NEET PHYSICS 2018-19 - Chennai

Periodic Test : 06 **Test ID :** 018

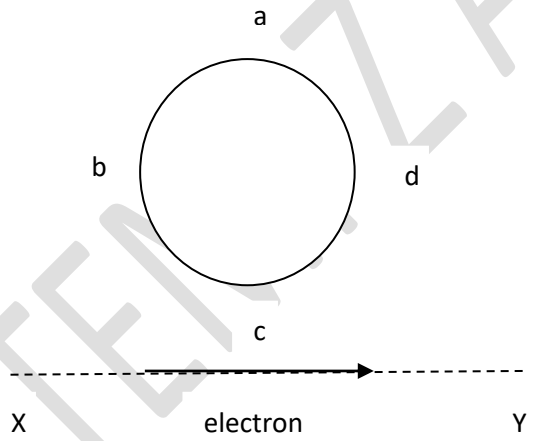
Number of questions: 150 **Test date: 25.03.2019**

Name: _____ **Time**: 3HRS

ID No: _____

Negative Marks : 4 marks for correct attempt & 1 mark deducted for every wrong attempt.

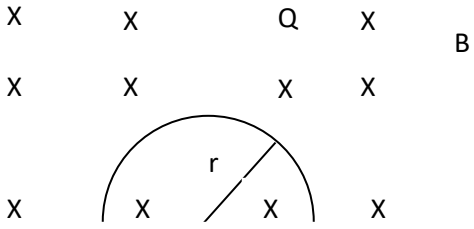
1. A series R-C circuit is connected to an alternating voltage source. Consider two situations :
   (a) When capacitor is air filled.
   (b) When capacitor is mica filled.
   Current through resistor is i and voltage across capacitor is V then
   (a) $i_a > i_b$
   (b) $V_a = V_b$
   (c) $V_a < V_b$
   (d) $V_a > V_b$
   (e)
2. An electron moves on a straight line path *XY* as shown. The abcd is a coil adjacent to the path of electron. What will be the direction of current, if any, induced in the coil?



   (a) The current will reverse its direction as the electron goes past the coil
   (b) No current induced
   (c) abcd
   (d) adcb

3. A resistance 'R' draws power 'P' when connected to an AC source. If an inductance is now placed in series with the resistance, such that the impedance of the circuit becomes `Z', the power drawn will be?
   (a) P(R/Z)
   (b) P
   (c)$P(R/Z)^2$
   (d)$P\sqrt{R/Z}$

4. A thin semicircular conducting ring (PQR) of radius *r* is falling with its plane vertical in a horizontal magnetic field B, as shown in the figure.



The potential difference developed across the ring when its speed is *v*, is

(a) zero
(b) $B v \pi r^2$ and P is at higher potential
(c) $\pi r B v$ and R is at higher potential
(d) 2rBv and R is at higher potential

5. A transformer having efficiency of 90% is working on 200 V and 3 kW power supply. If the current in the secondary coil is 6 A, the voltage across the secondary coil and the current in the primary coil respectively are
(a) 300 V, 15 A
(b) 450 V, 15 A
(c) 450 V, 13.5 A
(d) 600 V, 15A
6. A wire loop is rotated in a magnetic field. The frequency of change of direction of the induced e.m.f. is
(a) four times per revolution
(b) six times per revolution
(c) once per revolution
(d) twice per revolution

7. A coil of self-inductance *L* is connected in series with a bulb B and an AC source. Brightness of the bulb decreases when
(a) a capacitance of reactance $X_c = X_L$ is included in the same circuit.
(b) an iron rod is inserted in the coil.
(c) frequency of the AC source is decreased.
(d) number of turns in the coil is reduced.

8. The primary of a transformer when connected to a dc battery of 10 Volt draws a current of 1 mA. The number of turns of the primary and secondary windings are 50 and 100 respectively. The voltage in the secondary and the current drawn by the circuit in the secondary are respectively
(a) 20 V and 2.0 mA
(b) 10 V and 0.5 mA
(c) Zero volt and therefore no current
(d) 20 V and 0.5 Ma

9. A current of 2.5 A flows through a coil of inductance 5 H. The magnetic flux linked with the coil is
(a) 0.5 Wb
(b) 12.5 Wb
(c) zero
(d) 2 Wb

