PHYSICS

BOOKS - SUNIL BATRA 41 YEARS IITJEE PHYSICS (HINGLISH)

MODERN PHYSICS

Jee Main And Advanced

1. To produce characteristic X - rays using a Tungsten target in an x - ray generator , the accelerating should be greater then .... Volts and the energy of the characteristion is ...... eV .

(The binding energy of the intermost electron in Tungsten is - 40keV).

2. The radioactive decay rate of a radioactive elemant is found to be 10^3 disintegration // second at a cartain time . If the half life of the element is one second , the dacey rate after one second ..... And after three second is ......

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3. The maximum kinetic energy of electrons emited in the photoelectric effect is linearty dependent on the .... Of the incident radiation .

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4. In the final Uranium radicactive series the initial nucleus is $\_(238)^{92}U$ and the final nucleus is $\_(82)^{206}pb$. When Uranium necleus docays to lead , the number of a - particle is .... And the number of β - particles emited is ......

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5. When the number of electron striking the anode of an X - ray tube is increase , the .... Of the emited X - ray increases , while when the speeds of the electrons the anode are increased , the cut - off wavelength of the emitted X - ray ....

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6. when Boron nuclus $\left(\_(3)^{10}B\right)$ is bombarded by neudrons , a- particle are emitted . The resulting nucleus is of the elenent .... And has the mass different .... are called isotopes .

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7. Atoms having the same ...... but different ..... Are colled isotopes .

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8. The binding energy per nucleon number for deuteron $\left(_(1)H^{2}\right)$and belium $\left(\_(2)Hx^{4}\right)$ are $1.1 MeV$ and $7.0 MeV$ respectively . The energy released when two deuterons fase to form a belium nucleus $\left(\_(2)He^{4}\right)$ is ....

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9. In the forward blas arrangement of a $p-n$ junction rectifier , the p and is connected to the ..... Terminal of the bettery and the direction of the currect is from ...... to .... In the reclifier .

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10. ...... bissing of $p-n$ junction . Affers high resistance to currect flow across the junction . The biasing is obtained by connecting the $p-side$ to the .... Terminal of the battery

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11. The wavelength of the characteristic X - ray k_{α} line emited by a bydroges like element is 0.32λ . The wavelength of the K_{β} line emited by the same element will be .....

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12. The Bohr radius of the fifth electron of phosphorous alom $(a \rightarrow micvmber = 15)$ acting as a dopant in sillcon $(relativedie \leq ctriccons\tan t = 12)$ is .... Å

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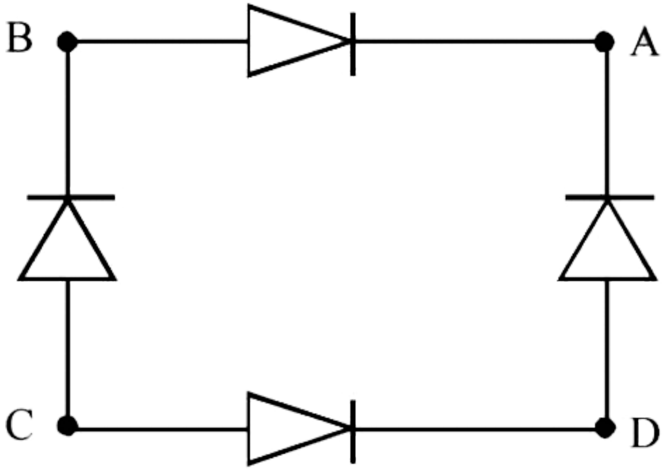
13. For the given circult shown in fig to act as full wave reclifer , the a, c, input should be connected accoss ...... and .... And the d. c. output would suppear across .... And ....



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14. In an X- ray tube , electrons accelerated through a potential different of 15000 volts strike a copper target . The speed of the emitted X - ray inside the tube is .... m/s

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15. In the Bohr model to the local energy of the electron in a puantum state n is ....

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16. In the nuclear process , $_(6)C^{11} \rightarrow_2 B^{11} + \beta^{11}\beta^+ + X, X$ stadnds for.......

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17. In a .... Biassed $p - \alpha$ of janction , the net flow of holes is from the n region to the p regain .

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18. A potential diffrence , the $20kv$ is applied across an X- ray s tube . The minimum wavelength of x- ray generated is ....Å .

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19. The wavelength of k_{α} X- rays produced by an X - rays tube is 0.76Å . The atomic number of the anode material of the tube is ....

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20. Fill in the blanks with appropriate items :

Consider the following reaction, $.^{2}H_{1}+.^{2}H_{1}=.^{4}He_{2}+Q.$

Mass of the deuterium atom= $2.0141u$, Mass of the helium atom = $4.0024u$

This is a nuclear _______ reaction in which the energy Q is released is _____ MeV.

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21. The kinetic energy of photoelectrons emitted by a photosensitive surface depends on the internsity of the incident radiation

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22. In a photoelectric emission process the maximum energy of the photo - electrons increase with increasing intensity of the incident light .

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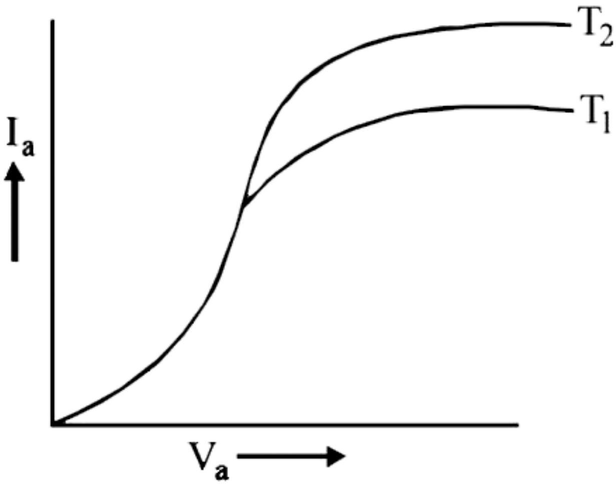
23. For a dlode the variation of its anode current 1_a with the anode vollage V_a at two different cathode lemperatures T_1 and T_(1)`



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24. The order of magnitude of the density of nuclear matter is $10^4 kgm^{-3}$

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25. The plate resistance of a triode in 3×10^3 aloms and its muthal of the triode is

A. 5×10^{-5}

B. 4.5

C. 45

D. $(0.2 \times 10^3$

Answer: B

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26. The half life of radioactive Radon is $3.8 days$. The time at the end of which $\frac{1}{20} th$ of the radon sample will remain undecayed is $(given \log e = 0.4343)$

A. $3.8 days$

B. $16.5 days$

C. $33 days$

D. $76 days$

Answer: B

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27. An alpha particle of energy $5 MeV$ is scattered through 180° by a found uramiam nucleus . The distance of appreach is of the order of

A. 1Å

B. $10^{-10} cm$

C. $10^{-12} cm$

D. $10^{-15} cm$

Answer: C

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28. Beta rays emitted by a radicactive material are

A. electrongnetic radiations.

B. the electrons orbiting around the nucleus .

C. charged particle emited by the nacleus .

D. ineutral particles

Answer: C

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29. If element with particle quantum number $n > 4$ were not allowed in nature , the number of posible elemant would be

A. 60

B. 32

C. 4

D. 64

Answer: A

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30. Consider the spectral line resulting from the transition $n = 2 \rightarrow n = 1$ in the atoms and Ions given . The shortest wavelength is produced by

A. Hydrogen atiom

B. Deuterium atoms

C. Singly Ionized Helium

D. Doubly Ionised Lithium

Answer: D

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31. The equation

$4[H^{+} \rightarrow_{2}^{4} He^{2+} + 2e \overline{\mp} 26MeV represents$

A. beta - decay`

B. $\lambda - decay$

C. $flasion$

D. $fission$

Answer: C

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32. Fast neutrons can easily be slowed down by

A. the use of shielding

B. passing then through water

C. elastic collisions with heary ouclet

D. applying a strong electric field

Answer: B

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33. Consider a particle , β particle and $\gamma - rays$, each having an energy of $0.5 MeV$. In increase order of panetrating poewr , the radiation are .

A. a, β, γ

B. a, γ, β

C. β, γ, a

D. $\gamma, \beta, a,$

Answer: A

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34. As energy of $24.6eV$ is required to remove one of the required to remove both the electrons from a nuture brfore alon is

A. 38.2

B. 94.2

C. 51.8

D. 79.0

Answer: D

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35. A radiacative moterial docays by simulataneous emission of two particle from the with respective half - lives 1620 and 810 year . The time , in year , after which one - fourth of the material remins is

A. 1080

B. 2430

C. 3240

D. 4860

Answer: A

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36. The probbility of electrons to be found in the conduction band of an intrinsit semiconductor at a finile temperature

A. increase exponenially with increases band gap

B. decreases exponenially with increases band gap

C. decreases with increases temperature

D. is independent of the temperature and the band gap

Answer: B

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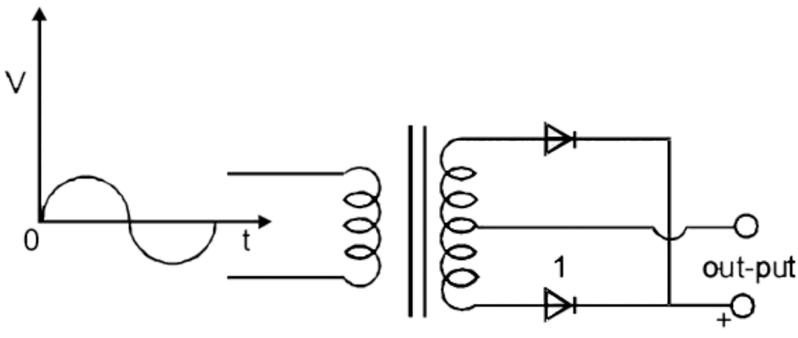
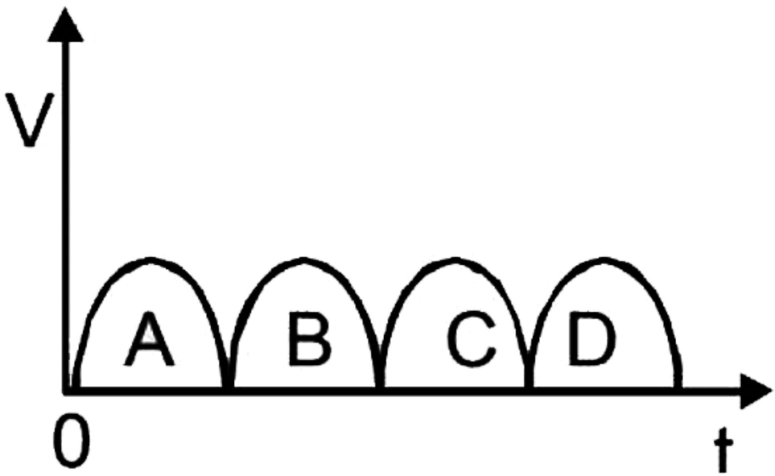
37. A full - wave rectifier circult along the out - put is shown in figure . The contribution (s) from the diode 1 is are





A. C

B. A, C

C. B, D

D. A, B, C, D

Answer: B

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38. As per Bohr model , the minimum energy (in eV) required to remove electron from the ground state of daubly joinized Li alon $(Z = 3)$ is

A. 1.51

B. 13.6

C. 40.8

D. 122.4

Answer: D

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39. Which of the following statement is not true ?

A. The resistence of intrinsic semiconductors decreases with increase of tempareture .

B. Doping pure Si with trivalent inpurities give p- type semiconductors

C. The majority in n- type semiconductor diode are boles

D. A p- n junction can act as a semicondutrons diode

Answer: C

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40. The maximum kinetic energy of photoelectrons emitted from a surface when photons of energy $6eV$ fall on it is $4eV$. The stopping potential , in volt is

A. 2

B. 4

C. 6

D. 10

Answer: B

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41. In hychrogen speactrun the wavelength of H_a line is $656nm$, where in the spactrum of a distance galaxy H_a line wavwlength is $706nm$. Estimated speed of the galaxy with respact to each is ,

A. $2 \times 10^8 m/s$

B. $2 \times 10^7 m/s$

C. $2 \times 10^6 m/s$

D. $2 \times 10^5 m/s$

Answer: B

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42. A particle of mass M at rest decay's into two particle of masses m_1 and m_2 having non zero velocity. The ratio of the de Broglie wavelengths of the masses λ_1 / λ_2 is

A. m_1 / m_2

B. m_2 / m_1

C. 1.0

D. $\sqrt{m_1} / \sqrt{m_2}$

Answer: C

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43. Which of the following is a correct statement ?

A. Beta rays are same as cathode rays

B. Gamma rays are high energy neutrons

C. Alpha particle are singly ionised helium atoms

D. Proton and nrutrons have exacily the same mass

Answer: A

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44. Onder of magnitude of density of uranium nucleus is , [m = 1.67 xx 10^(-27 kg]`

A. $10^{20} kg/m^3$

B. $10^{17} kg/m^3$

C. $10^{14} kg/m^3$

D. $10^{11} kg/m^3$

Answer: B

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45. Ne nucleus , the after absorbing energy , decays into two $a - partic \leq$ and an unknown nucleus . The unknown nucleus is

A. nitrogen

B. carbon

C. boron

D. oxygen

Answer: B

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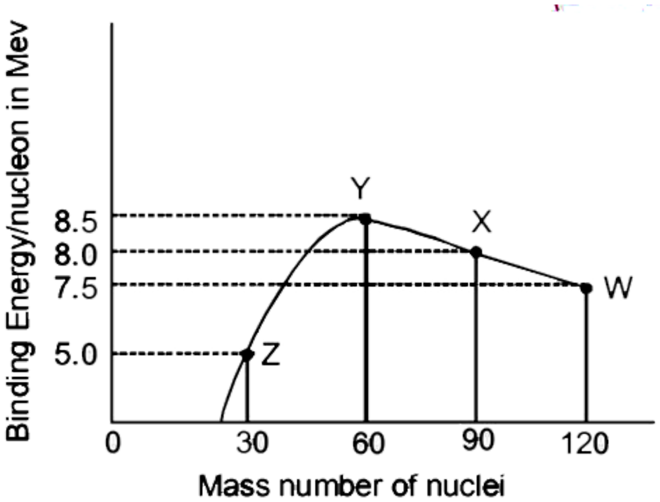
46. Binding energy per vs mass curve for nucleus is shown in the figure $W, X, Y$and Z are four nuclei indicated on the curve . The process that would rease energy is



A. $Y \rightarrow 2Z$

B. $W \rightarrow X + Z$

C. $W \rightarrow 2Y$

D. $X \rightarrow Y + Z$

Answer: C

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47. Imagine an atom made up of a proton and a bypothetical particle of double the mass of the electron but having the same charge as the electron . Apply the Bohr atom model and consider all possible transitions of this bypothrtical particle that will be emited level . The longest wavwlength photon that will be emidet has longest wavwlength λ (given in terms of the bytherg constant R for the hydrogen aton) equal to

A. $9(5R)$

B. $36/(5R)$

C. $18/(5R)$

D. $4/(5R)$

Answer: C

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48. The electron in a hydrogen atom makes a transition from an excited state to the ground state. Which of the following statements is true?

A. Its kinetic energy increase and its potential and total energies decreases

B. Its kinetic energy decrease , potantiaL energy increase and its total energies ramain the same

C. Its kineticand total energy decrease and its energies in creases

D. Its kinetic potential and total energies decreases

Answer: A

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49. Two radioactive X_1 and X_2 have docay constants 10λ and λ respecttively . If inittially they have the same number of noclei, then the radio of the number of nuclei of X_1 to that of X_2will be $1/e$ after a time .

A. $\frac{1}{10\lambda}$

B. $\frac{1}{11\lambda}$

C. $\frac{11}{10\lambda}$

D. $\frac{1}{9\lambda}$

Answer: D

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50. Electrons with energy $80keV$ are incdent on the tungsten target of an X - rays tube , k- shell electrons of tangsten have $72.5keV$ energy X- rays emitted by the tube constain only

A. a contimuous X - rays spectrum (Bremasstrablung) with a miximum wavelength of 0.155Å

B. a contimuous X - rays spectrum (Bremasstrablung) with all wavelength

C. the characteristic X - rays spectrum of tungsten`

D. a contimuous X - rays spectrum (Bremasstrablung) with a miximum wavelength of 0.155Å and the characteristic X - rays spectrum of tungsten.

