PHYSICS

BOOKS - CAREER POINT

PRACTICE TEST-6

Physics

1. The wavelength of the first spectral line in the Balmer series of hydrogen atom is 6561 Å. The wavelength of the second spectral line in

the Balmer series of singly-ionized helium atom is

A. 1216 Å

B. 1640 Å

C. 2430 Å

D. 4687 Å

Answer: A

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2. An electron and a photon possess the same deBroglie wavelength. If E_0 and E_{ph} are, respectively, the energies of electron and photon and v and c are their respective velocities, then E_e / E_{ph} =

A. v/c

B. v/2c

C. v/3c

D. v/4c

Answer: B

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3. If the wavelength of photon emitted due to transition of electron from third orbit to first orbit in a hydrogen atom is λ , then the wavelength of photon emitted due to transition of electron from fourth orbit to second orbit will be

A. $\frac{128}{27}\lambda$

B. $\frac{25}{9}\lambda$

C. $\frac{36}{7}\lambda$

D. $\frac{125}{11}\lambda$

Answer: A

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4. Monochromatic light of frequency 6.0×10^{14} Hz is produced by a laser. The power emitted is 2×10^{-3} W. The number of photons emitted on the average, by the source per second is :

A. 5×10^{16}

B. 5×10^{17}

C. 5×10^{14}

D. 5×10^{15}

Answer: D

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5. When a monochromatic point source of light is at a distance 0.2 m from a photoelectric cell, the saturation current and cut-off voltage are 12.0 mA and 0.5 V. If the

same source is placed 0.4 m away from the photoelectric cell, then the saturation current and the stopping potential respectively are :

A. 4 mA and 1V

B. 12 mA and 1V

C. 12 mA and 0.5 V

D. 3 mA and 0.5 V

Answer: D

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6. In the experiment of Davisson-Germer an electron beam of wavelength 1.5Å falls normally on a crystal for which atomic spacing in the surface layer is 3Å. The angle at which the first order maximum obtained is:

A. 0°

B. 30°

C. 60°

D. 90°

Answer: B

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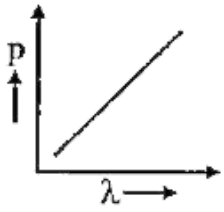
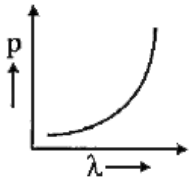
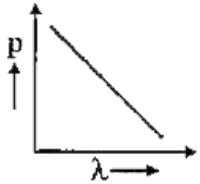
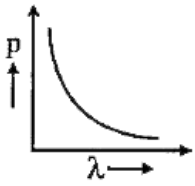
7. Which of the following figure represents the variation of particle momentum and associated de Broglie wavelength ?

A. 

B. 

C. 

D. 

Answer: D

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8. Maximum velocity of the photoelectrons emitted by a metal surface is $1.2 \times 10^5 ms^{-1}$. Assuming the specific charge of the electron to be $1.8 \times 10^{11} Ckg^{-1}$, the value of the stopping potential (in volt) will be

A. 2

B. 3

C. 4

D. 6

Answer: C

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9. Monochromatic light of frequency f_1 is incident on a photocell and the stopping potential is found to be V_1 . What is the new

stopping potential of the cell if it is radiated by monochromatic light of frequency f_2 ?

A. $V_1 - \frac{h}{e}(f_2 - f_1)$

B. $V_1 + \frac{h}{e}(f_1 - f_2)$

C. $V_1 - \frac{h}{e}(f_1 + f_2)$

D. $V_1 + \frac{h}{e}(f_2 - f_1)$

Answer: D

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10. The ratio of de-Broglie wavelength of α -particle to that of a proton being subjected to the same magnetic field so that the radii of their paths are equal to each other assuming the field induction vector $\overrightarrow{B}$ is perpendicular to the velocity vectors of the α -particle and the proton is:

A. 1

B. $1/4$

C. 1//2`

D. 2

Answer: C

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11. The ratio of de-Broglie wavelength of molecules of hydrogen and helium in two gas jars separately at temperatures of $27^\circ C$ and $127^\circ C$ respectively is:

A. $\frac{2}{\sqrt{3}}$

B. $\frac{2}{3}$

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

D. $\sqrt{\frac{8}{3}}$

Answer: D

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12. According to Einstein's photoelectric equation, the plot of the kinetic energy of the emitted photoelectrons from a metal versus

frequency of the incident radiation gives a straight line whose slope

A. depends on the nature of metal used

B. depends on the intensity of radiation

C. depends on both the intensity of radiation and the nature of metal used

D. is the same for all metals and independent of the intensity of radiation

Answer: D

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13. When light of wavelength 300 nm falls on a photoelectric emitter, photoelectrons are liberated. For another emitter, light of wavelength 600 nm is sufficient for liberating electrons. The ratio of work-function of two emitters is

A. $1:2$

B. $2:1$

C. $4:1$

D. $1:4$

Answer: B

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14. When 1 centimetre thick surface is illuminated with light of wavelength λ , the stopping potential is V. When the same surface is illuminated by light of wavelength 2λ , the stopping potential is V/3. Threshold wavelength for metallic surface is :

A. $4\lambda/3$

B. 4λ

C. 6λ

D. $8\lambda/3$

Answer: B

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15. When photons of energy hv fall on an aluminium plate (of work function E_0), photoelectrons of maximum kinetic energy K

are ejected. If the frequency of radiation is doubled, the maximum kinetic energy of the ejected photoelectrons will be

