100 gm is placed in a field of potential U = $5x^2 + \frac{10\ ergs}{gm}$. The frequency of oscillation of the particle will be

(1) 0.01 Hz

(2) 0.5 Hz

(3) 0.1 Hz

(4) 0.05 Hz

Q33. The Doppler width for an orange line of krypton is 550 x 10^{-13}m. If the wavelength of light is 605.8 nm, the coherent length will be:

(1) 0.6673 m

(2) 0.8873 m

(3) 0

(4) 605.8 nm

Q34. The ratio of intensities of the two waves that produce interference pattern is 16:1. The ratio of maximum to minimum intensities in fringe system will be:

(1) 16:1

(2) 4:1

(3) 5:3

(4) 25:9

Q35. The thickness of the soap film (refractive index 1.463) that will result in constructive interference in the reflected light, with the film is illuminated normally with a light of free space wavelength 600 nm:

(1) 0.1025 μm

(2) 0.2050 μm

(3) 0.0505 μm

(4) 0.4100 μm

Q36. In which of the following is the interference produced by the division of amplitude?

(1) Lloyd's mirror

(2) Newton's rings

(3) Young's double slit experiment

(4) Fresnel's biprism

Q37. In Newton's rings arrangement, bright and dark rings are obtained using sodium yellow light. What happens if the top surface of the glass plate on which the lens is kept is highly silvered:

(1) Fringes disappear

(2) Fringe width remain unchanged

(3) Fringe width decreases

(4) Fringe width increases

Q38. A single slit is illuminated by a light composed of two wavelengths, λ_1 and λ_2. Due to Fraunhoffer diffraction, one observes that the first minimum obtained for λ_1 coincides with the second minimum of λ_2. The relationship between λ_1 and λ_2 is

(1) $\lambda_1 = \lambda_2$

(2) $\lambda_1 = 2\lambda_2$

(3) $2\lambda_1 = \lambda_2$

(4) $\lambda_1 = 3\lambda_2$

Q39. The orders observed by a grating having 4000 lines per cm when illuminated normally by visible light of wavelength range 400 nm to 700 nm:

(1) 2 to 4

(2) 1 to 2

(3) 1 to 3

(4) 3 to 6

Q40. Significant diffraction of X-rays can be obtained

(1) by a single slit

(2) by a double slit

(3) by an atomic crystal

(4) plane transmission grating

Q41. A ray of light is incident on a glass plate of refractive index 1.732 at polarizing angle. The angle of refraction will be:

(1) 60°

(2) 30°

(3) 90°

(4) 0°

42. Quartz has refractive indices 1.553 and 1.544. The thickness of the quarter wave plate for sodium light of wavelength 589 nm will be

(1) 0.163 μm

(2) 0.326 μm

(3) 0.0815 μm

(4) 0.662 μm

Q43. A satellite moves around the earth in a circular orbit of radius R cantered at the earth. A second satellite moves in an elliptic orbit of major axis 8 R, with the earth at one of the foci. If the former takes 1 day to complete a revolution, the latter would take

(1) 21.6 days

(2) 8 days

(3) 3 hours

(4) 1.1 hour

Q44. The unit of pressure of one bar is

(1) 1 Pascal

(2) 1 kilo Pascal

(3) 100 k Pascal

(4) 1000 k Pascal

Q45. Stress strain relationship for Newtonian fluid is

(1) Parabolic

(2) Hyperbolic

(3) Linear

(4) Inverse type

Q46. The function

$$\int(x) = \begin{Bmatrix} -\pi \; for - \pi < x \leq 0 \\ \pi \; for \; 0 < x \leq \pi \end{Bmatrix}$$

Be a periodic function of period 2π. The coefficient of sin 5x in the Fourier series expansion of f(x) in the interval [-π, π] is

(1) 4/5

(2) 5/4

(3) 4/3

(4) 3/4

Q47. The Fourier series of an odd periodic function will consist of

(1) Sine terms only

(2) Cosine terms only

(3) Constant terms only

(4) All the three terms

Q48. Let $\vec{a}$ and $\vec{b}$ be two distinct three dimensional vectors. The component of $\vec{b}$ that is perpendicular to a is given by

(1) $\frac{\vec{a}\times(\vec{b}\times\vec{a})}{a^2}$

(2) $\frac{\vec{b}\times(\vec{a}\times\vec{b})}{b^2}$

(3) $\frac{\vec{a}(\vec{b}.\vec{a})}{a^2}$

(4) $\frac{\vec{b}(\vec{b}.\vec{a})}{b^2}$

Q49. Which one the following is Dirichlet condition

(1) Function must have a finite number of maxima and minima in expansion interval

(2) Function can have an infinite number of finite discontinuities in expansion interval

(3) $(f(t))^2$ must be absolutely summable

(4) $\int_{t_1}^{\infty} f(t)dt < \infty$

Q50. Which of the following functions can be used as an integrating factor to turn the following non-exact equation into an exact equation?