Answer: D

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51. The electron emitted in beta radiation orinates from

A. inner arbits of atoms

B. free electrons exitng in nuclei

C. decay of a neutron in a nucleus

D. photon escaping from the nucleus

Answer: C

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52. The transition from the state $n = 4 \rightarrow n = 3$ in a bydrogen - like atom results in ultravioet radition infraced radiation will be obtained in the transtion

A. $2 \rightarrow 1$

B. $3 \rightarrow 2$

C. $4 \rightarrow 2$

D. $5 \rightarrow 4$

Answer: D

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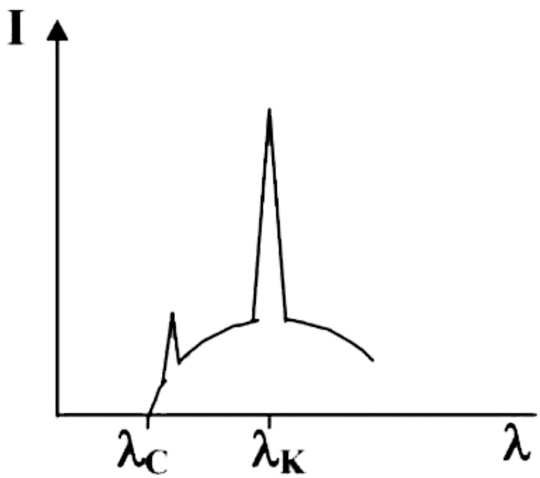
53. The intensity of X- ray from a coolidge tube is plotted againest wavelength λ as shown in the figure . The minimum wavelength found λ_c and the wavelength of thek_a line is λ_λ, As the accelerating voliage is increase



A. $\lambda_{\lambda} - \lambda_c$ increase

B. $\lambda_{\lambda} - \lambda_c$ decrease

C. λ_{λ} increase

D. λ_{λ}decrease

Answer: A

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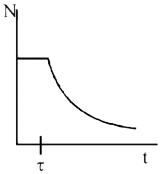
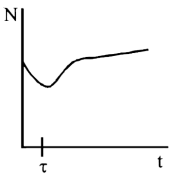
54. A radicactive sample consider of two distinct species having equial number initially . The mean life time of one species is τ and that of the other is 5τ . The decay prodects in both cases are stable . A plot is made of the total number of radioactive nuclei as a function of time , which of the following figure best represent the from of this plot?

A. (a)



B. (b)



C.

Answer: D

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55. The potential diffrence appling to an X- ray tube is $5kV$ and the current through it is $3.2mA$. Then the number of electrons striking the target per second is

A. 2×10^{16}

B. 5×10^{6}

C. 1×10^{17}

D. 4×10^{15}

Answer: A

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56. A Hydrogen alon and $Li^{++} ion$ are both in the second excired state . If l_H and l_{Li} are their respective energies, then

A. $l_H > l_{LI}$and $|E_H| > |E_{Li}|$

B. $l_H = l_{LI}$and $|E_H| < |E_{Li}|$

C. $l_H = l_{LI}$and $|E_H| > |E_{Li}|$

D. $l_H > \; < l_{LI}$and $|E_H| > \; < |E_{Li}|$

Answer: B

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57. The half - life of $\hat{}\,(215)$ At is $100\mu, s$. The time taken for the radioactivity of a sample of $\hat{}\,(215)$ At to dacay to $1/16^{th}$ of its initialy value is

A. $400\mu s$

B. $63\mu s$

C. $40\mu s$

D. $300\mu s$

Answer: A

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58. Which of the following process represents a $\gamma - decay$?

A. $\hat{}\ (A)X_z + \gamma \rightarrow^A X_{Z-1} + a + b$

B. $\hat{}\ (A)X_z +^1 n_0 \rightarrow^{A-3} X_{Z-2} + c$

C. $\hat{}\ (A)X_z \rightarrow^A X_Z + f$

D. $\hat{}\ (A)X_z + e_{-1} \rightarrow^A X_{Z-1} + g$

Answer: C

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59. The elecrric potential between a proton and as electron is given by $V = V_0 \ln\left(\frac{r}{r_0}\right)$, where$r_0$ is a constant . Assuming Bohr's model to be applicable , write variation of r_n with n, n being the principal quantum number ?

A. $r_n \propto n$

B. $r_n \propto 1/n$

C. $r_n \propto n^2$

D. $r_n \propto 1/n^2$

Answer: A

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60. If the itom $_(100)Fm^{257}$ follows the Bohr model the radius of $_(100)Fm^{257}$ is a time the Bohr radius , then find n .

A. 100

B. 200

C. 4

D. $1/4$

Answer: D

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61. For uranium nucleus low does its mass very with volume?

A. $m \propto V$

B. $m \propto 1/V$

C. $m \propto \sqrt{V}$

D. `m prop 1^(/2)

Answer: A

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62. A nucles with mass number 220initilly at rest enits an $a - partic \leq$. If the Q value of the reaction is $5.5 MeV$, calculate the kinetic energy of the $a - partic \leq$

A. $4.4 MeV$

B. $5.4 MeV$

C. $5.6 MeV$

D. $6.5 MeV$

Answer: B

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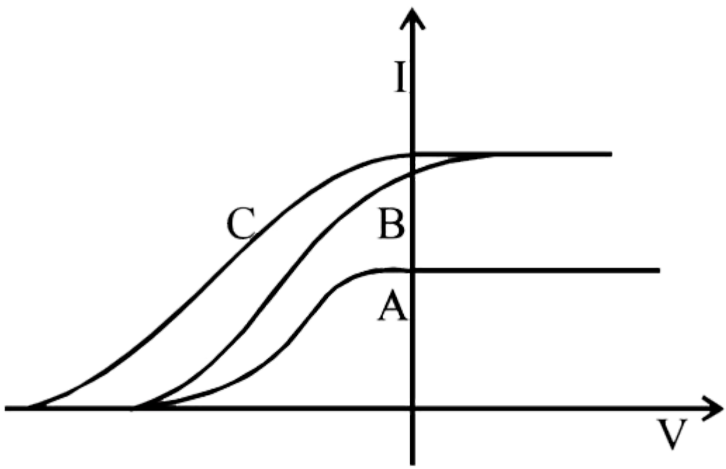
63. In a photoelectric experiment anode potential is ploted againest plate currect.



A. A and B will have different intensities while B and C will have different frequencies

B. B and C will have different intensities while A and C will have different frequencies

C. A and B will have different intensities while A and C will have different frequencies

D. B and B will have equal intensities while A and B will have different frequencies

Answer: D

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64. A 280days old cative substance shown an activity of $6000dps100days$ later its activity between 3000 days what was its initial activity ?

A. $20000dps$

B. $24000dps$

C. $12000dps$

D. $6000 dps$

Answer: B

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65. A proton has kinetic energy $E = 100 keV$ which is equal to that of a photo is λ_1 . The ratio of k_2 / λ_1 is proportional to

A. E^2

B. $E^{1/2}$

C. E^{-1}

D. $E^{-1/2}$

Answer: D

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66. k_a wavelength emitted by an atom of atomic number $E = 11$ is λ find the atomic number for an atomic that amils k_a radiation with wavwlength $43.$

A. $Z = 6$

B. $Z = 4$

C. $Z = 11$

D. $Z = 44$

Answer: A

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67. A photon collides with a stationary hydrogen atom in ground state inolestically . Energy of the order of inicro second another photon collicles with same hydrogen atom indastisically with an energy of $15eV$ what will be observad by the detanctor?

A. One photon of energy $10.2eV$ and an electronof energy $1.4eV$

B. 2 photon of energy of $1:4eV$

C. 2 photon of energy of $10.2eV$

D. One photon of energy $10.2eV$ and another photon of $1.4eV$

Answer: A

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68. A beam of electronis as $YDSE$ experiment . The slit width is d when the velocity of electron is increase , then

A. no interference is observed

B. fringer width increases

C. fringer width decreases

D. fringer width remain same

Answer: C

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69. If a star can convert all the .He nuclei comnpletely into oxigen nucles , the energy released per oxigen nucles is . He nuclease is 4.0026 amu and mass of oxigen nuclease is 15.9994amu]

A. $7.6MeV$

B. $56.12MeV$

C. 10.24 meV`

D. $23.9MeV$

Answer: C

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70. $_(87)^{223}$Ra is a radioactive substance having half life of 4 days Find the problability that a nucleas undergoes after two half lives

A. 1

B. $\frac{1}{2}$

C. $\frac{3}{4}$

D. $\frac{1}{4}$

Answer: C

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71. In the option given below , let E denote the rest mass energy of a nucleas and n a neutron .The correct option is

A. E(_(92)^(236)U) gt$E$(_(92)^(236)I) +E(_(92)^(236)Y) + 2E (n)`

B. E(_(92)^(236)U) lt$E$(_(92)^(137)I) +E(_(39)^(97)Y) + 2E (n)`

C. E(_(92)^(236)U) lt$E$(_(56)^(140)Ba) +E(_(36)^(94)Kr) + 2E (n)`

D. E(_(92)^(236)U) =E(_(56)^(140)Ba) +E(_(94)^(36)Kr) + 2E (n)`

Answer: A

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72. The largest wavelength in the ultraviolet region of the hydrogen spetrum is 122 nm. The samallest wavelength in the infrared ragaion of the hydrogen spetrum (to the nearest integer) is

A. $802nm$

B. $823nm$

C. $1882nm$

D. $1648nm$

Answer: B

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73. Eletrons with de- Broglie wavwlength λ fall on the target in an X- rays tube . The cut off wavelength of the emitted X- rays is

A. lambda_(0) = (2mclambda^(2))/(h)`

B. $\lambda_0 = \frac{2h}{mc}$

C. $\lambda_0 = \frac{2m^2c^2\lambda^3}{h^2}$

D. $\lambda_0 = \lambda$

Answer: A

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74. Which one of the following atatement i9s $WRONG$ in the context of X- rays generated from X- rays tube ?

A. Wevelength of characteristic X- rays decrease when the atomic number of the target increase

B. cot - off wavelength of the contimous X - rays depends on the atomic number of the target

C. Intensity of the characteristic X -rays depend on the electrical power given to the X- rays tube

D. cut - off wavelength of the continous X- rays depends on the energy of the electrons in the X-rays tube

Answer: B

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75. A radioactive sample S_1 having an activity $5\mu Ci$ has twice the number of inucle as another sample S_2 which has as activity of $10\mu Ci$. The half lives of $S_1$and S_2can be

A. $20 years$ and $5 years, respectively$

B. $20 years$ and $10 years, respectively$

C. $10 yearseatch$

D. $5 yearseatch$

Answer: A

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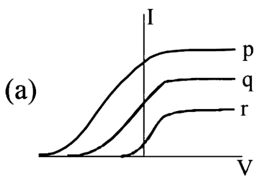
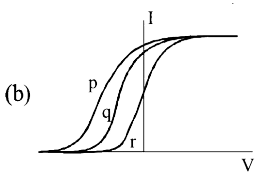
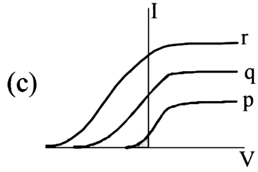
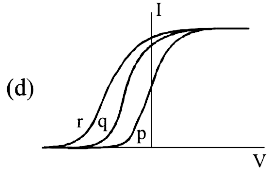
76. photoelectric affect experiments are performer using ther different medal plates p, q and$r$ having work functionphi_(p) = 2.0 eV, phi_(e) = 2.5 eV and phi_(r) = 3.0 eV $respectively A light beam conta \in \in g wave \leq n > h of$ 550nm , 450 nm and 350nm $with equal \int ensities illu$ min $ates each of the plate. The c$ or $rect$1 -V $graph f$ or the exp $eriment is$ [Take hc = 1240 eV nm]`

A. 

B. 

C. 

D. 

Answer: A

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77. The wavelength of the spectral live the Balner series of hydrogen atom is $6561A^\circ$. The wavelength of the second spectralline in the Balmer series of singly - ionized belium atom is

A. $1215A^2$

B. $1640A^2$

C. $2430A^2$

D. $4687A^2$

Answer: A

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78. A pulse of light of duration $100ns$ is alsorbed completely by a small object inillally at rest power of the pulse is $30mW$ and the speed of light is $3 \times 10^8 ms^{-1}$ The final momentum of the object is

A. $0.3 \times 10^{-17} kgms^{-1}$

B. $3.0 \times 10^{-17} kgms^{-1}$

C. $1.0 \times 10^{-17} kgms^{-1}$

D. $9.0 \times 10^{-17} kgms^{-1}$

Answer: B

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79. If $\lambda_{c\mu}$ is the wavelength of $K_a X - raysl \in eof \cap p$ or $(a \to mic\nu mber29)$ and lambda_(Mo) $isthewave \leq n > hofthe$k_(a) $X - raysl \in eofmolynde\nu m(a \to mic\nu mber42)thenratio$lambda_(ca) ^(1 lambda_(Mo)` is close to

A. 1.99

B. 2.14

C. 0.50

D. 0.48

Answer: B

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80. A metal is illumimated by light of two different wavelength $248nm$ and $310nm$. The maximum speeds of the photoelecrtron corresponding in these wavwlength are u_(1) and u_(2)

$respectively. If the ratio u_1 : u_2 = 2 : 1$ and $hc = 1240 eV nm$, the work function of the inetial is rearly

A. $3.7eV$

B. $3.2eV$

C. $2.8eV$

D. $2.5eV$

Answer: A

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81. The electrotatic energy of Z protons uniformly distributed throughout a spherical nucleus of ratio R is given by

$$E = \frac{3Z(Z-1)e^2}{54\pi e_0 R}$$

The measured masses of the neutron $\_(1)^1 H,_7^{15} N$ and $,_8^{15} O are 1.008665u, 1.007825u, 15.000109u$ and 15.0030

repectively Given that the ratio of both the _(7)^(12) N and _(8)^(15) O nu8cles are same , 1 u = = 931.5 Me Vc^(2) $(c is the speed of light)$ and e^(2)//(4 p-i e^_(0)) = 1.44 MeV

$fmAs\sum \in gt\hat{t}hed \Leftrightarrow erencebetweentheb \in d \in ge4 \neq rgiesof$

_(7_^(15) N and _(8)^(15) O ` is puraly due to the electric energy , The radius of the nucleas of the nuclei is

A. $2.85fm$

B. $3.03fm$

C. $3.42fm$

D. $3.80fm$

Answer: C

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82. As accident in a nuclear laboratory resulting in deposition of a certain amount of radioaction radioctive material of half life 18days inside the loboratory Teste revealed that the radiation was 64 times more than the permissible lovel repuered for save operation of the laboratory what is the minimum number of days after which the laboratory can be considered safe for use?

A. 64

B. 90

C. 108

D. 120

Answer: C

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83. The shorted wavelength of X- rays emitted from an X- rays tube depends on

A. the currect in the tube

B. the vollage applied to the tube

C. the nuture of the gas in tube

D. the atomic number of the target material

Answer: B::D

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84. The threshold wavelength for photoelectric from a material is 5200Å photoelectric will be emittillumnated with when this meterial is illiuminated with monecharnatic radiation from a

A. 50watt infrared lamp

B. 1 - watt infra- red lamp

C. 50watt ubraviolet lamp

D. 1 - watt ahraviolet lamp

Answer: C::D

Watch Video Solution

85. from the following equation pick out the possible nuclear fasion reactions

A. $_(6)C^{13} +_1 H^1 \rightarrow_6 C^{14} + 4.3MeV$

B. $_(6)C^{12} +_1 H^1 \rightarrow_7 C^{13} + 2MeV$

C. $_(6)C^{14} +_1 H^1 \rightarrow_6 C^{15} + 7.3MeV$

D. _(92) U^(235) + _(0)n^(1) rarr _(54) Xe^(140) + _(38) st^(94) + _(0)n^(1) + _(0)n^(1) + gamma + 200 MeV`

Answer: B::C

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86. In Both 's model of the hydrogen atom

A. the radius of theorbit is propertional to n^2

B. the total energy of the electron in nth orbit is an propertional to n

C. the engular momentum of the electron in an orbit is an integral mulliple of `(h)/(2 pi)

D. the magnatube of potential energy of the electron in any orbit is grater then in K.E.

Answer: A::C::D

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87. Selected the correct statement from the following

A. A diode can be used as a neclifier

B. A triode connot be used as a recifier

C. the currect is a diode is always propotianal to the applilled vollage

D. The linner porton odf the $1-V$ characteristic of a triode is used for amplification without distortion

Answer: A

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88. for a give a plate voltage , the plate currect in a triode cvalve is maximum when the potential of

A. the grid is positive and plate is negetive

B. the grid is zero and plate is positive

C. the grid is negative and plate is positive

D. the grid is positive and plate is positive

Answer: D

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89. The X- rays beam coming from an X- rays tube will be

A. monuchromatic

B. having all wavwlength smaller than a cortain maximum wavelength

C. having all wavwlength largest than a cortain maximum wavelength

D. having all wavwlength lying between a minimum and a maximum wavelength

Answer: C

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90. The mass number of a nucleus is

A. always less then its number is

B. always more then its number is

C. sometimes equal to its atomic number

D. sometimes more then and sometimes equal to its atomic number

Answer: C::D

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91. photoelectric effect supports quantion nuture of light because

A. ther is a minimum frequency of light below which no photoelectric are emitted

B. the maximum kinetic energy of photo electros depends only on the frequency of light and not on its intesity

C. even on the metal surface is fandly illumnated the photoelectronic leave the surface immedanetely

D. electric charge of the photoelectron is quanized

Answer: A::B::C

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92. Dividing a negative beta dacay