10. A coil of resistance 400 Ω is placed in a magnetic field. If the magnetic

flux ϕ (Wb) linked with the coil

varies with time t (sec) as ϕ= 5012

+4. The current in the coil at
t = 2 sec is
(a) 0.5 A
(b) 0.1 A
(c) 2 A
(d) 1 A

11. In an electromagnetic wave in free space the root mean square value of the electric field is E_{rms}= 6 V m^{-1}. The peak value of the magnetic field is
(a) 2.83 x 10^{-8}T

(b) 0.70×10^{-8}T
(c) 4.23×10^{-8}T
(d) 1.41×10^{-8}T

12. A 100 Ω resistance and a capacitor of 100 Ω reactance are connected in series across a 220 V source. When the capacitor is 50% charged, the peak value of the displacement current is
(a) 2.2 A
(b) 11 A
(c) 4.4 A
(d) $11\sqrt{2}$ A

13. Out of the following options which one can be used to produce a propagating electromagnetic wave?
(a) A chargeless particle
(b) An accelerating charge
(c) A charge moving velocity
(d) A stationary charge

14. The energy of em waves is of the order of15 keV. To which part of the spectrum does it belong?
(a) Ultraviolet rays
(b) γ-rays
(c)X-rays
(d) Infra-red rays

15. A radiation of energy 'E' falls normally on a perfectly reflecting surface. The momentum transferred to the surface is (C = Velocity of light)
(a) $2E/C^2$
(b) E / C^2
(c) E / C
(d) 2E / C

16. Light with an energy flux of 25×10^4 W m^{-2} falls on a perfectly reflecting surface at normal incidence. If the surface area is 15 cm^2, the average force exerted on t face is
(a) 1.25×10^{-6} N
(b) 2.50×10^{-6} N
(c) 1.20×10^{-6} N
(d) 3.0×10^{-6} N

17. The condition under which a microwave oven heats up a food item containing water molecules most efficiently is
(a) Microwaves are heat waves, so always produce heating.
(b) Infra-red waves produce heating in a microwave oven.
(c) The frequency of the microwaves must match the resonant frequency of the water molecules.
(d) The frequency of the microwaves has no relation with natural frequency of water molecules.

18. An electromagnetic wave of frequency $V = 3.0$ MHz passes from vacuum into a dielectric medium with relative permittivity $\epsilon = 4.0$. Then
(a) Wavelength is doubled and frequency becomes half.
(b) Wavelength is halved and frequency remains unchanged.
(c) Wavelength and frequency both remain unchanged.
(d) Wavelength is doubled and frequency unchanged.

19. The electric field associated with an em wave in vacuum is given by $E = \hat{t}\ 40 \cos (lc — 6 \times 10^8 t)$ where E, z and t are in volt/m, meter and

seconds respectively. The value of wave vector k is
(a) 2 m^{-1}
(b) 0.5 m^{-1}
(c) 6 m^{-1}
(d) 3 m^{-1}

20. The ratio of amplitude of magnetic field to the amplitude of electric field for an electromagnetic wave propagating in vacuum is equal to
(a) the speed of light in vacuum
(b) reciprocal of speed of light in vacuum
(c) the ratio of magnetic permeability to the electric susceptibility of vacuum
(d) unity

21. The ratio of resolving powers of an optical microscope for two wavelengths λ_1 = 4000 Å and λ_2= 6000 Å is
(a) 9 : 4
(b) 3 : 2
(c) 16 : 81
(d) 8 : 27

22. Young's double slit experiment is first performed in air and then in a medium other than air. It is found that 8^{th} bright fringe in the medium lies where 5^{th} dark fringe lies in air. The refractive index of the medium is nearly
(a) 1.59
(b) 1.69
(c) 1.78
(d) 1.25

23. A beam of light from a source L is incident normally on a plane mirror fixed at a certain distance x from the source. The beam is reflected back as a spot on a scale placed just above the source L. When the mirror is rotated through a small angle Θ, the spot of the light is found to move through a distance y on the scale. The angle Θ is given by
(a) y/ x
(b) x / 2y
(c) x / y
(d) y / 2x

24. A thin prism having refracting angle 10° is made of glass of refractive index 1.42. This prism is combined with another thin prism of glass of refractive index 1.7. This combination produces dispersion without deviation. The refracting angle of second prism should be
(a) 6°
(b) 8°
(c) 10°
(d) 4°

25. Two polaroids P_1 and P_2 are placed with their axis perpendicular to each other. Unpolarised light I_0 is incident on P_1. A third polaroid P_3 is kept in between P_1 and P_2 such that its axis makes an angle 45° with that of P_1. The intensity of transmitted light through P_2 is
(a) I_0 / 4
(b) I_0 / 8
(c) I_0 / 16
(d) I_0 / 2