$(3ycosx - xysinx) + 2xcosx\frac{dy}{dx} = 0$?

(1) x^2

(2) x^2y

(3) y^2

(4) xy^2

Q51. The value of integral $\int_0^\infty \frac{x^{a-1}}{1-x} dx$, where 0 < a < 1: will be

(1) $\frac{\pi}{sin\pi a}$

(2) $\frac{2\pi}{sin\pi a}$

(3) $\frac{\pi}{sin2\pi a}$

(4) $\frac{\pi}{2sin\pi a}$

Q52. The value of m, so that $2x-x^2+my^2$ may be harmonic is:

(1) 0

(2) 2

(3) 3

(4) 1

Q53. The solution of $\frac{\partial u}{\partial t} = 4\frac{\partial u}{\partial x}$ is

(1) Ae^{kx+t}

(2) $Ae^{k(x+t)}$

(3) Ae^{x+t}

(4) $Ae^{k(\frac{x}{4}+t)}$

Q54. Which of the following matrices is skew Hermitian:

(1) $\begin{bmatrix} 0 & i \\ i & 0 \end{bmatrix}$

(2) $\begin{bmatrix} 0 & i \\ -i & 0 \end{bmatrix}$

(3) $\begin{bmatrix} i & 0 \\ 0 & i \end{bmatrix}$

(4) $\begin{bmatrix} i & 0 \\ 0 & -i \end{bmatrix}$

Q55. The solution of differential equation

$x \log x \frac{dx}{dy}$ +y = 2 log x is:

(1) $y\log x=(\log x)^2+C$

(2) $y=(\log x)^2+C$

(3) $y=2\log x+C$

(4) $y=x(\log x)^2+C$

56. A charge q is placed at a distance 3R from the centre of a ground conducting sphere of radius r. The image charge and its distance are respectively:

(1) $\frac{-q}{3}$ and $\frac{R}{3}$

(2) $\frac{-q}{3}$ and $\frac{R}{6}$

(3) q and $\frac{R}{3}$

(4) $\frac{q}{3}$ and $\frac{R}{3}$

Q57. The Laplace's equation is CGS Gaussian System is:

(1) $\nabla^2 V = \frac{\rho_0}{\varepsilon_0}$

(2) $\nabla^2 V = -4\pi\rho$

(3) $\nabla^2 V = 4\pi\sigma$

(4) $\nabla^2 V = 0$

Q58. The ratio of the intensity of magnetic field at the center of a very long solenoid to that at the extreme ends is:

(1) 2

(2) 1/2

(3) 4

(4) 1/4

Q59. The electric field associated with an electromagnetic wave propagating in free space is given as:

$\vec{E}=E_0\cos(kz-wt)\hat{l}+E_0\cos(kz+wt)\hat{l}$

(1) 0

(2) $\frac{E_0\ B_0}{\mu_0}$

(3) $\frac{2E_0\ B_0}{\mu_0}$

(4) $\frac{E_0\ B_0}{2\mu_0}$

Q60. In an electromagnetic wave, the electric field of amplitude 6.2 V/m oscillates with a frequency of 2.4 $\times 10^{10}$ Hz. The Energy density of the wave is:

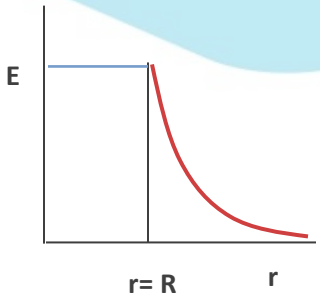
(1) 14 x 10^{-10} J/m^3

(2) 2.4 x 10^{-10} J/m^3

(3) 3.4 x 10^{-10} J/m^3

(4) 4.4 x 10^{-10} J/m^3

Q61. This variation of electric field with distance is observed in which of the following objects:



(1) Line of charge

(2) Sheet of charge

(3) Solid Sphere

(4) Spherical Shell

Q62. The plane electromagnetic wave has magnetic field

$\vec{B}$(x,y,z)= $B_0 \sin\left[(x=y)\frac{k}{\sqrt{2}}+wt\right]\hat{k}$, where k is a wave number and $\hat{l}, \hat{j}$ and $\hat{k}$ are the unit vectors along x, y and z directions respectively. The average pointing vector is:

(1) $-\frac{B_0^2 C^2 k}{2\mu_0 w}\left(\frac{\hat{l}+\hat{j}}{2}\right)$ units

(2) $\frac{B_0^2 C^2 k}{2\mu_0 w}\left(\frac{\hat{l}+\hat{j}}{2}\right)$ units

(3) - $\frac{B_0^2 C^2 k}{2\mu_0 w}\left(\frac{\hat{l}+\hat{k}}{2}\right)$ units

(4) $\frac{B_0^2 C^2 k}{2\mu_0 w}\left(\frac{\hat{l}+\hat{k}}{2}\right)$ units

Q63. The state of polarization of the electromagnetic wave with field components

$E_X = E_0 \sin\left(kz - wt + \frac{\pi}{4} + 90°\right)$

$E_y = \frac{1}{\sqrt{2}} E_0 \sin(kz - wt)$

(1) Linearly polarized

(2) Right circularly polarized

(3) Left circularly polarized

(4) Left elliptically polarized

Q64. A monochromatic electromagnetic wave in vacuum is incident normally on a substance of refractive index 1.5, the ratio of magnitude of the electric vector which is reflected to that of incident wave is

(1) 1/2

(2) 1/3

(3) 1/4

(4) 1/5

Q65. For a given dielectric, the electronic polarizability a

(1) Increases with temperature

(2) Decreases with temperature

(3) Is not affected by the temperature change

(4) May increase or decrease with temperature

Q66. All natural processes are irreversible. This is a direct consequence of

(1) First law of thermodynamic

(2) Second law of thermodynamics

(3) Third law of thermodynamics

(4) Gibb's paradox

Q67. In a cyclic process

(1) Work done is zero

(2) Work done by the system is equal to the quantity of heat given to the system

(3) Work done does not depend on the quantity of heat given to the system

(4) The internal energy of the system increases

Q68. A Carnot engine operating between 27° C and 127 C has efficiency equal to

(1) 21%

(2) 22%

(3) 24%

(4) 25%

Q69. The area of Carnot cycle on T-S diagram represents

(1) Heat absorbed by the source

(2) Work done in a cycle

(3) Heat rejected to the sink

(4) Efficiency of the engine

Q70. Under equilibrium conditions, the thermodynamic variable associated with black body radiation at temperature T which reduces to zero is

(1) Entropy

(2) Helmholtz free energy

(3) Gibb's free energy

(4) Pressure

Q71. Which statistics will be applied to deuterons and a particles?

(1) Bose Einstein

(2) Fermi Dirac

(3) Maxwell Boltzmann

(4) None

Q72. The total number of accessible states of N non interacting particles of spin 1/2 is

(1) $2N^2$

(2) N^2

(3) 2n/2

(4) N

Q73. Einstein's formula for heat capacity

(1) Fails at higher temperature

(2) Fails at lower temperature because it goes as T instead of T

(3) Fails at lower temperature because it decreases exponentially instead of T^3

(4) Falls at all temperature range

Q74. The ratio of two specific heats of a diatomic gas is

(1)1.66

(2)1.33

(3)1.40

(4)1.52

Q75. An oil bath kept at 27 C is being supplied heat at the rate of 100 Js. Assuming the process to be quasi-static, the rate of increase of entropy of the system is approximately

(1) 3.7 $JK^{-1}s^{-1}$

(2) 3.7 $JK^{-1}s^{-2}$

(3) 0.33 $JK^{-1}s^{-1}$

(4) 0.33 $JK^{-1}s^{-2}$

Q76. Ten milligrams of a radioactive substance of life period 2 years is kept for four years. How much of the substance remained unchanged?

(1) 5 mg

(3) 2.5 mg

(2) 2 mg

(4) 0 mg

Q77. Which of the following disintegration series of heavy elements will give Bi^{209} as stable nucleus?

(1) Thorium series

(3) Uranium series

(2) Neptunium series

(4) Actinium series

Q78. The ratio of the sizes of $^{208}_{82}$Pb and $^{26}_{12}$Mg nuclei is approximately

(1) 2

(2) 4

(3) 8

(4) 16

Q79. What is second nearest neighbor distance in bee crystal whose conventional unit cell parameter is a?