A. as atomic electron is ejection

B. as electron which is already present within the nuclease is ejection

C. a neclues in the nuclease decay emiting an electron

D. a part of the necule the binding energy of the nuclease is converted into an electron

Answer: C

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93. During a nuclear fasion reaction

A. a heavy nuclease break into two fragments by itself

B. a light nucleus bomberded by theremal neutrous breaks up

C. a heavy nucleus bombered by thermal neudrons break up

D. two light nucleus combered by thermal and posibly other product

Answer: D

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94. The potential different applied to an X-rays tube is increase .As a result , in the emitted radiation

A. the intersity increase

B. the minimum wavelength increasres

C. the intencity remain unchanged

D. the minimum wavelength decrease

Answer: C::D

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95. A freshly prepared radioactive source of half life 2 hr emited radiation of intencity which is 64 times the permissibe level . The minimum time after which it would be possible to work safely with this source is

A. $6hr$

B. $12hr$

C. $24hr$

D. $128hr$

Answer: B

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96. impurity atoms with which pure silicon should be doped to make a p - type semiconductor are those of

A. phosphorus

B. boron

C. antimoiny

D. aluminium

Answer: B::D

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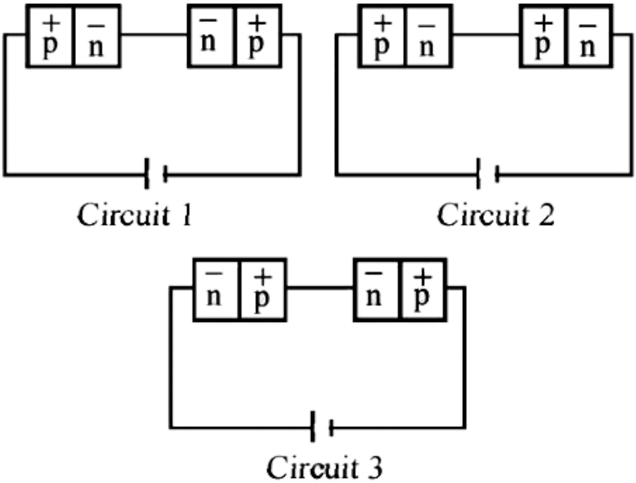
97. Two identical p=- a junctions may be connected in seres in which a bettery in three ways , fig . The potential drops access the two p - n junction are equal in



A. circuit 1 and circuit2

B. circuit 2 and circuit3

C. circuit 3 and circuit1

D. circuit 1 only

Answer: B

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98. The decay constant of a radiaoacation sample is λ . The half life and mean life of the sample are respectively given by

A. $1/\lambda \text{ and } (\in 2)/\lambda$

B. $(\in 2)/\lambda$and 1// lambda `

C. $\lambda(\in 2) \text{ and } 1/\lambda$

D. $\lambda/(\in 2) \text{ and } 1/\lambda$

Answer: B

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99. When a monochromatic point source of light is at a distance of 0.2 m from a photoelectron cell the cut off voltage and the saturation currect are respectively $0.6V$ and $18.0mA$ if the same is plased $0.6m$ away from the photoelectric cell , then

A. the stopping potential will be $0.2Vo <$

B. the stopping potential will be $0.6Vo <$

C. the stopping potential will be $6.0Vo <$

D. the stopping potential will be $2.0Vo <$

Answer: B::D

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100. In an n- p-n transistor cirrect , the collectorcurrect is $10mA$ if 90% of the electrons reach the collector.

A. the emitter currect will be $9mA$

B. the base currect will be $1mA$

C. the emitter currect will be $11mA$

D. the base currect will be $-1mA$

Answer: B::C

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101. A star initially has 10^{40} deuterons it product energy via the process $_(1)H^2 +_1 H^2 + \rightarrow_1 H^3 + p$. and $_(1)H^2 +_1 H^3 + \rightarrow_2 He^4 + n$

If the deuteron supply of the average power radiated by the state is $10^{16}W$, the deuteron supply of the state is exhausted in a time of the order of .

The masses of the nuclei are as follows:

$M\left(H^2\right) = 2.014a\mu,$

`M(p) = 1.007 amu, M(n) = 1.008 amu, M(He^(4)) = 4.001 amu.

A. 10^(6) s.`

B. 10^(8) s.`

C. 10^(12) s.`

D. 10^(16) s.`

Answer: C

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102. photons of energy $4.25eV$ strike the surface of metal A, the ejection photoelectric have maximum kinetic energy $T_A eVe \neq rgy 4.70eV is T_B = (T_A - 1.50)eV$ if the de Brogle wavelength of these photoelec tron is $\lambda_B = 2\lambda_A$, then

A. The work function of $Ais 2.25eV$

B. The work function of $Bis 4.20eV$

C. $T_A = 2.00eV$

D. $T_B = 2.75eV$

Answer: A::B::C

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103. which of the following statement (s) is (are) correct ?

A. The rest mass of a stable nucleus is less then the sum of the rest mases opf its separated niuceons

B. The rest mass of a stable nucleus is greater then the sum of the rest mases opf its separated niuceons

C. in nuclear fission , energy is released by fasing two nuclei of medium mass (approximately $100 a\mu$)

D. in nuclear fission , energy is released by fregmentation of a very heavy nucleus

Answer: A::D

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104. Holes are charge carriers in

A. intrinsic semicondutors

B. ionic solids

C. p- type samiondactors

D. inctals

Answer: B::C

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105. A transister is used in the common emitted mode as no amplifer , Then

A. the base - emitter junction is forward - biassed

B. the base - emitter junction is reverse- biassed

C. the input signal is connected in series with the voltage applied to has the base- emitter junction

D. the input signal is connected in series with the voltage applied to has the base- collector junction

Answer: A::C

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106. Let m_p be the mass of a poton , M_1 the mass of a $\_(10)^{20}Ne$ nucleus and M_2 the mass of a $\_(20)^{40}Ca$ nucleus . Then

A. $M_2 = 2M_1$

B. $M_2 > 2M_1$

C. $M_2 < 2M_1$

D. $M_1 < 10(m_n + m_p)$

Answer: C::D

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107. The electron in a hydrogen atom make a transtion $n_1 \rightarrow n_2$ where n_1 and n_2 are the priocipal quantum number of the two states . Assume the Bohr model to be valid . The time period of the electron in the initial state is eight time that in the state . THe possible values of n_1 and n_2 are

A. $n_1 = 4, n_2 = 2$

B. n_(1) = 8 , n_(2) = 2`

C. n_(1) = 8 , n_(2) = 1 `

D. n_(1) = 6 , n_(2) = 3`

Answer: A::D

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108. The half - liofe of $\hat{}\ (131)1$is days Given a sample of $\hat{}\ (131)1$ at time $t = 0$, we get that

A. no nucleus will decay $t = 4days$

B. no nucleus will decay $t = 8days$

C. no nucleus will decay $t = 16days$

D. a given nucleus may dacay at any time after $t = 0$

Answer: D

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109. In a p- n junction diode not connected to any circuit,

A. the potential is the same everwhere

B. the p- type side is at a bigher potential that the n - type side

C. then is an electric at the junction directed from

D. there is an electric fied at the junction directed from the p- type side to the n - type side

Answer: C

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110. X- rays are produced in an X- rays tube operating at a given accelerating voltage . The wavelength of the contimous X- rays has values from

A. $0 \to \infty$

B. $\lambda_{\min} \to \infty where \lambda_{\min} > 0$

C. $0 \to \lambda_{\max} where \lambda_{mx} < \infty$

D. $\lambda_{\min} \to \lambda_{\max} where 0 < \lambda_{\min} < \to \lambda_{\max} < \infty$

Answer: B

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111. The work function of a substance is $4.0 eV$ The longest wavwlength of light that can cause photoelectron emission from this substance is approximately

A. $540 nm$

B. $400nm$

C. $310nm$

D. $220nm$

Answer: C

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112. The half - life period of a radioactive element X is same as the mean - life time of the another radicoactive electront Y initial both of then the same number of atom . Then

A. X and Y have the same decay rate initial ly

B. X and Y dacay at the same decay rate always

C. Y will dacay at a faster rate then X

D. X will dacay at a faster rate then Y

Answer: C

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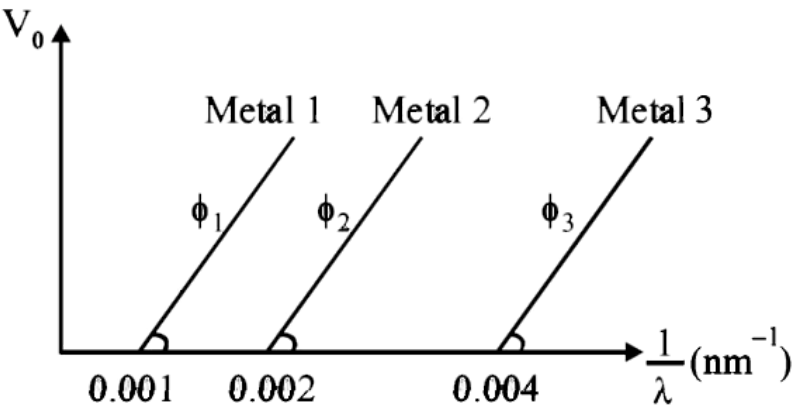
113. The graph between the stopping potential (V_0) and $\left(\frac{1}{\lambda}\right)$ is shown in the figure ϕ_1, ϕ_2 and ϕ_3 are work function , which of the following is //are correct



A. $\phi_1 : \phi_2 : \phi_3 = 1 : 2 : 4$

B. $\phi_1 : \phi_2 : \phi_3 = 4 : 2 : 1$

C. $\tan\theta \propto \frac{hc}{€}$

D. ultravioletight can be used emit photoelectrons from metal 2 and $3only$

Answer: A::C

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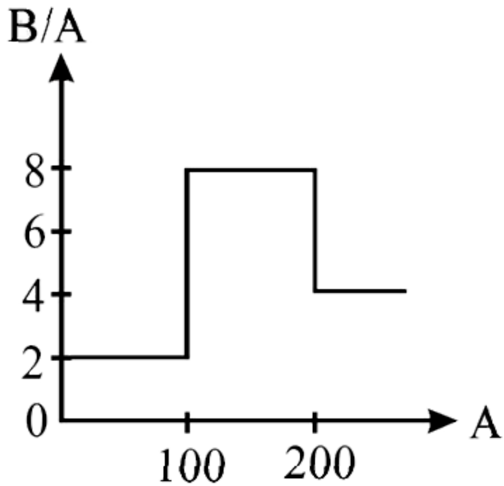
114. Assume that the nucles binding energy per nucleus(B/A) versus mass number (A) is as shown in the figure Use this plate to choose the energy the correct (s) given below



A. fusion of two nucleus with mass number typing in the range of $1 < A < 50$ will release energy

B. fusion of two nucleus with mass number typing in the range of $51 < A < 100$ will release energy

C. fusion of a nucleus typing in the mass of$100 < A < 200$ will release energy when broken into two equal fragments

D. fusion of a nucleus typing in the mass range of$200 < A < 260$ will release energy when broken into two equal fragments

Answer: B::D

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115. The radius of the orbit of an electron in a Hydrogen - like atom is $4.5s_0$ where s_0 is the bohr radius its orbital angular momentum is $\frac{3b}{2\pi}$ it is given that is is plank constant and R is rabdery constant .The possible wavelength (s) , when the atom de- exciter , is (are)

A. $\frac{9}{32R}$

B. $\frac{9}{16R}$

C. $\frac{9}{5R}$

D. $\frac{4}{3R}$

Answer: A::C

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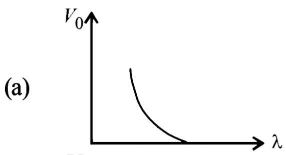
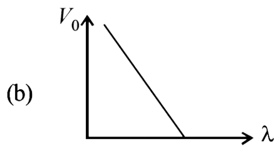
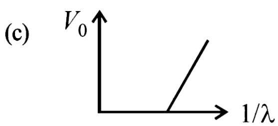
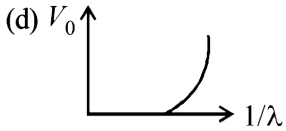
116. For photo - electric effect with incident photo wavelength λ the stopping is V_0 identify the correct variation(s) of V_0 with λ and $1/\lambda$

A. 

B. 

C. 



D.

Answer: A::C

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117. A fission reaction is given by $\_ (92)^{236} U \rightarrow_{54}^{140} Xe +_{38}^{94} St + x + y$, where x and y are two particle Consider $\_ (92)^{236} U$ to be at rest , the kinetic energies of the products are deneted by $k_{xe} K_{st} K_s (2MeV)$ and repectively . Let the binding energy per nucleus of $\_ (92)^{236} U,_{54}^{140} Xe$ and $_{38}^{94} Stbe 7.5 MeV, 8.4 MeV$ and $8.5 MeV$, respectively Considering different conservation laws, the correct sption (s) is (are)

A. $x = n, y = n, K_{St} = 129 MeV, K_{xe} = 86 MeV$

B. $x = p, y = e^{-}, K_{St} = 129 MeV, K_{xe} = 86 MeV$

C. $x = p, y = n, K_{St} = 129 MeV, K_{xe} = 86 MeV$

D. $x = n, y = n, K_{St} = 86 MeV, K_{xe} = 129 MeV$

Answer: A

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118. Hight excited state for hydrogen - like atom (also called rydherg quanitum number n, where ngtgt1 which of the following statement is (are) true?

A. Relative change in the radil of two consecative orbiats does niot depend on Z

B. Relative change in the radil of two consecative orbiats varies as $1/n$

C. Relative change in the energy of two consecative orbiats varies as $1/n^3$

D. Relative change in the angular moments of two consecative orbiats varies as $1/n$

Answer: A::B::D

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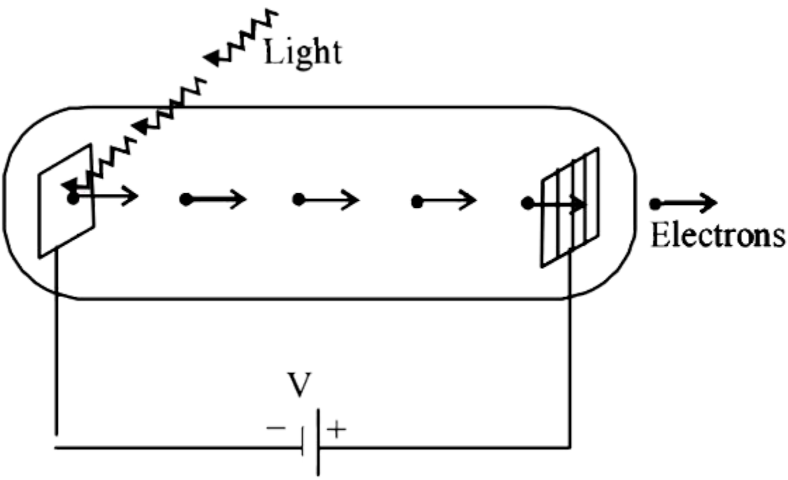
119. Light of wavelength λ_{ph}falls on a plate a vacum teke as shown in the figure .The work function of the conducting meterial kept at a distance d from the cathon A petential different V is maximum between the electrodes if the minimum de Brogle waveleeength of the electrons passing through the anode is λ_e which of the following statement (s) is (are) true?



A. $\lambda_e$decrease with increase in ϕ and λ_{ph}

B. λ_e is approximentily balved , if d is doubled

C. for large potential diffrence $(V > > \phi / e)$. $\Lambda_e$is approximately

halved if V is made four time

D. λ_e increase at the same rate as $\lambda_{ph} f$ or $\lambda_{ph} < hc / \phi$

Answer: C

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120. A single electron orbikt around a stationary nucleus of charge $+Ze$

when Z is a constant and e is the magnitube of the electronic charge if

$47.2 eV excitethee \leq ctronomthe \sec ondbohr$ or $bit \rightarrow thethirdbohhr$ or $\rightarrow thefourthbohr$ or $bit(iii)Thewave \leq n > hofthee \leq ctronmag \neq ti$ $\neq rgypotentiale \neq rgypotentiale \neq rgy$ and $theangarmomentumofthe$ $\neq rgyofhydro \geq na \rightarrow m$

= 13.6 eV $bohrradius$= 5.3 xx 10^(-11) matre$velocityoflight$= 3 xx 10^(8)

m//sec$planks' scons \tan t$ = 6.6 xx 10^(-34)` jules - sec)

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121. Hydrogen atom is ground state is excied by mean of monochromatic radiation of wavelength 975Å How many asume different lines are possible is the resulting spactrum ? Calculate the lorgest energy for hydrogen atom as $13.6eV$

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122. How many electron potons and mass number in a nucleus of atomic number 11 and mass 24?

(i) number of electron = (ii)number of proton = (iii)number of neutrons =

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123. The energy needed to detach the electron of a hydrogen like ion in ground state is a system(a) what is the wavelength of the radiation emitted when the electron jumps from the first excited state to the ground state? (b) What is the radius of the orbit for this atom?