26. Two identical glass (μ= 3/2) equiconvex lenses of focal length f each are kept in contact. The space between the two lenses is filled

with water ($\mu_w = 4/3$). The focal length of the combination is
(a) f/3
(b) f
(c) 4 f/3
(d) 3 f/4

27. An air bubble in a glass slab with refractive index 1.5 (near normal incidence) is 5 cm deep when viewed from one surface and 3 cm deep when viewed from the opposite face. The thickness (in cm) of the slab is
(a) 8
(b) 10
(c) 12
(d) 16

28. The interference pattern is obtained with two coherent light sources of intensity ratio n. In the interference pattern, the ratio $\frac{I_{max}-I_{min}}{I_{max}+I_{min}}$ will be
(a) $\sqrt{n}/n+1$
(b) $2\sqrt{n}/(n+1)$
(c) $\sqrt{n}/(n+1)^2$
(d) $2\sqrt{n}/(n+1)^2$

29. A person can see clearly objects only when they lie between 50 cm and 400 cm from his eyes. In order to increase the maximum distance of distinct vision to infinity, the type and power of the correcting lens, the person has to use, will be
(a) convex, +2.25 diopter
(b) concave, -0.25 diopter
(c) concave, -0.2 diopter
(d) convex, +0.15 diopter

30. A linear aperture whose width is 0.02 cm is placed immediately in front of a lens of focal length 60 cm. The aperture is illuminated normally by a parallel beam of wavelength 5×10^{-5} cm. The distance of the first dark band of the diffraction pattern from the centre of the screen is
(a) 0.10cm
(b) 0.25cm
(c) 0.20cm
(d) 0.15cm

31. The de-Broglie wavelength of a neutron in thermal equilibrium with heavy water at a temperature T (kelvin) and mass m, is
(a) $h/\sqrt{3mkT}$
(b) $2h/\sqrt{3mkT}$
(c) $2h/\sqrt{mkT}$
(d) $h/\sqrt{mkT}$

32. The photoelectric threshold wavelength of silver is 3250×10^{-10} m. The velocity of the electron ejected from a silver surface by ultraviolet light of wavelength 2536×10^{-10}m is [Given h= 4.14×10^{-15} eV s and c = $3 \times 10^8 ms^{-1}$]
(a) $=0.6 \times 10^6$ m s^{-1}
(b) $= 61 \times 10^3$ m s^{-1}
(c) $=0.3 \times 10^6$ m s^{-1}
(d) $= 6 \times 10^5$ m s^{-1}

33. Electrons of mass in with de-Broglie wavelength λ fall on the target in an X-ray tube. The cutoff wavelength (λ_0) of the emitted X-ray is
(a) $\lambda_0 = 2mc\lambda^2/h$
(b) $\lambda_0 = 2h/mc$
(c) $\lambda_0 = 2m^2c^2\lambda^3/h^2$
(d) $\lambda_0 = \lambda$

34. Photons with energy 5 eV are incident on a cathode C in a photoelectric cell. The maximum energy of emitted photoelectrons is 2 eV. When photons of energy 6 eV are incident on C, no photoelectrons will reach the anode A, if the stopping potential of A relative to C is
(a) +3 V
(b) +4 V
(c) -1 V
(d) -3 V

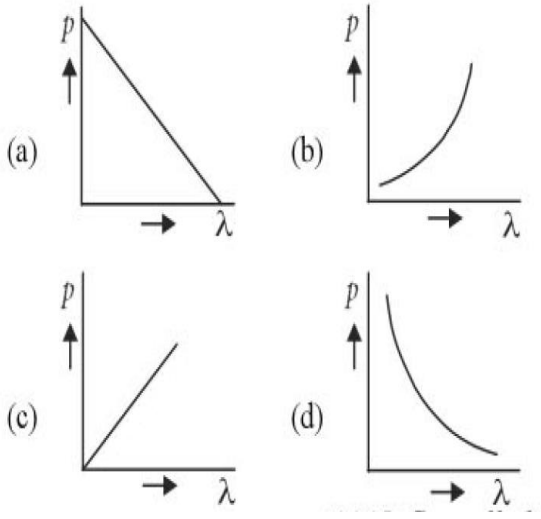
35. An electron of mass m and a photon have same energy E. The ratio of de-Broglie wavelengths associated with them is
(a) $c(2mE)^{1/2}$
(b) $\frac{1}{c}(\frac{2m}{E})^{1/2}$
(c) $\frac{1}{c}(\frac{E}{2m})^{1/2}$
(d) $(\frac{E}{2m})^{1/2}$