(1) a

(2) $\frac{a}{2}$

(3) $a\sqrt{2}$

(4) $\frac{\sqrt{3}a}{2}$

Q80. In a simple cubic lattice $d_{100} : d_{110} : d_{111}$ is

(1) 6:3:2

(2) 6:3:$\sqrt{2}$

(3)$\sqrt{6}$:$\sqrt{3}$:$\sqrt{2}$

(4) $\sqrt{6}$:$\sqrt{3}$:$\sqrt{4}$

Q81. If the angle between the direction of incident X-ray and diffracted one is 16, the angle of incidence (glancing) will be

(1) 32°

(3) 24°

(2) 90°

(4) 82°

Q82. If $\vec{K}$ is wave vector of incident X-ray and $\vec{G}$ be the reciprocal lattice vector then condition for Bragg reflections is given by

(1) $\vec{K} = \vec{G}$

(2) $|\vec{K}| = |G|$

(3) $2\vec{K}\text{-}\vec{G} = G^2$

(4) $\vec{K} = -\vec{G}$

Q83. The temperature dependency of the electrical resistivity of a metal according to classical free electron theory

(1) $\rho \propto T^2$

(2) $\rho \propto T^{-1}$

(3) $\rho \propto T^{1/2}$

(4) $\rho \propto T^{-2}$

Q84. The Fermi level of an intrinsic semiconductor is pinned at the center of the band gap. The probability of occupation of the highest electron state in valence hand at room temperature, will be

(1) Zero

(2) Between zero and half

(3) Half

(4) One

Q85. The form factor of a half wav rectifier is

(1) $\frac{\pi}{2}$

(2) $\frac{\pi}{\sqrt{2}}$

(3) $\frac{\pi}{2\sqrt{2}}$

(4) π

Q86. Which of the following gates has the exact inverse output of the OR gate for all possible input combinations?

(1) AND

(2) NOT

(3) NOR

(4) NAND

Q87. The decimal equivalent of hexadecimal E 5 is

(1) 279

(2) 229

(3) 427

(4) 3000

Q88. In case of the wave function $\psi = \frac{e^{ikr}}{r}$, the possibility current density is

(1) $\frac{\hbar k}{mr^2}$

(2) $\frac{\hbar k}{mr}$

(3) $\frac{\hbar k}{r^2}$

(4) $\frac{\hbar k}{r}$

Q89. A particle is described by a wave function $\psi(x)=e^{-|x|}$ in one dimension. The probability that it will be found in the region $|x| \leq a$, $a > 0$ is

(1) e^{-a}

(2) e^{-2a}

(3) $1 - e^{-a}$

(4) $1 - e^{-2a}$

Q90. Two's complement (decimal) of the binary number 1000001 is

(1) +63

(2) -63

(3) +62

(4) -62

Q91. Two particles are moving towards each other with equal velocities c/2. Their velocity of approach will be

(1) C

(2) C/2

(3) 4C/5

(4) C/4

Q92. If the momentum of an electron moving with a velocity 0.9e is increased by 1% then the increase in its energy is

(1) 1%

(2) 0.9%

(3) 0.81%

(4) 0.5%

Q93. The phase-shift between input and output voltages of CE amplifier

(1) 90°

(2) 120°

(3) 180°

(4) 270°

Q94. The purpose of capacitors in a transistor amplifier is to

(1) Protect the transistor

(2) Cool the transistor

(3) Provide biasing

(4) Couple or bypass a.c. component

Q95. If the blinding enery per nucleon in $^{7}_{3}Li$ and $^{4}_{2}He$ nuclei are 5.60 MeV and 7.06 MeV respectively, then in reaction $p+^{7}_{3}Li$ ----> $^{4}_{2}He$; energy of proton must be

(1) 28.24 MeV

(2) 17.28 MeV

(3) 1.46 MeV

(4) 39.2 MeV

Q96. According to Einstein's photoelectric equation, the plot of the kinetic energy of the emitted photo electrons from a metal vs, the frequency of the incident radiation gives straight line whose slope

(1) depends on the nature of the metal used

(2) depends on the intensity of the radiation

(3) depends both on the intensity of the radiation and the metal used

(4) is the same for all metals and independent of the intensity of the radiation

Q97. Curie temperature is the temperature above which

(1) a ferromagnetic material becomes paramagnetic

(2) a paramagnetic material becomes diamagnetic

(3) a ferromagnetic material becomes diamagnetic

(4) a paramagnetic material becomes ferromagnetic

Q98. If $\psi=\sqrt{\frac{2}{L}}\cos\frac{\pi x}{L}e^{-iet/\hbar}$, then <x> in the limit $\frac{-L}{2}$ <x< $\frac{L}{2}$ is

(1) $\frac{3}{4L}$

(2)

(3) $\frac{1}{4L}$

(4) $\frac{L}{2}$

Q99. For a transistor amplifier in common emitter having load impedance of 1 kΩ ($h_{fe}=25*10^{-6}$ S) the current gain is

(1) -5.2

(2) -24.8

(3) -15.7

(4) -48.78

Q100. Which of the following phenomenon can be explained by quantum mechanical tunnelling through the barrier?

(1) α-decay

(2) Emission of photo electrons from metal surface

(3) γ -decay

(4) α-decay