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124. A double ionised lithium atom is hydrogen like with atomic number 3

(i)Find the wavelength of the radiation to excite the electron in Li^{++} from the first to the third bohr orbit (Ionisection energy of the hydrogen atom equals 13.6)

(ii) How many spectral lines are observed in the emission spetrum of the above excled system ?

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125. A triod has plate characteristies in the from of purallet lines in the region of our interest At a given in terms of platevoltage V (in volts) by the algebraic relation

$1 = 0.125V - 7.5$

for grid of - 3 volts is 5 millanpers , determine the plate resistance of(r_(p)) transcondutance (g)and the arrplfication facter (u) for the trid

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126. A particle of charge equal to that of an electron - e, and mass in a clarcus orbita nucleus the charge$+3E$ (Take the mass of the nucleus to be infinite Assuming that the bohr model of the atom is applicable to this system

(i) Derve an expression for the radius of the bohr orbit

(ii) find the value of a which the radius is approtimated the same as that of the bohr orbit fo the hydrogen atome

(iii) find the wavelength of the radiation emitted when the mu- meson jump from the thiord orbit of the first orbit

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127. A gas of identical hydrogen-like atoms has some atoms in the lowest in lower (ground) energy level A and some atoms in a partical upper (excited) energy level B and there are no atoms in any other energy level.The atoms of the gas make transition to higher energy level by absorbing monochromatic light of photon energy $2.7eV$.

Subsequenty , the atom emit radiation of only six different photon energies. Some of the emitted photons have energy $2.7eV$ some have energy more , and some have less than $2.7eV$.

a Find the principal quantum number of the intially excited level B

b Find the ionization energy for the gas atoms.

c Find the maximum and the minimum energies of the emitted photons.

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128. Electrons in hydrogen like atom $(Z = 3)$ make transtion from the fifth is the fourth orbit and from the third orbit The resulting madition are incided nurmally an a meal plate and eject photoelectron the stopping potential for the photoelectron ejected by the longer wavelength

(Rydhery constant $= 1.094 \times 10^7 m^{-1}$

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129. It is propssed to use the nucles fasion

$_(1)^2 H +_1^2 H \rightarrow_2^4 He$

in a nucleas of $200MW$ rating if the energy from the above reaction is used with a 25 per cast effecincy in the rector , low maney game of deuterium fiel will be needed per day (The masses of $\_(1)^2 H$ and $^2_4 Heare 2.0141$atomic mass unit and 4.0028atyomic mass uniot repertively)

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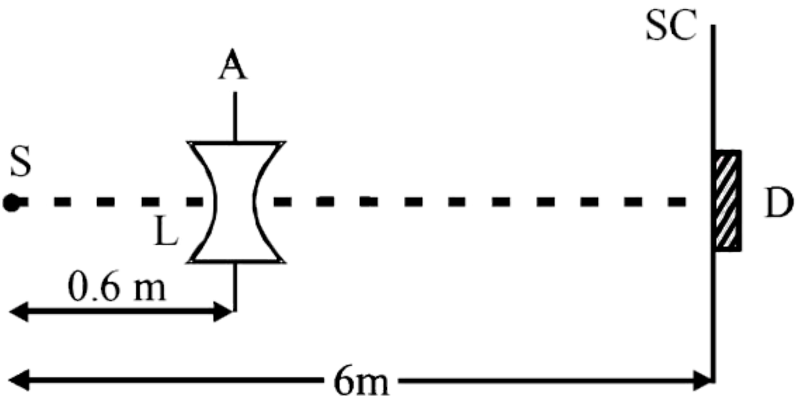
130. A monochormatic point source radiating wavelength 6000Å with power 2 vate an aperture A of diameeter $0.1m$ and a lorge screen SC are placed as shown in fig, A photoemissive detector D of surface area $0.5cm^2$ is placed at the centre of the screen . The efficiency of the detector for the photoelectron generation per incident photon is 0.9



(a) Calculate the photon flat at the centre of the screen and the photocurrwect in the detector.

(b) If the concave lens L of focal length 0.6 m is inserted in the aperture as shown . find the new values of photon flot and photocurrect Assume a uniform average transmission of 80% from the lens .

(c) If the work function of the photoemissive surface is $1eV$. calculate the values of the stopping potential in the two cases (within and with the lelens in the epertuire).

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131. A nucleus X, initially at rest , undergoes alpha dacay according to the equation ,

$$\_\ (92)^{A} X \rightarrow_{2}^{228} Y + a$$

(a) Find the value of A and Z in the above process.

(b) The alpha particle producted in the above process is found to move in a circular track of radius $0.11m$ in a uniform mmagnatic field of 3 Tesia find the energy (in MeV) released during the process and the binding energy of the patent nucleus X

Given that : $m(\gamma) = 228.03u, m\left(\_\ (0)^{1}\right) = 1.0029u.$

$m\left(\_\ (2)^{4} He\right) = 4.003u, m\left(\_\ (1)^{1} H\right) = 1.008u$

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132. Light from a discharge tube containing hydrogen atoms falls on the surface of a piece of sodium . The kinetic energyof the fastest photonelectrons emittede from from sodium is $0.73eV$. The work function for sodium is $1.82eCV$ find

(a) the energy of the photons causing the photoelectric emission ,

(b) the quantum number of the two level inveloved in the emission of there photons,

(c) the change in the angular momentum of the electron in the hydrogen atom in the above transition and,

(d)the recoll speed of emitted atom assuming it to be at rest before the transition.

(Ionization potential of hydrogen is $13.6 eV$)

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133. A small quantity of solution containing Ne^{24} radio nucliode (half life $= 15 hour$) of activity 1.0 microcurlar is injected into the blood of a person A sample of the blood of volume $1 cm^3$ taken a after 5 hour shown an activity of the blood in the body of the person . Assume that redicative solution mixed uniformly in the blood of the person $(1 curie = 3.7 \times 10^{10}$ disntegrations per sound)

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134. A hydrogen like atom (atomic number Z) is uin a higher excleted atate of quantum n , The excited atom can make a two photon of energy 10.2 and $17.0eV$ respactively , Alernately the atom from the same excited state by successively eniting two photons of energies $4.25eV$ and $5.95eV$ respectively

Determine the value of n and Z (Ionization energy of H- atom $= 13.6eV$)

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135. As electron in a hydrogen - like atom , is in an excited state it has a total energy of $-3.45eV$ Calculate (i) the kinetyic energy and (ii) the de Brogle wavelength of the electron.

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136. As a given instant there are 25% undercayed radio - active nucles in az sample . After 10 second the number of undecayed nucles reduces to 12.5% Calculate (i() mean - like of the nucleus, and (ii) the time in which the number of undecayed nuclei will further to 6.25% of the reducted number .

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137. Assume that the de Brogie wave associated with an electron can can from a standing wave between the atome arrange in a one dimensional array with nodes at each of the atomic sites it is found that one such standing wave if the distance d between the aloms of the arry is $2M139waveisaga \in f \text{ or } mad \text{ if } dis \in creased \rightarrow$ 2.5Å` . A similar standing in the distance if d find the energy of the electrons velts and tghe least value of d for which the standing wave type described above can from .

Watch Video Solution

138. The elecron curium $\_(96)^{248}$ On has a mean life of 10^{13} second ist pirmary dacay mode with a probilly of 8% and the letter with a probillty of 92% Each fission released $200MeV$ of energy . The masses involved in a - dacay are as follows

$\_(96)^{248}Cm = 248.072220u$,$_{94}$ $(244) Pu = 244.064100u$ and $^4_2He = 4.002603u$

calculate the power output from a sample of

$10^{20}Cma \rightarrow m(1u = 931MeV/e^2)$

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139. Nuclei of a radioactive A are being produceted at a constant rate a . The electro has a decay constant λ . At time $t = 0$ there are N_0nucleius of the element .

(a) calculate the number N of nuclei of A at same t

(b) if a = 2N_(0) lambda) $calc\underline{a}tethe\nu mberofvc \leq iof$A $aftero \neq half - l$ if eofA and the lim $it \in gvalueof$Nast rarr oo`

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140. photoelectrons are emited when $40nm$ radiation is incident on a surface of work function $1.9eV$ These photoelectron pass tjhrough a ragain cotaining a - particle A maximum energy electron conbines with an a - particle to from a He^{+} ion emitting a single photon in this process He^{+} ions thus formed are in their fourth excited state find the energies in eV of the photons typing is the 2 to $4eV$ rage, that are likrly to be emitted during and after the combiution $\left[Takeh = 4014 \times 10^{-15} eVs\right]$

Watch Video Solution

141. A hydrogen - like atom of atomic number Z is in an excited state of quantion number $2n$ it can emit a maximum energy photon of energy $40.8eVisemiedf \in dn, Z$ and $thegroundstatee \neq rgy(\in eV)f$ or $thisa - exclation, Groundstatee \neq rgyofhydro \geq na \rightarrow mis - 13.6eV$

Watch Video Solution

142. when a beam of $10.6eV$ photons of intensity $2.0W/m^{2}$ falls on a platinum surface of area $1.0 \times 10^{4}m^{2}$ and work function $5.6eV, 0.53\%$ of the incidentphotons eject photoelectrons find the number of photoelectrons emited per second and their minimum energies (in eV)Take $1eV = 1.6 \times 10^{-19}J$

Watch Video Solution

143. In a nuclear reaction $\hat{}(235)Undergoesfissionliberat \in g$200 MeV $e \neq rgy. Thereac \rightarrow rhasa$10 $\%efficiency$ and $\prod uces$1000 MW power . If the reactor is to function for 10year . Find the total mass of required .

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144. A nucleus at rest undergoes a decay emitting an a particle of de - Broglie wavelength $\lambda = 5.76 \times 10^{-15} m$ if the mass of particle is $4.002 a\mu$, determine the total kinetic energy in the final state Hence , obratain the mass of the parent nucleus in amu (1 amu = 931.470 MeV//e^(2))`

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145. A radioactive nucleus Xdecay to a nucleus Y with a decay with a decay Concept $\lambda_x = 0.1 s^{-1}$, γ further decay to a stable nucleus Z with a decay constant $\lambda_y = 1/30s^{-1}$ initialy, there are only X nuclei and their number is $N_0 = 10^{20}$ set up the rate equations for the population of $X^{9})Y$ and Z The population of Y nucleus as a function of time is givenby

$N_y(1) = N_0\lambda_x l(\lambda_x - \lambda_y))(\exp(-\lambda_y 1))F \in dthetimeatwhich$N_(y)

$is \max i\mu m$ and $\det er \min ethepop \underline{*}_ ion$X and Y` at that instant.

Watch Video Solution

146. A hydrogen - like atom (described by the Bohr model) is observed to emit six wavelength , originating from all possible transitions between $-0.85eV$ and $-0.544eV$ (inclading bohr these values)

(a) Find the atomic number of the atom

(b) Calculate the smallest wavelength emitted in these transitions .

(Take $hc = 1240)eV - nm$, ground state energy of hydrogen atom $= 13.6eV)$

Watch Video Solution

147. Two metallic plate A and B , each of area $5 \times 10^{-4} m^2$, are placed parallel to each at a separation of $1cm$ plate B carries a positive charge of $33.7 \times 10^{-12} C$ A monocharonatic beam of light , with photoes of energy $5eV$ each , starts falling on plate A at $t = 0$ so that 10^{16} photons fall on it per sqare mater for every 10^6 incident photons fall on it per square meter per second Assume that one photoelectron is emitted for every 10^6 incident photons . Also assume that all the emitted photoelectron are collected by plate B and the work function of plate A remain constant at the value $2eV$ Determine

(a) the number of photoelectrons emitted up to $i = 10s$,

(b) the magnitude of the electron field between the plate A and B at $i = 10s$, and

(c) the kinetic energy of the most energotic photoelectrons emitted at $i = 10s$ whenit reaches plate B

Negilect the time taken by the photoelectrons to reach plate $BTake \varepsilon_0 = 8.85 \times 10^{-12} C^2 N - m^2)$

Watch Video Solution

148. frequency of a photon emitted due to transition of electron of a cerrain element from $L \rightarrow K$shell is found to be $4.2 \times 10^{18} Hz$ using moseley 's law, find the atomic number of the element , given that the Rydberg's constant R = 1.1 xx 10^(7) m^(-1)`

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149. A radioative sample emit $n\beta$ - particle is 2 sec , in next $5eV$ sec $itemit$ 0.75 n beta`- particle , what is the mean life of the sample?

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150. In a photon electric experiment set upm , photons of energy $5eV$ falls on the cathode having work function $3eV$ (a) if the seturation current is $i = 4\mu A$ for intensity $10^{-5} W/m^2$, then plot a graph between anode potential and current (b) Also draw a graph for intensity of incident radiation $2 \times 10^{-5} W/m^2$

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151. A radoactive sample of $\hat{}(238)U$ decay to pb through a process for which the half is 4.5×10^9 year Find the rate of number of nuclei of $pb \rightarrow^{238} U$after a time of 1.5×10^9 year Given $(2)^{19} = 1.26$

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152. The photons from the balmer series in Hydrogen spectrum having wavelength between $450nm$ to $700nm$ are incident on a metal surface of work function $2eV$ find the maximum kinetic energy os ejected electron (Given hc = 1242 eV nm)`

Watch Video Solution

153. The potential energy of a particle of mass m is given by

$V(x) =$ lambda_(1) and lambda_(2)

$arethede - Brog \le wave \le n > hoftheparti c \le , when$= lex le 1 and xgt 1$repectively,\quad \text{if} \quad the \rightarrow tale \neq rgyofpartic \leq is2$ E_(0) find

λ_1 / λ_2

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154. Highly energetic electron are bombarded in a target of an element containing 30 neutrons Tne ratio of nucleus to that of Helium nucleus is $(14)^{1/3}$. Find (a) atomic number of the nucleus (b) the frequency of k_a line of the X- rays producted $\left(R = 1.1 \times 10^7 m^{-1} \text{ and } c = 3 \times 10^8 m/s\right)$

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155. In hydrogen - like atom $(z = 1)$ with line of Lyman series has wavelength λ the de - broglie's wavelength of electron in the level from which it originated is also λ Find the value of n ?

Watch Video Solution

156. In a mixture of $H - He^{+}$ gas ($He +$ is singly ionized He atom), H atom and $He +$ ions are excited to their respective first sxcited state subequendy H atoms transfer their total excilation energy to $He +$ ions (by collsions) Assume that the bohr model of atom is exactly veld.

The questum number n of the state fnally populand in He^{+} inos is -

A. 2

B. 3

C. 4

D. 5

Answer: C

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157. In a mixture of $H - He^{+}$ gas ($He +$ is singly ionized He atom), H atom and $He +$ ions are excited to their respective first sxcited state subequendy H atoms transfer their total excilation energy to $He +$ ions (by collsions) Assume that the bohr model of atom is exactly veld.

The wavelength of light emitted in the visible region by $He +$ Ions after collisions with H atoms is -

A. $6.5 \times 10^{-7} m$

B. $3.6 \times 10^{-7} m$

C. $4.8 \times 10^{-7} m$

D. $4.0 \times 10^{-7} m$

Answer: C

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158. In a mixture of $H - He^{+}$ gas ($He +$ is singly ionized He atom), H atom and $He +$ ions are excited to their respective first sxcited state subequendy H atoms transfer their total excilation energy to $He +$ ions (by collsions) Assume that the bohr model of atom is exactly veld.