36. When a metallic surface is illuminated with radiation of wavelength λ, the stopping potential is V .If the same surface is illuminated with radiation of wavelength 2λ, the stopping potential is V/4. The threshold wavelength for the metallic surface is
(a) (5/2) λ
(b) 3 λ
(c) 4 λ
(d) 5 λ

37. A photoelectric surface is illuminated successively by monochromatic light of wavelength λ and If the maximum kinetic energy of the emitted photoelectrons in the second case is 3 times that in the first case, the work function of the surface of the material is (h = Planck's constant, c= speed of light)
(a) 2hc / λ
(b) hc / 3 λ
(c) hc / 2 λ
(d) hc/ λ

38. Light of wavelength 500 nm is incident on a metal with work function 218 eV. The de Broglie wavelength of the emitted electron is
(a) >=2.8 X 10^{-9}m
(b) <= 2.8 x 10^{-12}m
(c) <2.8 X 10^{-10} m
(d) <2.8 x 10^{-9}m

39. Which of the following figures represent the variation of particle momentum and the associated de-Broglie wavelength?



40. A certain metallic surface is illuminated with monochromatic light of wavelength, λ. The stopping potential for photo-electric current for this light is 3

V_0. If the same surface is illuminated with light of wavelength 2 λ, the stopping potential is V_o. The threshold wavelength for this surface for photo-electric effect is
(a) π / 4
(b) π / 6
(c) 6 λ
(d) 4 λ

41. Radioactive material `A' has decay constant `8 λ', and material 'B' has decay constant 'λ'. Initially they have same number of nuclei. After what time, the ratio of number of nuclei of material 'B' to that 'A' will be 1 /e ?
(a) 1/ 7 λ
(b) 1/8 λ
(c) 1/9 λ
(d) 1/ λ

42. The ratio of wavelengths of the last line of Balmer series and the last line of Lyman series is
(a) 1
(b) 4
(c) 0.5
(d) 2

43. If an electron in a hydrogen atom jumps from the 3^{rd} orbit to the 2^{nd} orbit, it emits a photon of wavelength λ. When it jumps from 4^{th} orbit to the 3^{rd} orbit, the corresponding wavelength of the photon will be
(a) (16/25) λ
(b) (9/16)λ
(c) (20/7)λ
(d)(20/13) λ

44. The half-life of a radioactive substance is 30 minutes. The time (in minutes) taken between 40% decay and 85% decay of the same radioactive substance is
(a) 15
(b) 30
(c) 45
(d) 60

45. Give the vallue of Rydberg constant is 10^7 m^{-1}, the wave number of the last line of the Balmer series in hydrogen spectrum will be
(a) 0.25 x 10^7 m^{-1}
(b) 2.5 x 10^7 m^{-1}
(c) 0.025 x 10^4 m^{-1}
(d) 0.5 x 10^7 m^{-1}

46. When an α-particle of mass m moving with velocity v bombards on a heavy nucleus of charge Ze, its distance of closest approach from the nucleus depends on m as
(a) 1/ m^2
(b) m
(c) 1/m
(d)$1/\sqrt{m}$

47. A nucleus of uranium decays at rest into nuclei of thorium and helium. Then
(a) The helium nucleus has more momentum than the thorium nucleus.
(b) The helium nucleus has less kinetic energy than the thorium nucleus.
(c) The helium nucleus has more kinetic energy than the thorium nucleus.

(d) The helium nucleus has less momentum than the thorium nucleus.

48. In the spectrum of hydrogen, the ratio of the longest wavelength in the Lyman series to the longest wavelength in the Balmer series is
(a) 27/5
(b) 5/27
(c) 4/9
(d) 9/4

49. If radius of the $^{27}_{13}Al$ nucleus is taken to be R_{Al}, then the radius of $^{125}_{53}Te$ nucleus is nearly
(a) 3/5 R_{Al}
(b) $(13/53)^{1/3}$ R_{AI}
(c) $(53/13)^{1/3}$ R_{AI}
(d) (5/3) R_{AI}

50. Consider 3rd orbit of He+ (Helium), using non-relativistic approach, the speed of electron in this orbit will be [given K= 9 x 10^9 constant, Z = 2 and h (Planck's Constant) = 6.6 x 10^{-34} J s]
(a) 0.73 x 10^6 m/s
(b) 3.0 x 10^8 m/s
(c) 2.92 x 10^6 rn/s
(d) 1.46 x 10^6 m/s