The ratio of the kinetic energy of the $n = 2$ electron for the H atom to the of He^{+} Ion is -

A. 14

B. $1/2$

C. 1

D. 2

Answer: A

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159. Scienists are working hard to develop inclear fusion reactor Nocies of heavy hydrogen, $_(1)^2H$, known as deuteron and denoted by D, can be thought of as a candidate for fusion rector . The $D-D$ reaction is $_(1)^2H +_1^2 H \rightarrow_2^1 He + n + e \ne rgy$ in the core of fasion reactor a gas of heavy hydrogen of $_(1)^2H$ nucles and electrons is know as plasma . The nuclei move randonity in the reactor to take place Unally , the temperature in the reactor core are too ligh and to natrual will can be used to confine the to pleama for a time l_(0) before the particles by away from the case if n is the denasity (number volume) of determines , the product$nt_0$is called Lavson number in one of the criteria , a reactor is termed successful if Lawson number is greater then $5 \times 10^{14} s / cm^2$

it may be helpfull to use the following botczmann constant

$\lambda = 8.6 \times 10^{-5} eV / k, \frac{e^2}{4\pi s_0} = 1.44 \times 10^{-9} eVm$

in the cure of nucleus fusion reactor , the gas become plasma because of

A. strong nucleus force acting between the deuterons

B. coulomb force acting between the deuterons

C. coulmb force acting between deuteron - ecectron pairs

D. the hight temperature maintained inside the reactor

Answer: D

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160. Scienists are working hard to develop inclear fusion reactor Nocies of heavy hydrogen, $\_(1)^2 H$, known as deuteron and denoted by D, can be thought of as a candidate for fusion rector . The $D - D$ reaction is $\_(1)^2 H +_1^2 H \rightarrow_2^1 He + n + e \neq rgy$ in the core of fasion reactor a gas of heavy hydrogen of $\_(1)^2H$ nucles and electrons is know as plasma . The nuclei move randonity in the reactor to take place Unally , the temperature in the reactor core are too ligh and to natrual will can be used to confine the to pleama for a time l_(0) before the particles by away from the case if n is the denasity (number volume) of determines , the product$nt_0$is called Lavson number in one of the criteria , a reactor is termed successful if Lawson number is greater then $5 \times 10^{14} s / cm^2$

it may be helpfull to use the following botczmann constant

$\lambda = 8.6 \times 10^{-5} eV / k, \dfrac{e^2}{4\pi s_0} = 1.44 \times 10^{-9} eVm$

Assume that two deuteron nuclei in the core of fasion reactor at temperacture energy T are moving toward each other, each with kinectic energy $1.5kT$, whenn the seperation between them is large enogh to leglect coulomb potential energy . Also neglate any interaction from other particle in the core . The minimum temperature T required for them to reach a separation of $4 \times 10^{-15} m$ is in the range

A. $1.0 \times 10^9 K < T < 2.0 \times 10^9 K$

B. $2.0 \times 10^9 K < T < 3.0 \times 10^9 K$

C. $3.0 \times 10^9 K < T < 4.0 \times 10^9 K$

D. $4.0 \times 10^9 K < T < 5.0 \times 10^9 K$

Answer: A

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161. Scienists are working hard to develop inclear fusion reactor Nocies of heavy hydrogen, $_(1)^2 H$, known as deuteron and denoted by D, can be thought of as a candidate for fusion rector . The $D - D$ reaction is $_(1)^2 H +_1^2 H \rightarrow_2^1 He + n + e \neq rgy$ in the core of fasion reactor a gas of heavy hydrogen of $_(1)^2 H$ nucles and electrons is know as plasma . The nuclei move randonity in the reactor to take place Unally , the temperature in the reactor core are too ligh and to natrual will can be used to confine the to pleama for a time l_(0) before the particles by away from the case if n is the denasity (number volume) of determines , the product$nt_0$is called Lavson number in one of the criteria , a reactor is termed successful if Lawson number is greater then $5 \times 10^{14} s / cm^2$ it may be helpfull to use the following botczmann constant

$\lambda = 8.6 \times 10^{-5} eV / k, \dfrac{e^2}{4\pi s_0} = 1.44 \times 10^{-9} eVm$

Result of calulations for fopur different desine of a fasion reactor using $D-D$ reaction are given below which of these is most promising based on Lawson crierion ?

A. deuteron density $=2.0\times10^{12}cm^{-3}$,

confinement time $=5.0\times10^{-3}s$

B. deuteron density $=8.0\times10^{14}cm^{-3}$,

confinement time $=9.0\times10^{-1}s$

C. deuteron density $=4.0\times10^{23}cm^{-3}$,

confinement time $=1.0\times10^{-11}s$

D. deuteron density $=1.0\times10^{24}cm^{-3}$

confinement time $=4.0\times10^{-12}s$

Answer: B

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162. When a particle is restricted to move along x- axis between $x = 0$ and $x = 4$ whwre a is opf nanometer demension , its energy can take only certain spscfic values . The allowed energies of the particles only in such a restiricted regain , correspond to the formation of standing wave with nodes at its end $x = 0$ and $x = a$.The wavelength of this standing wave is related to the linear momentum p of the paarticle according to the de Broglie relation .The energy of the particle of mass m is reated to its linear momentum as

$E = \frac{p^2}{2m}$. thus , the energy of the particle can be denoted by a quantum number n taking value $1, 2, 3, ...$ $(n = 1, cal \leq dthegroundstate)$ corresponding to the number of loops in the standing wave use the model described above to answer the following there question for a particle moving in the line $x = 0 \to x = aTakeh = 6.6 \times 10^{-34} Js$ and $e = 1.6 \times 10^{-19} C$

The alloewd energy for the particle for a particular value of n is proportional to

A. a^{-2}

B. $a^{-3/2}$

C. a^{-1}

D. a^{2}

Answer: A

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163. When a particle is restricted to move along x- axis between $x = 0$ and $x = 4$ whwre a is opf nanometer demension , its energy can take only certain spscfic values . The allowed energies of the particles only in such a restiricted regain , correspond to the formation of standing wave with nodes at its end $x = 0$ and $x = a$.The wavelength of this standing wave is related to the linear momentum p of the paarticle according to the de Broglie relation .The energy of the particle of mass m is reated to its linear momentum as

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corresponding to the number of loops in the standing wave use the model described above to answer the following there question for a particle moving in the line $x = 0 \rightarrow x = aTakeh = 6.6 \times 10^{-34} Js$ and $e = 1.6 \times 10^{-19} C$

If the mass of the particle is $m = 1.0 \times 10^{-30} kg$ and $a = 6.6 nm$ the energyof the particle in its ground state is closest to

A. $0.8 meV$

B. $8 meV$

C. $80 meV$

D. $800 meV$

Answer: B

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164. When a particle is restricted to move along x- axis between $x = 0$ and $x = 4$ whwre a is opf nanometer demension , its energy can take only certain spscfic values . The allowed energies of the particles only in such a restiricted regain , correspond to the formation of standing wave with nodes at its end $x = 0$ and $x = a$.The wavelength of this standing wave is related to the linear momentum p of the paarticle according to the de Broglie relation .The energy of the particle of mass m is reated to its linear momentum as

$E = \frac{p^2}{2m}$. thus , the energy of the particle can be denoted by a quantum number n taking value $1, 2, 3, \dots. (n = 1, cal \leq dthegroundstate)$ corresponding to the number of loops in the standing wave use the model described above to answer the following there question for a particle moving in the line $x = 0 \to x = aTakeh = 6.6 \times 10^{-34} Js$ and $e = 1.6 \times 10^{-19} C$

The speed of the particle , that can take discrete values, is propotional to

A. $n^{-3/2}$

B. n^{-1}

C. $n^{1/2}$

D. n`

Answer: D

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165. The key feature of Bohr'[s spectrum of hydrogen atom is the quantization of angular momentum when an electron is revolving around a proton we will extend this to a general rotational motion to find quntized rotantized rotational energy of a diatomic molecule assuming it to be right . The rate to energy applied is Bohr's quantization condition

A diatomic molecute has moment of inertie 1by Bohr's quantization condition its rotational energy in the n^{th} level $(n = 0is \neg allowed)$is

A. $\frac{1}{n^2}\left(\frac{h^2}{8\pi^2 1}\right)$

B. $\frac{1}{n}\left(\frac{h^2}{8\pi^2 1}\right)$

C. $n\left(\frac{h^2}{8\pi^2 1}\right)$

D. $n^2\left(\frac{h^2}{8\pi^2 1}\right)$

Answer: D

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166. The key feature of Bohr'[s spectrum of hydrogen atom is the quantization of angular momentum when an electron is revolving around a proton we will extend this to a general rotational motion to find quntized rotantized rotational energy of a diatomic molecule assuming it to be right . The rate to energy applied is Bohr's quantization condition it is found that the excitation from ground to the first excited state of rotation for the CO molecule is close to $\frac{4}{\pi} \times 10^{11} Hz$ then the moment of inertia of CO molecule about its center of mass is close to

$\left(Take h = 2\pi \times 10^{-34} Js\right)$

A. $2.76 \times 10^{-46} kgm^2$

B. $1.87 \times 10^{-46} kgm^2$

C. $4.67 \times 10^{-47} kgm^2$

D. $1.17 \times 10^{-47} kgm^2$

Answer: B

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167. The key feature of Bohr'[s spectrum of hydrogen atom is the quantization of angular momentum when an electron is revolving around a proton we will extend this to a general rotational motion to find quntized rotantized rotational energy of a diatomic molecule assuming it to be right . The rate to energy applied is Bohr's quantization condition

In a CO molecule, the distance between $C(mass = 12a.m.u)$ and $O(mass = 16a.m.u)$ where 1 a.m.u = (5)/(3) xx 10^(-27) kg , `is close to

A. $2.4 \times 10^{-10} m$

B. $1.9 \times 10^{-10} m$

C. $1.3 \times 10^{-10} m$

D. $4.4 \times 10^{-11} m$

Answer: C

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168. The $\beta - decay$ process , discoverwd around 1900 , is basically the decay of a neutron (n) in the laboratory , a proton (p) and an electron $\left(e^{-}\right)$ are observed as the decay that the kinetic energy of the electron should be a constant . But experimentally , if was observed that the electron kinectic energy has continuous spectrum Considering a three-body decay process , i.e.

$n \rightarrow p + e^{-} + \bar{\nu}_e,$ around 1930 , pauli expained the observed $(\bar{\nu}_e)$ to be massaless and possessing negligible energy , and the neutrino to be at rest , momentum and energy conservation principle are applied from this calculate , the maximum kinectic energy of the electron is $0.8 \times 10^6 eV$

The kinectic energy carrect by the proton is only the recoil energy

If the - neutrono had a mass of $3eV / c^2$ (where c is the speed of light) insend of zero mass , what should be the range of the kinectic energy K. of the electron ?

A. $0 \leq k \leq 0.8 \times 10^6 eV$

B. $3.0eV \leq k \leq 0.8 \times 10^6 eV$

C. $3.0eV \leq k \leq 0.8 \times 10^6 eV$

D. $0 \leq k \leq 0.8 \times 10^6 eV$

Answer: D

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169. The $\beta - decay$ process , discoverwd around 1900 , is basically the decay of a neutron (n) in the laboratory , a proton (p) and an electron (e^{-}) are observed as the decay that the kinetic energy of the electron should be a constant . But experimentally , if was observed that the electron kinectic energy has continuous spectrum Considering a three-body decay process , i.e.

$n \rightarrow p + e^{-} + \bar{\nu}_e,$ around 1930 , pauli expained the observed $(\bar{\nu}_e)$ to be massaless and possessing negligible energy , and the neutrino to be at rest , momentum and energy conservation principle are applied from this calculate , the maximum kinectic energy of the electron is $0.8 \times 10^6 eV$ The kinectic energy carrect by the proton is only the recoil energy

What is the maximum energy of the anti-neutrino ?

A. zero

B. Mach less then $0.8 \times 10^6 eV$

C. Nearly $0.8 \times 10^6 eV$

D. Mach large then $0.8 \times 10^6 eV$

Answer: C

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170. STATEMENT - 1

If the accelerating potential in an X - rays tube is increased, the wavelength of the characteristic X- rays do not change .

STATEMENT -2

When an electron beam strikes the target in an X- rays tube, part of the kinectic energy is converted into X - rays energy .

A. Statement - 1 is true , Statement -2 is true Statement -2 is a correct explanation for Statement - 1

B. Statement - 1 is true , Statement -2 is true Statement -2 is a NOT a correct explanation for Statement - 1

C. Statement - 1 is true , Statement -2 is false

D. Statement - 1 is false , Statement -2 is true

Answer: B

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171. An α- particle and a proton are accelerated from rest by a potential difference of 100V. After this, their de-Broglie wavelengths are λ_a and λ_p respectively. The ratio $\frac{\lambda_p}{\lambda_a}$, to the nearest integer, is.

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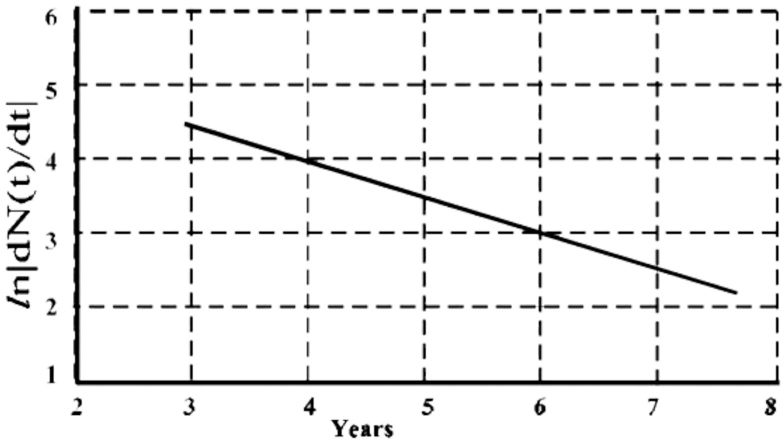
172. To determine the half life of a radioactive element , a student plot a graph of in $\left|\frac{dN(t)}{dt}\right|$ versus t , Here $\left|\frac{dN(t)}{dt}\right|$ is the rate of radiation decay at time t , if the number of radioactive nuclei of this element decreases by a factor of p after 4.16year the value of p is



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173. The activity of a freshly prepared radioactive sample is 10^{10} disintegrations per second , whose mean life is $10^9 s$ The mass of an atom of this radioisotope is $10^{-25} kg$ The mass (in mg) of the radioactive is

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174. A silver of radius $1cm$ and work function $4.7eV$ is suspended from an insulating thread in freepace it is under continuous illumination of

$200nm$ wavelength light AS photoelectron are emitted the sphere gas charged and acquired a potential . The maximum number of photoelectron emitted from the sphere is $A \times 10^{e} (where 1 < A < 10)$ The value of z is

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175. A proton is first from very loward a nucleus with charge $Q = 120e$, where e is the nucles The de Brogle wavelength (in unit of fin) of the proton at its start is (tke the proton mass , $m_p = (5/3) \times 10^{-27} kgh/s = 4.2 \times 10^{-15} Js/C$, $\frac{1}{4\pi s_0} = 9 \times 10^{9} m/F, 1fm = 10^{-15} m$

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176. The work function of Silver and sodium are $4.6 \text{ and } 2.3eV$, respectively . The ratio of the slope of the stopping potential versus frequency plot for silver to that of sodium is

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177. A fresbly prepared of a radioisotope of half - life $1386s$ has activety 10^3 disentegrations per second Given that ln $2 = 0.693$ the fraction of the initial number of nuclei (expressedin nearest integer percentage) that will decay in the first $80s$ after preparation of the sample is

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178. A nuclear power supplying electrical power to a villages uses a radioactive meterial of half life T year as the fiel . The amount of fuel at the beginning is such that the total power requirement of the village is 12.5% of the electrical power available from the plate at that time if the plate is able to meet the total power needs of the village for a maximum period of nT year , then the value of n is

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179. Consider a hydrogen atom with its electron in the n^{th} orbital An electomagnetic radiation of wavelength $90nm$ is used to ionize the atom . If the kinetic energy of the ejected electron is $10.4eV$, then the value of $nis(hc = 1242eVmn)$

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180. For a radioactive meterial , its activity A and rate of charge of its activity R are defined as $A = -\frac{dN}{dt}$ and $R = \frac{dA}{dt}$ where $N(t)$ is the number of nuclei at time I .Two radioactive source $P(meanl \text{ if } e\tau)$ and $Q(meanl \text{ if } e2\tau)$ have the same activity at $t = 2\tau R_p$ and R_Q respectively , if $\frac{R_p}{R_Q} = \frac{n}{e}$

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181. An electron is an excited state of Li^{2+} ion angular mometum $3b/2\pi$. The de Broglie wavelength of the electron in this state is $p\pi s_0(wherea_0$ is the bohr radius) The value of p is

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182. The isotope $_(5)^{12}B$ having a mass $12.014 u undergoes \beta - decay \rightarrow_6^{12} C_6^{12} C$has an excited state of the nucleus $\left(_(6)^{12}C^* at 4.041 MeV\right.$ above its ground state if $_(5)^{12}E decay \rightarrow_6^{12} C^*$, the maximum kinetic energy of the $\beta - partic \leq$ in unit of $MeV is \left(1u = 931.5 MeV / c^2\right.$ where is the speed of light in vacume) .

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183. A hydrogen atom in its ground state is by light of wavelength $970 Å Tak \in ghc / e = 1.237 \times 10^{-6} eVm$ and the ground state energy of hydrogen atom as $-13.6 eV$ the number of lines present in the emmission spectrum is

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184. If $13.6eV$ energy is required to ionized the hydrogen atom, then the energy required to remove an electron from $n = 2$ is

A. $10.2eV$

B. $0eV$

C. $3.4eV$

D. $6.8eV$

Answer: C

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185. At absolute zero , Si acts as

A. non - metal

B. metal

C. insulator

D. none of these

Answer: C

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186. At a specific instant emission of radioactive compound is deflected in a magnetic field. The compound cannot emit

A. I,ii,iii

B. I,ii,iii,iv

C. iv

D. ii,iii

Answer: A

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187. Sodium and copper have work functions $2.3eV$ and $4.5eV$ respectively . Then the ratio of the wavelength is nearest

A. $1:2$

B. $4:1$

C. $2:1$

D. $1:4$

Answer: C

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188. Formation of covelent bonds in compound exhibits

A. wave nature of electron

B. particle nature of electron

C. bohr wave and particle nature of electron

D. none of these

Answer: A

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189. If N_0 is the original mass of the substance of half - life period $t_{1/2} = 5 year$ then the amount of substance left after 15 year is

A. $N_0/8$

B. $N_0/16$

C. $N_0/2$

D. $N_0/4$

Answer: A

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190. By increasing the temperature , the specific of a conductor and a semiconductor

A. increases for both

B. decrases for both

C. increases, decreases

D. decreases , increases

Answer: C

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191. The energy band gap is maximum in

A. metals

B. superoonductors

C. insulators

D. semiconductors

Answer: C

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192. The part of a transistor which is most heavily doped to product large number of majority carriers is

A. emmiter

B. base

C. collector

D. can be any of the above three

Answer: A

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193. which of the following are not electromagnetic waves ?

A. cosmic rays

B. $\Gamma rays$

C. $\beta - rays$

D. X- rays

Answer: C

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194. A strip of copper and another of germanium are cooled from room tempreature to $80K$ The resistance of

A. each of these decreases

B. copper strip increase and that of germanium decreases

C. copper strip increase and that of germanium increase

D. each of these increase

Answer: C

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195. Which of the following radiation has the least wavelength ?

A. $\lambda - rays$

B. $\beta - rays$

C. $a - rays$

D. $X - rays$

Answer: A

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196. which a U^{238} nucleus original at rest , decay by emitting an alpha particle having a speed u , the recoil speed of the residual nucleus is

A. $\frac{4u}{238}$

B. $-\frac{4u}{234}$

C. $\frac{4u}{234}$

D. $-\frac{4u}{238}$

Answer: C

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197. The difference in the variation of resistence with temperature in a metel and a semiconductor arises essmially due to the difference in the

A. crystal sturcture

B. variation of the number of change carriers with tempeature

C. type of bonding

D. variation of scattaring mechanism with temperature

Answer: B

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198. A radioactive sample at any instant has its disintegration ratye 5000 disintegrations per minute After 5 minutes , the rate is 1250 disintegration per Then , the decay constant (per minute)

A. $0.4 \in 2$

B. $0.2 \in 2$

C. $0.1 \in 2$

D. $0.8 \in 2$

Answer: A

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199. A nucleus with $Z = 92$ emits the following in a sequence

$a, \beta^{-}, \beta^{-} a, a, a, a, a, \beta^{-}, \beta^{-}, a, \beta^{+}, \beta^{+}, a$

Them Z of the resulting nucleus is

A. 76

B. 78

C. 82

D. 74

Answer: B

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200. Two identical photocathodes receive light of frequency f_1 and f_2 if the velocites of the photo electrons (of mass m) coming out are repectively v_1 and v_2 then

A. $v_1^2 -$ v_(2) ^(2)= (2h)/(m) (f_(1) - f_(2))`

B. $v_1 + v_2 = \left[\frac{2h}{m}(f_1 + f_2)\right]^{1/2}$

C. $v_1^2 +$ v_(2) ^(2)= (2h)/(m) (f_(1) + f_(2))`

D. $v_1 + v_2 = \left[\frac{2h}{m}(f_1 - f_2)\right]^{1/2}$

Answer: A

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201. Which of the following cannot be emited by radicative subsstances durind their decay ?

A. protons

B. Neutroes

C. Helium nuclei

D. Elactrons

Answer: A

Watch Video Solution

202. In the nuclear fusion reaction

$_(1)^2 H +_1^3 H \rightarrow_2^4 He + n$

given that the repulsive potential energy between the two nuclei is $-7.7 \times 10^{-14} J$, the temperature at which the gases must be beated the reaction is nearly

[Boltzmann's constant $k = 1.38 \times 10^{-23} J/K]$

A. $10^7 K$

B. $10^5 K$

C. $10^3 K$

D. $10^9 K$

Answer: B::D

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203. Which of the following atoms has the lowest ionization potential ?

A. $\_(7)^{14}N$

B. $\_(55)^{133}Cs$

C. $\_(18)^{40}Ar$

D. $\_(8)^{16}O$

Answer: B

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204. The wavelength involved in the spectrum of deuterium $\left(\ _{-}(1)^{2}D\right)$ are slightly different from that of hydrogen spectrum because

A. the size of the two nuclei are different

B. the nucllear forces are different in the two cases

C. the masses of the two neclei rae different

D. the atraction between the electron and the nucleus is different in the two cases

Answer: C

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205. In the middle of the depletion layer of a reverse - biased $p-n$ junction , the

A. electron field is zero

B. potential is maximum

C. electron field is maximum

D. potential is zero

Answer: A

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206. If the bineding energy of the electron of the electron in a hydrogen atom is $13.6eV$ the energy required to remove the electron from the first excited state of Li^{++} is

A. $30.6eV$

B. $13.6eV$

C. $3.4eV$

D. $122.4eV$

Answer: A

Watch Video Solution

207. A radiation of energy E falls normally on a perfctly refelecting surface . The momentum transferred to the surface is

A. Ec

B. $2E/c$

C. E/c

D. E/c^2

Answer: B

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208. According to Einstein's photoelectric equjation , the plot of the kinetic energy of the incident radaiation given as straight the whose used slope

A. depends both on the intensity of the radiation and the mertal used

B. depend on the intensity of the radiation

C. depends on the nature of the metal used

D. is the for the all metal s and independent of the intensity of the radiation

Answer: D

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209. The work function of a substance is $4.0eV$ The longest wavwlength of light that can cause photoelectron emission from this substance is approximately

A. $310nm$

B. $400nm$

C. $540nm$

D. $220nm$

Answer: A

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210. A nucleus desintegrated into two nucleus which have their velocities in the ratio of $2:1$. The ratio of their nuiclear sizes will be

A. $3^{\frac{1}{2}}:1$

B. $1:2^{1/3}$

C. $2^{1/3}:1$

D. $1:3^{\frac{1}{2}}$

Answer: B

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211. The binding energies per nucleon for deuteron $(._1 H^2)$ and helium ($._2 He^4)$ are $1.1 MeV$ and $7.0 MeV$ respectively. The energy released when two deutrons fuse to form a helium nucleus $(._2 He^4)$ is........

A. $23.6 MeV$

B. $26.9 MeV$

C. 13.9MeV`

D. $19.2 MeV$

Answer: A

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212. An alpha particle of energy $5 MeV$ is scattered through 180° by a found uramiam nucleus . The distance of closest approach is of the order of

A. $10^{-12} cm$

B. $10^{-10} cm$

C. $1 A$

D. $10^{-15} cm$

Answer: A

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213. When npn transistor is used as an amplifier

A. electron move from collector to base

B. boles move from emitted to base

C. electron move from base to collector

D. holes move from base to emiter

Answer: C

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214. For a transistor amplifier in common emitter configuration for load impedance of $1k\Omega$. $\left(h_{fe}=50 \text{ and } h_{oe}=25\times10^{-6}\right)$ the current gain is

A. -24.8

B. -15.7

C. -5.2

D. -48.78

Answer: D

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215. Apiece of copper and another of germanium are cooler from room teperature to $77K$, the resistence of

A. copper increase and germanium decrease

B. each of them decraeses

C. each of them incraeses

D. copper decrease and germanium increase

Answer: D

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216. The manifestation of band structure in solids is due to

A. Bohr's correspondence principle

B. pauli's exclusion principle

C. Heisenberg's encerainly principle

D. Boltzmann's law

Answer: B

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217. When $p-n$ junction diode is forward baised them

A. both the deplection regain and harrier height are reducted

B. the depletion regain is widened and harrier height is reduced

C. the deplection regain , is reducted and harrier heighis increases

D. Both the depletion regain and barrier are increases

Answer: A

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218. If radius of the $\_(13)^{27}Al$ necleus is estimated to be 3.6 fermithen the radius of $\_(52)^{125}Te$ nucleus be nearly

A. $8 fermi$

B. $6 fermi$

C. $5 fermi$

D. $6 fermi$

Answer: B

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219. Starting with a sample of pure $.^{66}\,Cu$, $\frac{3}{4}$ of it decays into Zn in 15 minutes. The corresponding half-life is

A. $15 \min utes$

B. $10 \min utes$

C. $7\frac{1}{2} \min utes$

D. $5 \min utes$

Answer: D

Watch Video Solution

220. A photocell is illuminated buy asmall bright source places 1 m away when the same source oh light is placed `(1)/(2) m away. The number of electron emitted by photocathode would

A. increase by a factor of 4

B. decrease by a factor of 4

C. increase by a factor of 2

D. decrease by a factor of 4

Answer: A

Watch Video Solution

221. The electron condactivety of a samiconductor increases $2480nm$ is incident on it . The hand gap in (eV) for the semicondactor is

A. $25eV$

B. $1.1eV$

C. $0.7eV$

D. $0.5eV$

Answer: D

Watch Video Solution

222. The intensity of gamma radiation from a given source is 1

On passing through $36mm$ of lead , it is reduced to $\frac{1}{8}$. The thickness of lead which will redace the intensity to $\frac{1}{2}$ will be

A. $9mm$

B. $6mm$

C. $12mm$

D. $18mm$

Answer: C

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223. In a common base ampifier , the phase difference between the input signal and output voltage is

A. π

B. $\frac{\pi}{4}$

C. $\frac{\pi}{2}$

D. 0`

Answer: D

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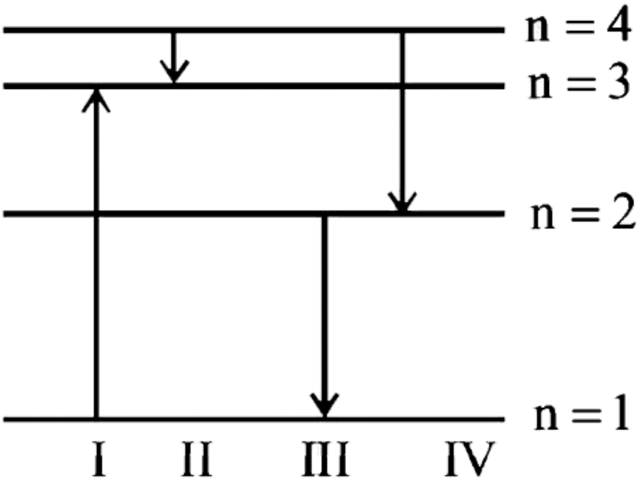
224. The disgram shown the energy levels for an electron is a certain atom . Which transition shown the emission of a photon with the most energy ?



A. iv

B. iii

C. ii

D. i

Answer: B

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225. If the kinetic energy of a electron , it's debroglie wavelength changes by the factor

A. 2

B. $\frac{1}{2}$

C. $\sqrt{2}$

D. $\frac{1}{\sqrt{2}}$

Answer: D

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226. A necear transformation is denoted by $X(n, a)_3^7 Li$ Which of the following is the neclues of electron X?

A. $\_(5)^{10} Be$

B. $\hat{} (12) C_6$

C. $\_(4)^{11} Be$

D. $\_\ (5)^9 B$

Answer: A

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227. In a fall wave rectifer circuit operating from $50Hz$ mains frequency , the fundamental frequency in the ripple would be

A. $25Hz$

B. $50Hz$

C. $70.7Hz$

D. $100Hz$

Answer: D

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228. In a common base mode of a transition , the collector current is $5.488 mA$ for an emitter currect of $5.60 mA$. The value of the base current amplification factor (β) will be

A. 49

B. 50

C. 51

D. 48

Answer: A

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229. The threshould frequency for a metallic surface corresponds to an energy of $6.2 eV$ and the stopping potential for a radiation insident on this surface is $5V$. The incident radiation lies in

A. ultra - violet region

B. infra- red regaion

C. visible region

D. X- ray ragion

Answer: A

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230. An alpha nucleus of energy $\frac{1}{2}m\nu^2$ bombards a heavy nucleus of charge Ze . Then the distance of closed approach for the alpha nucleus will be prpportional to

A. ν^2

B. $\frac{1}{m}$

C. $\frac{1}{\nu^2}$

D. $\frac{1}{Ze}$

Answer: C

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231. The time taken by a photoelectron to come out after the photon strikes is approximately

A. $10^{-4}s$

B. $10^{-10}s$

C. $10^{-16}s$

D. $10^{-1}s$

Answer: B

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232. When $_(3)Li^7$ nucleii are bombarded by protons , and the resultant nucleii are $_(4)Be^8$, the emitted particle will be

A. α particle

B. β particle

C. γ particle

D. neutrons

Answer: C

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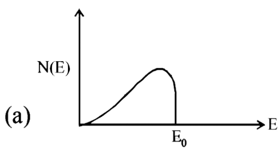
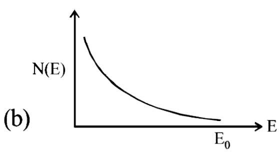
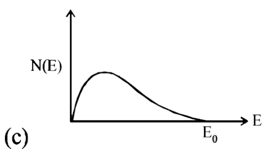
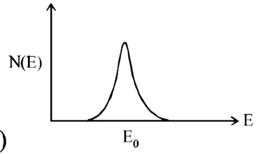
233. The energy spectrum of $\beta - partic \leq$ [number N€ as a function of $\beta - e \neq rgyE]$ emitterfrom a radioactive source is

A. 

B. 

C. 

D. (d) 

Answer: C

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234. A solid which is not transperent to visible light and whose conductivily increase with temperature is formed by

A. Ionic bonding

B. Covatent bonding

C. vander Waals bonding

D. Metallic bonding

Answer: B

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235. If the ratio of the concentration of electron to that of holes in a semiconductor is $\frac{7}{5}$ and the ratio of currect is $\frac{7}{4}$ then what is the ratio of their drift velocities ?

A. $\frac{5}{8}$

B. $\frac{4}{5}$

C. $\frac{5}{4}$

D. $\frac{4}{7}$

Answer: C

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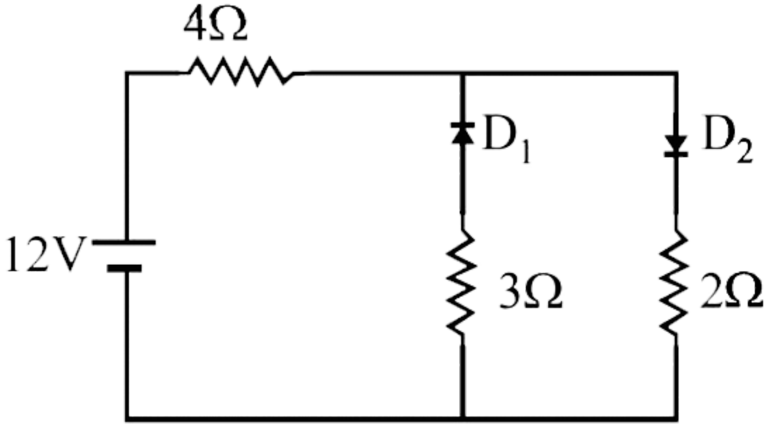
236. The circuit has two opposotively connected ideal diodes in parallel what is the currect flowing in the circuit ?



A. $1.71A$

B. $2.00A$

C. $2.31A$

D. $1.33A$

Answer: B

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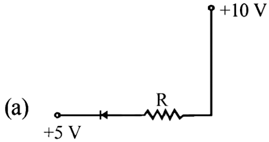
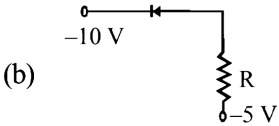
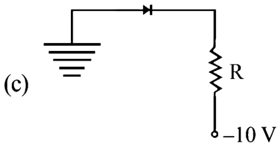
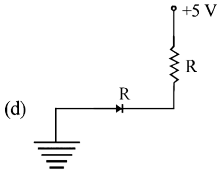
237. If the following which one of the diodes reverse biased?

A. 

B. 

C. 

D. 

Answer: D

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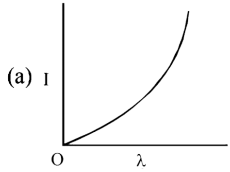
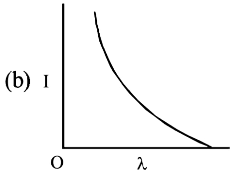
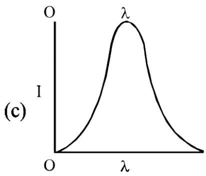
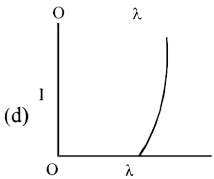
238. The anode vollage of a photocell is kept fixed . The wavelength $\lambda$of the light falling on the cathode varies as follows

A. 

B. 

C. 

D. 

Answer: B

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239. If the binding energy per nucleon in $\_(3)^7 Li$ and ${}_2^4 He \nu c \leq iare 5.60 MeV$ and $7.06 MeV$ respectively then in the reaction

$P +_3^7 Li \rightarrow 2_2^4 He$

energy of proton mnust be

A. $28.24 MeV$

B. $17.28 MeV$

C. $1.46 MeV$

D. $39.2 MeV$

Answer: B

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240. The half is the correct unit used to report the measurement of

A. the obility of a beam of gamma rey photons to produce ions in a target

B. the energy effect by radiation to a target

C. the biological effect of radiation

D. the rate of decay of a radioactive source

Answer: C

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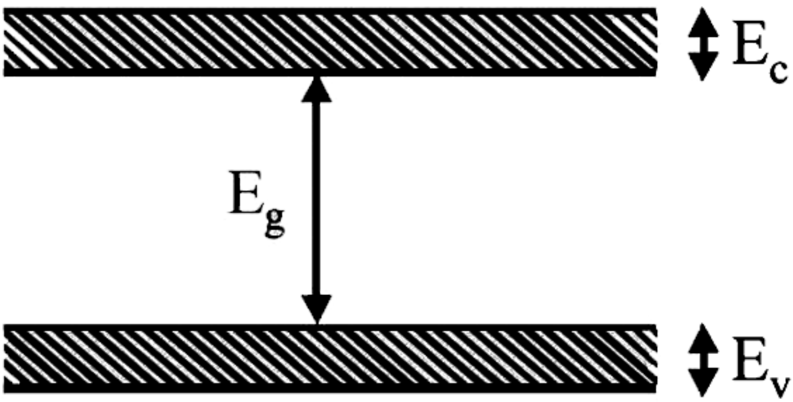
241. If the lattice constant of this semiconductor is decreases, then which of the following is correct ? gtbrgt



A. All $E_c, E_g, E_v, \in crease$

B. E_c and $E_v \in creasebut E_g, decrease$

C. E_c and $E_v decreasebut E_g, \in crease$

D. All $E_c, E_g, E_v, decrease$

Answer: C

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242. The rms value of the electric field of the light from the sun is $720N/C$ The energy total energy total energy density of the electromagnetic wave is

A. $4.58 \times 10^{-6} J/m^3$

B. $6.37 \times 10^{-9} J/m^3$

C. $81.35 \times 10^{-12} J/m^3$

D. $3.3 \times 10^{-3} J/m^3$

Answer: A

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243. If M_O is the mass of an oxygen is otpe $_(8)O^{17}$, M_p and M_N are the mases of a proton and a neutron respectively , the nuclear binding energy of the isotope is

A. $(M_O - 17M_N)c^2$

B. $(M_O - 8M_p)c^2$

C. $(M_O - 8M_p - 9M_N)c^2$

D. $(M_O c^2$

Answer: C

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244. In gamma ray emission from a nucleus

A. only the proton number changes

B. both the neutron and the proton number change

C. there in no change in the proton number and the neutron number

D. only the neutron number changes

Answer: C

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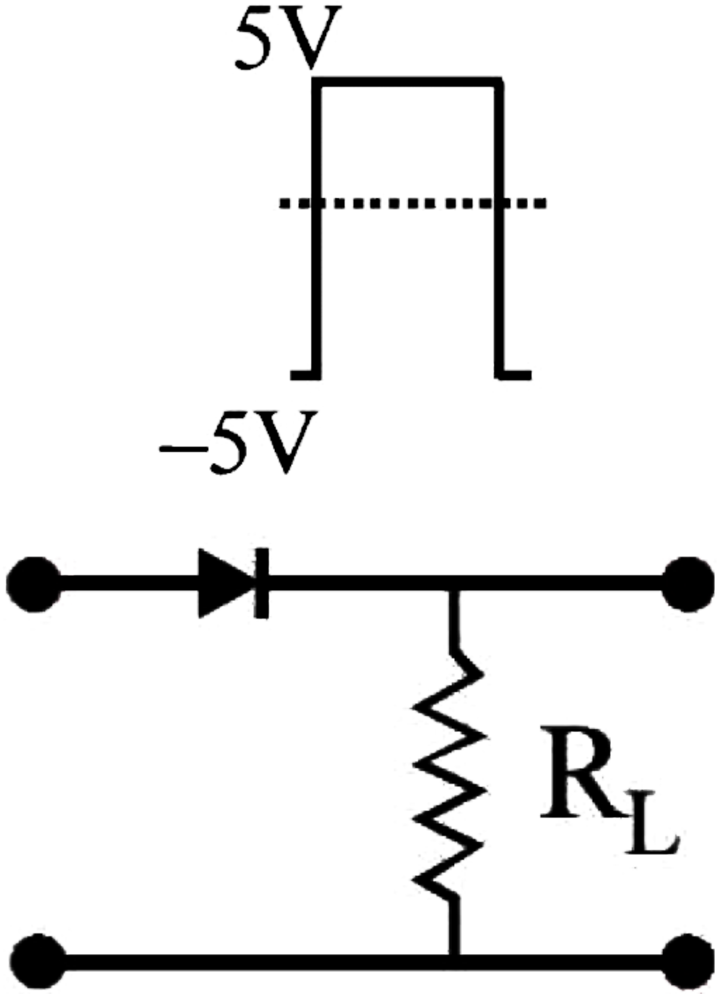
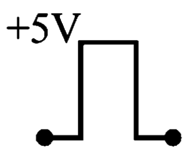
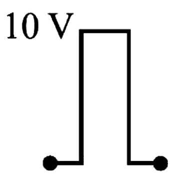
245. If in a $p-n$ junction diode , a squire input single of $10V$ is applied as shown

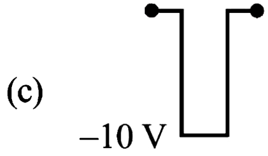


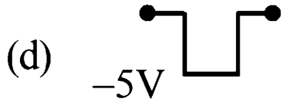
(a)


A.

(b)


B.

C. 

D. 

Answer: A

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246. Photon of frequency v has a momentum associated with it . If c is the velocity of light , the momentum is

A. hc/c

B. v/c

C. hvc

D. hv/c^2

Answer: A

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247. The half-life period of a radioactive element x is same as the mean life time of another radioactive element y. Initially, both of them have the same number of atoms. Then,

(a) x and y have the same decay rate initially

(b) x and y decay at the same rate always

(c) y will decay at a faster rate than x

(d) x will decay at a faster rate than y

A. X and Y decay at same rate always

B. X will decay faster then$Y$

C. Y will decay faster then$X$

D. X and Y have same rate initially

Answer: C

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248. Carbon , silicon and germanium have four velence electrons each . At room temperature which one of the following statements is most appropriate ?

A. the number of free electron for conduction is significant is Si and Ge but small in C

B. the number of free conduction electron is significant in C but small in Si and Ge

C. the number of free conduction electron is negligibly small in all the three.

D. the number of free electron for conduction is significant in allthe three

Answer: A

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249. Which of the following transition in hydrogen atom emit photons of bighest frequency ?

A. $n = 1 \rightarrow n = 2$

B. $n = 2 \rightarrow n = 6$

C. $n = 6 \rightarrow n = 2$

D. $n = 2 \rightarrow n = 1$

Answer: D

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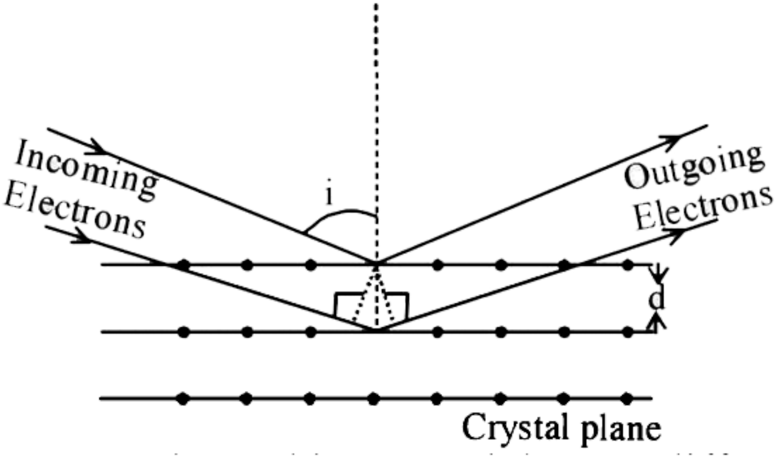
250. Wave property of electron implies that they will show diffraction effected . Davisson and Germer demonstrated this by diffracting electron from crystals . The law governing the diffraction from a crystals is obtained by requiring that electron waves reflected from the planes of atoms in a crystal inter fere constructiely



Electron accelerated by potential V are diffracted from a crystal if $d = 1\text{Å}$ and $i = 30^\circ$, V should be about $\left(h = 6.6 \times 10^{-34} Js, m_e = 9.1 \times 10^{-31} kg, e = 1.6 \times 10^{-19} C\right)$

A. $2000V$

B. $50V$

C. $500V$

D. $1000V$

Answer: B

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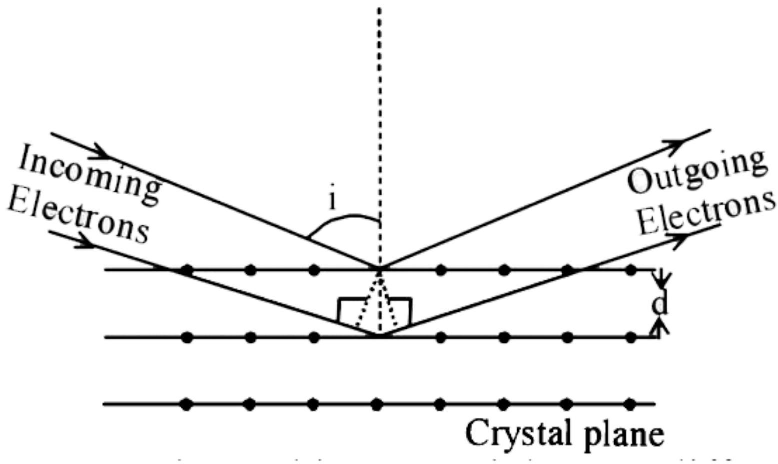
251. Wave property of electron implies that they will show diffraction effected . Davisson and Germer demonstrated this by diffracting electron from crystals . The law governing the diffraction from a crystals is obtained by requiring that electron waves reflected from the planes of atoms in a crystal inter fere constructiely



If a strong diffraction peak is observed when electrons are incident at an angle i from the normal to the crystal planes with distance d between them (see fig) de Brogle wavelength λ_{dB} of electrons can be calculated by the relationship (n is an intenger)

A. $d \sin i = n\lambda_{dB}$

B. $2d \cos i = n\lambda_{dB}$

C. $2d \sin i = n\lambda_{dB}$

D. $d \cos i = n\lambda_{dB}$

Answer: B

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252. This question contains Statement - 1 and Statement -2 Of the four choice given after the Statements , choose the one that best decribes the two Statements

Statement- 1:

Energy is reased when heavy underge fission or light nuclei undergo fasion and

Statement- 2:

for nuclei , binding energy nucleon increases with increasing Z while for light nuclei it decreases with increasing Z

A. Statement - 1 is false ,Statement - 2 is true

B. Statement - 1 is true ,Statement - 2 is true, Statement - 2 is a correct explanation for Statement - 1

C. Statement - 1 is true ,Statement - 2 is true, Statement - 2 is not a correct explanation for Statement - 1

D. Statement - 1 is true ,Statement - 2 is false

Answer: D

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253. A working transitior with its three legs marked P, Q and R is tested using a multimeter No conduction is found between $P, Q$by connecting the common (negative) terminal of the multimeter to R and the ofther (positive) terminal to or Q some resistance is seen on the multimeter . Which of the following is true for the transistor ?

A. it is an npn transistor with R as base

B. it is a pop transistor with R as collector

C. it is a pop transistor with R as emitter

D. it is an npn transistor with R as collector

Answer: A

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254. Suppose an electron is attracted toward the origin by a force $\frac{k}{r}$ where k is a constant and r is the distance of the electron from the origein .By appling Bohr model to this system the radius of the n^{th} orbital of the electron is found to be r_n and the kinetic energy of the electron to be T_n , Then which of the following is true ?

A. $T_n \propto \frac{1}{n^2}, r_n \propto n^2$

B. T_n independent of n, $r_n \propto n$

C. $T_n \propto \frac{1}{n}, r_n \propto n$

D. $T_n \propto \frac{1}{n}, r_n \propto n^2$

Answer: B

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255. The transition from the state $n = 4$ to $n = 3$ in a hydrogen-like atom results in ultraviolet radiation. Infared radiation will be obtained in the transition

A. $3 \rightarrow 2$

B. 4 rarr 2 `

C. $5 \rightarrow 4$

D. 2 rarr 1 `

Answer: C

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256. The surface of a metal is illuminted with the light of $400nm$ The kinetic energy of the ejection photoelectron was found to be $1.68eV$ The work function of the metal is :

A. $1.41eV$

B. $1.51eV$

C. $1.68eV$

D. $3.09eV$

Answer: A

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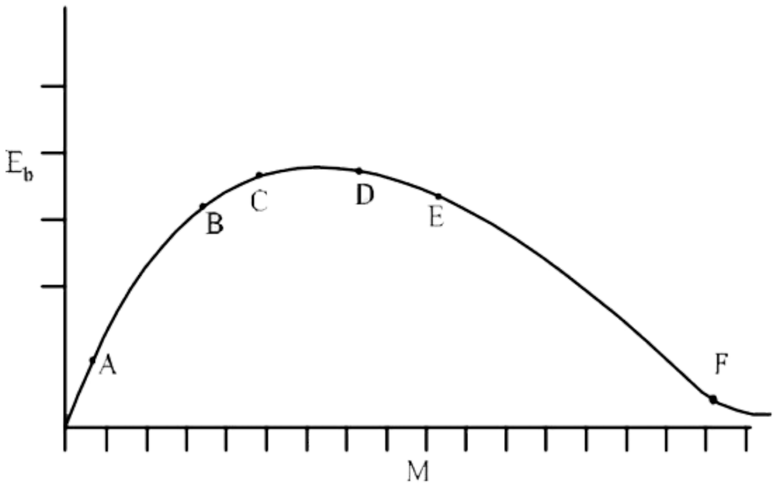

257.

The above is a plot of binding energy per nucleon E_b against the nuclear mass M, A, B, C, D, E, F correspond to different nuclei Consider four reactions:

A. $A + B \rightarrow C + \varepsilon$

B. $C \rightarrow A + B + \varepsilon$

C. $D + E \rightarrow F + \varepsilon$ and

D. $F \rightarrow D + E + \varepsilon,$

Answer: D

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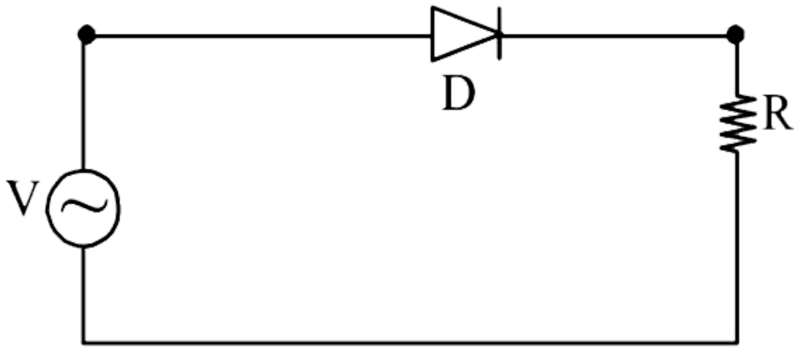
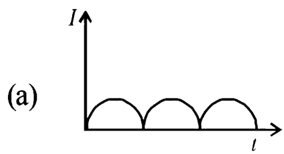
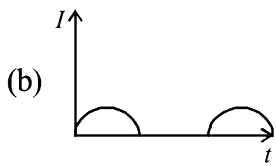
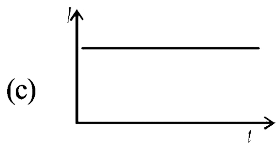
258. a p -n juction (D) shown in the figure can act an a rectifier An alternatting current source (V) is connected in the circuit

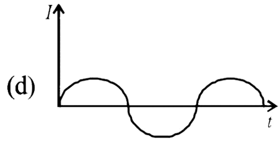


The corrent (I) in the resistor® can be shown by :

A. 

B. 

C. 



D.

Answer: B

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259. Statement - 1 : When ultraviolet light is incident on a photoncell , its stopping potential is V_0 and the maximum kinetic energy of the photoelectrons is $K_{\max}$ when the altraviolet light is replaces by X- rays both V_0 and $K_{\max}$ increase

Statement - 2 : photoelectrons are emitted with speeds ranging from zero to a maximum value because of the range of frequencies present in the incident light

A. Statement - 1 is true , statement - 2 is true , statement - 2 is the correct explanation of statement - 1

B. Statement - 1 is true , statement - 2 is true , statement - 2 is not the correct explanation of statement - 1

C. Statement - 1 is false , statement - 2 is true

D. Statement - 1 is true , styatement - 2 is false

Answer: D

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260. A nuclear of mass $M + \delta m$is at rest and decay into two daughter nuclei of equal mass $\frac{M}{2}$ each speed is c

The binding energy per nucleon for the nucleus is E_1 and that for the daugther nuclei is E_2 Then

A. $E_2 = 2E_1$

B. $E_1 > E_2$

C. $E_2 > E_1$

D. $E_1 = 2E_2$

Answer: C

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261. A nuclear of mass $M+\delta m$is at rest and decay into two daughter nuclei of equal mass $\frac{M}{2}$ each speed is c

The speed of daughter nuclei is

A. $c\frac{\delta m}{M+\delta m}$

B. $c\sqrt{\frac{2\delta m}{M+\delta m}}$

C. $c\sqrt{\frac{\delta m}{M}}$

D. $c\sqrt{\frac{\delta m}{M+\delta m}}$

Answer: B

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262. A radiaoactive nucleus (initial mass number A and atomic number Z emits $3a - partic \leq s$ and $2positrons$The ratio of number of neutrons to that of proton in the final nucleus will be

A. $\dfrac{A-Z-8}{Z-4}$

B. $\dfrac{A-Z-4}{Z-8}$

C. $\dfrac{A-Z-12}{Z-4}$

D. $\dfrac{A-Z-4}{Z-2}$

Answer: B

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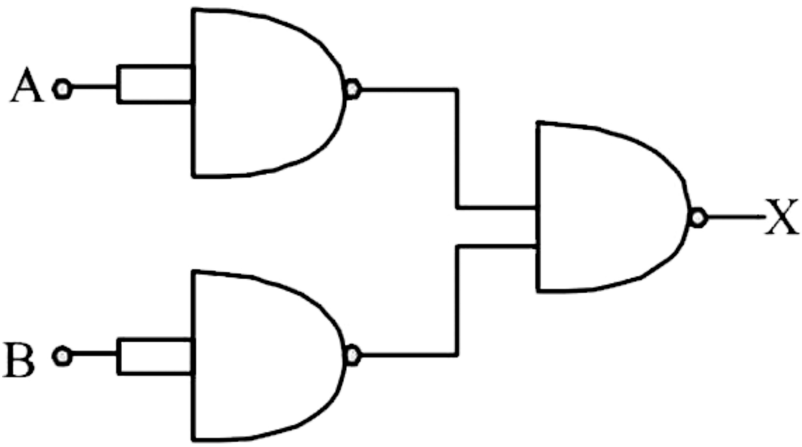
263. The combination of shown below yieds



A. $ORgate$

B. $NOTgate$

C. $XORgate$

D. $NANDgate$

Answer: A

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264. If the source of power$4kW$ product10^{20} photons //second , the radiation belongs to a part spectrum called

A. X- rays

B. ultraviolet rays

C. microwaves

D. $\gamma rays$

Answer: A

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265. The quwstion has statement - 1 and statement - 2 Of the four choices given after the statements , choose the one that best describes the two statements

statement - 1 : Sky wave signals are used for long distance radio communication . These signals are in generel , less stable then ground wave signals statement - 2 : The state of inosphere varies from to hour day and season to season .

A. Statement -1 is true ,Statement -2 is true , Statement -2 is the correct explanation of Statement -1

B. Statement -1 is true ,Statement -2 is true , Statement -2 is not the correct explanation of Statement -1

C. Statement -1 is false ,Statement -2 is true

D. Statement -1 is true ,Statement -2 is false

Answer: B

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266. Energy required for the electron excitation in Li^{++} from the first to the third Bohr orbit is

A. $36.3 eV$

B. $108.8eV$

C. $122.4eV$

D. $12.1eV$

Answer: B

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267. The half life of a radioactive substance is 20 minutes . The approximate time interval $(t_1 - t_2)$ between the time t_2 when $\frac{2}{3}$ of it had decayed and time t_(1)$when$(1)/(3)` of it had decay is

A. 14 min

B. 20 min

C. 28 min

D. 7 min

Answer: B

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268. This question has statement - 1 and statement - 2 of the four choice given after the statements choose the one that best describes the two statements

statement - 1 : A metallic surface is irradiated by a monochromatic light of frequency

$v > v_0 (thethresholdequency). The \max im, umkimetice \neq rgy$ and $thes$

K_(max) and V_(0)

$respectively$ if $theequency \in cidentonthesurfaceisdoub \leq d, \perp hthe$

K_(max) and V_(0)` are also doubled

statement - 2 : The maximum kinetic energy and the stopping potential of photonelectron emitted from a surface are linearly dependent on the frequency of incident light

A. Statement -1 is true ,Statement -2 is true , Statement -2 is the correct explanation of Statement -1

B. Statement -1 is true ,Statement -2 is true , Statement -2 is not the correct explanation of Statement -1

C. Statement -1 is false ,Statement -2 is true

D. Statement -1 is true ,Statement -2 is false

Answer: C

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269. Hydrogen atom is exited from ground state to another state with principal quantum number equal to 4 Then the number of spectral linear in the emission spectra will be

A. 2

B. 3

C. 5

D. 6

Answer: D

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270. A ratio has a power of $1kW$ and is operating at a frequency of $10GHz$ it is located on a mountain top of beigh $500m$ The maximum distance upto which it can detect object located on the surface of the earth (Radius of earth $= 6.4 \times 10^6 m)$ is

A. $80km$

B. $16km$

C. $40km$

D. $64km$

Answer: A

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271. Assume that a neutron breaks into a proton and an electron . The energy reased during this process is (mass of neutron $= 1.6725 \times 10^{-27} kg$ mass of proton $= 1.6725 \times 10^{-27} kg$ mass of electron $= 9 \times 10^{-31} kg)$

A. $0.73 MeV$

B. $7.10 MeV$

C. $6.30 MeV$

D. $5.4 MeV$

Answer: A

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272. A diatomic molecule is madde of two masses m_1 and m_2 which are separated by a distance r . If we calculate its rotational energy by appliying Bohr's rule of angular momemtum quantization it energy will be (n is an integer)

A. $\dfrac{(m_1 + m_2)^2 n^2 h^2}{2m_1^2 m_2^2 r^2}$

B. $\dfrac{n^2 h^2}{2(m_1 + m_2) r^2}$

C. $\dfrac{2n^2 h^2}{m_1 + m_2} r^2\Big)$

D. $\dfrac{(m_1 + m_2) n^2 h^2}{2m_1 m_2 r^2}$

Answer: D

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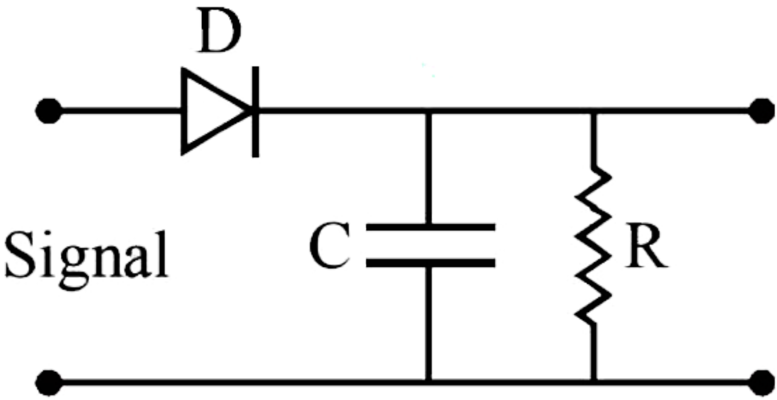
273. A diode detector is used to detect an amplitudennodulated wave of 60% modulation by using a condence of capacity 250 picodarad in parallel with a load resistance 100 kilo obm find the maximum modulated which could be find the maximum modalated frequency which could be detected by it



A. $10.62MHz$

B. $10.62kHz$

C. $5.31MHz$

D. $5.31kHz$

Answer: B

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274. The magnetic field In a tranvelling dectromagnetic wave has a penk value of $20nT$ The peak value of electron field strength is :

A. $3Vm$

B. $6Vm$

C. $9Vm$

D. $12Vm$

Answer: B

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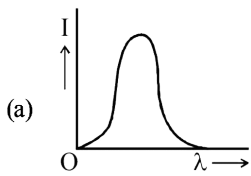
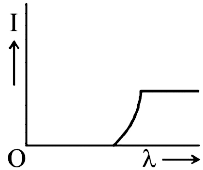
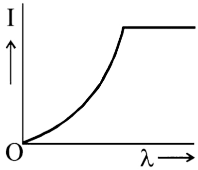
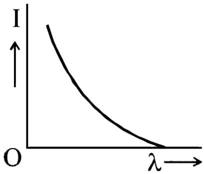
275. The anode vollage of a photocell is kept fixed . The wavelength $\lambda$of the light falling on the cathode varies as follows

A. 

B. (b) 

C. (c) 

D. (d) 

Answer: D

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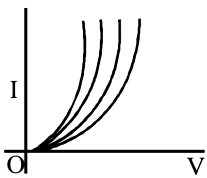
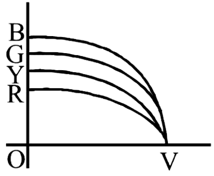
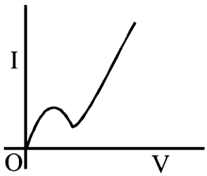
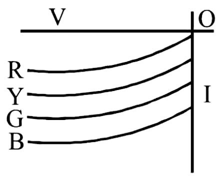
276. The $1-V$ characteristic of on LED is

A. (a) 

B. (b) 

C. (c) 

D. (d) 

Answer: A

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277. In a hydrogen like atom electron make transition from an energy level with quantum number n to another with quantum number $(n-1)$ if $n > > 1$, the frequency of radiation emitted is proportional to :

A. $\frac{1}{n}$

B. $\frac{1}{n^2}$

C. $\frac{1}{n^3/2}$

D. $\frac{1}{n^2}$

Answer: D

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278. The currect voltage relation of a diode is given by $1 = \left(e^{vanv/T} - 1\right)mA$ where the applied volied V is in volts and the tempetature T is in degree kelvin if a student make an error meassurting $\pm 01V$ while measuring the current of $5mAat300K$ what be the error in the value of current in mA

A. $0.2mA$

B. $0.02mA$

C. $0.5mA$

D. $0.05mA$

Answer: A

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279. During the propogation wave in a medium

A. Electric energy density is double of the magnetic energy density

B. Electric energy density is half of the magnetic energy density

C. Electric energy equal is double of the magnetic energy density

D. Both eneric and magnetic energy densities are zero

Answer: C

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280. The radiation corresponding to $3 \to 2$ transition of hydrogen atom falls on a metal surface to produce photoelectrons . These electrons are made to enter circuit a magnitic field $3 \times 10^{-4} T$ if the ratio of thelargest circular path follow by these electron is `10.0 mm , the work function of the metal is close to

A. $1.8eV$

B. $1.1eV$

C. $0.8eV$

D. $1.6eV$

Answer: B

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281. Hydrogen $\left(\_ (1)H^{1}\right)$ Deuterium $\left(\_ (1)H^{2}\right)$ singly omised helium $\left(\_ (1)He^{1}\right)$ and doubly ionised lithium $\left(\_ (1)Li^{6}\right)^{++}$ all have one electron around the nucleus Consider an electron transition from $n = 2 \rightarrow n = 1$ if the wavelength of emitted radiartion are $\lambda_1, \lambda_2, \lambda_3,$ and λ_4, repectivelly then approximetely which one of the following is correct ?

A. $4\lambda_1 = 2\lambda_2 = 2\lambda_3 = \lambda_4$

B. $\lambda_1 = 2\lambda_2 = 2\lambda_3 = \lambda_4$

C. $\lambda_1 = \lambda_2 = 4\lambda_3 = 9\lambda_4$

D. $\lambda_1 = 2\lambda_2 = 3\lambda_3 = 4\lambda_4$

Answer: C

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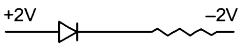
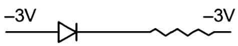
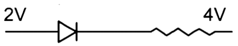
282. The forward biased diode comection is

(a) 

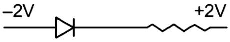
A.

(b) 

B.

(c) 

C.

(d) 

D.

Answer: A

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283. A redc LED emits light at 0.1 wall uniformily around it . The amplitude of the electric field of the light at a distnce of $3m$ from the diode is

A. $5.48Vm$

B. $7.75Vm$

C. $1.73Vm$

D. $2.45Vm$

Answer: D

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284. A signal of $5kHz$ frequency is amplitade modulated on a carrue wave of frequency`2MHz . The frequency of the resulant signal is //are

A. 2005 kHz, 200 kHz and 1995 kHz`

B. $2000kHz \text{ and } 1995kHz$

C. $2MHzonly$

D. $2005Hz \text{ and } 1995kHz$

Answer: A

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285. As an electron makes a transition from an excited state to the ground state of a hydrogen - like atom //ion

A. kinectic energy decreases potential energy increases but total energy remain same

B. kinectic energy and total energy decreases but potential energy increases

C. in kinectic energy increases but potential energy and total energy decreases

D. kinectic energy potential energy and total energy decreases

Answer: C

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286. For a common emiter configuration if a and β have their usualy meaning , the incorrrect relationship between a and β is :

A. $a = \frac{\beta}{1+\beta}$

B. $a = \frac{\beta^2}{1+\beta^2}$

C. $\frac{1}{a} = \frac{1}{\beta} + 1$

D. $a = \frac{\beta}{1-\beta}$

Answer: B::D

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287. if $a, b, c, d$are inputs to a gate and x is its output , then as per the following time graph , the gate is :

d

c

b

a

x

A. OR

B. $NAND$

C. NOT

D. AND

Answer: A

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288. Chooce the correct statement :

A. in frequency modulation the amplitude of the high frequency carrieer wave is made to very in proportion to the amplitude of the audio signal .

B. in frequency modulation the amplitude of the high frequency carrieer wave is made to very in proportion to the frequency of the audio signal .

C. in amplitude modulation the amplitude of the high frequency carrieer wave is made to very in proportion to the amplitude of the audio signal .

D. in amplitude modulation the frequency of the high frequency carrier wave is made to very in proportion to the amplitude of the audio signal .

Answer: C

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289. In a photoelectric experiment, with light of wavelength λ, the fastest election has speed v. If the exciting wavelength is changed to $\frac{3\lambda}{4}$, the speed of the fastest emitted electron will become

A. $= v\left(\frac{4}{3}\right)^{\frac{1}{2}}$

B. $= v\left(\frac{3}{4}\right)^{\frac{1}{2}}$

C. $> v\left(\frac{4}{3}\right)^{\frac{1}{2}}$

D. $< v\left(\frac{4}{3}\right)^{\frac{1}{2}}$

Answer: C

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290. Half-lives of two radioactive elements A and B are 20 minutes and 40 minutes respectively. Initially, the samples have equal number of nuclei. After 80 minutes, the ratio of decayed numbers of A and B nuclei will be

A. $1:4$

B. $5:4$

C. $1:16$

D. $4:1$

Answer: c

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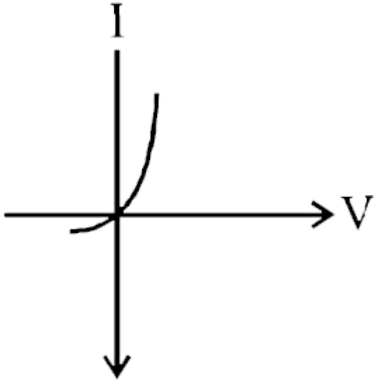
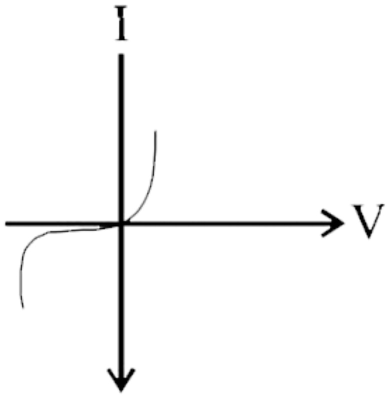
291. Identify the semiconductor devices whose characteristics are given below , in the order (a) ,(b) ,(c) ,(d) :



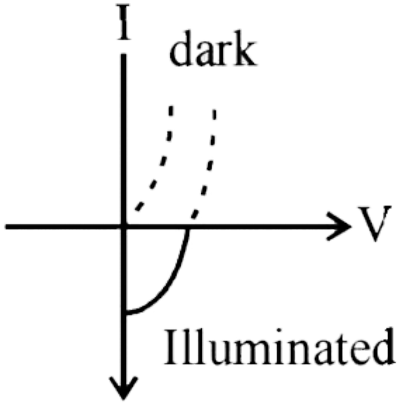
(a)

(a)



(b)

(b)



(c)

(c)

(d)

A. Solar cell , Light dependent resistance, zener diode , simple diode

B. Zener diode ,Solar cell , simple diode Light dependent resistance

C. Simple diode,zener diode, Solar cell , Light dependent resistance

D. Zener diode ,simple diode Light dependent resistance,Solar cell

Answer: C

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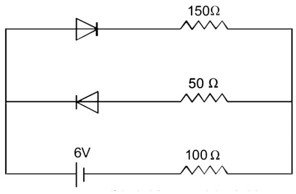
Mcq One Correct Answer

1. The circuit shown in the contain two diodes each with a forward resitance of 50 obms and with infinite back ward resistence , if the battery voltage is $6V$, the correct through the 100 obm resistence (in amperes) is



A. zero

B. 0.02

C. 0.03

D. 0.036

Answer: B

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