A. K + hv

B. $K + E_0$

C. 2K

D. K

Answer: A

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16. The threshold frequency for a certain metal is v_0. When light of frequency $v = 2v_0$ is incident on it, the maximum velocity of photoelectrons is 4×10^6 m/s. If the frequency of incident radiation is increased to $5v_0$, then the maximum velocity of photoelectrons in m/s) will be:

A. $\frac{4}{5} \times 10^6$

B. 2×10^6

C. 8×10^6

D. 2×10^7

Answer: C

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17. A modern 200 watt sodium street lamp emits yellow light of wavelength 0.6 fm. Assuming it to be 25% efficient in converting electrical energy to light, the number of photons of yellow light it emits per second is :

A. 6×10^{20}

B. 3×10^{19}

C. 1.5×10^{20}

D. 6×10^{18}

Answer: C

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18. The fossil bone has a $^{14}C : {}^{12}C$ ratio, which is (1/16) of that in a living animal bone. If the half-life time of ^{14}C is 5730 years, then the age of the fossil bone is :

A. 11460 years

B. 17190 years

C. 22920 years

D. 45840 years

Answer: C

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19. The intensity of gamma radiation from a given source is I. On passing through 36 mm of lead, it is reduced to I/8. The thickness of

lead which will reduce the intensity to I/2, will be:

A. 18 mm

B. 12 mm

C. 6 mm

D. 9 mm

Answer: B

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20. 10^{-3} kg of radioactive isotope of atomic mass 226 emits $3.72 \times 10^{10} \alpha$- particles in a second. If 4.2×10^{-2} J of energy is released in 1 hour in this process, the average energy of the α-particle is

A. 1.42 MeV

B. 1.96 MeV

C. 9.2 MeV

D. 19.6 MeV

Answer: D

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21. N atoms of a radioactive element emit n alpha particles per second. The half life of the element is

A. $\frac{n}{N}s$

B. $\frac{N}{n}s$ s

C. $\frac{0.693N}{n}s$

D. $\frac{0.693n}{N}s$

Answer: C

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22. The mean lives of a radioactive substance are 1620 year and 405 year for α-emission and β -emission respectively. Find the time during which three-fourth of a sample will decay if it is decaying both by α-emission and β -emission simultaneously

A. 249 years

B. 449 years

C. 133 years

D. 99 years

Answer: B

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23. In a particular sample of mica, the ratio of 38Sr" atoms to $_{37}Rb^{87}$ atoms is 0.020. Assume that the Srhas been produced solely by the decay of the naturally radioactive non heavy element Rb^{87} having a half life of 4.68×10^{10}

years. What is the maximum age of the mica sample ?

A. 1.3×10^9 years

B. 1.3×10^{10} years

C. 1.3×10^{11} years

D. 1.3×10^8 years

Answer: A

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24. The natural boron of atomic weight 10.81 is found to have two isotopes B^{10} and B^{11} . The ratio of abundance of isotopes in natural boron should be:

A. $11:10$

B. $81:19$

C. $10:11$

D. $19:81$

Answer: D

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25. The half-life period of a radioactive element X is same as the mean life time of another radioactive element Y. Initially they have the same number of atoms. Then :

A. X and Y decay at same rate always

B. X will decay faster than Y

C. Y will decay faster than X

D. X and Y have same decay rate initially

Answer: C

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26. A certain radioactive material ${}_{Z}X^{A}$ starts emitting a and B particles successively such that the end product is ${}_{z-3}Y^{A-8}$ The number of α and β particles emitted are:

A. 4 and 3 respectively

B. 2 and 1 respectively

C. 3 and 4 respectively

D. 3 and 8 respectively

Answer: B

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27. In carbon-nitrogen nuclear fusion cycle, protons are fused to form a helium nucleus, positrons and release some energy. The number of protons fused and the number of positrons released in this process respectively are

A. 4,4

B. 4,2

C. 2,4

D. 4,6

Answer: B

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28. In a fusion process, a proton and a neutron combine to give a deuterium nucleus. If m_m andm_p be the masses of neutron and proton

respectively, the mass of deuterium nucleus is

:

A. equal to $m_n + m_p$

B. more than $m_n + m_p$

C. less than $m_n + m_p$

D. can be less than or more than $(m_n + m_p)$

Answer: C

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29. The correct relation between n_e and n_k in an intrinsic semiconductor at ordinary temperature is

A. $n_e > n_k$

B. $n_e < n_k$

C. $n_e = n_k$ s

D. $n_e = n_k = 0$

Answer: C

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30. P-type semiconductors are -

A. positively charged

B. produced when boron is added as an impurity to germanium

C. produced when phosphorus is added as an impurity to silicon

D. produced when carbon is added as an impurity to germanium

Answer: B

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31. If a semiconductor has an intrinsic carrier concentration of $1.41 \times 10^{16} / m^3$ when doped with $10^{21} / m^3$ phosphorus, then the concentration of holes/moat room temperature will be -

A. 2×10^{21}

B. 2×10^{11}

C. 1.41×10^{10}

D. 1.41×10^{16}

Answer: D

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32. Which filter circuit is better?

A. π type

B. Choke input type

C. Capacitor type

D. None of the above

Answer: A

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33. The value of current in the following diagram will be -

A. 0 amp

B. 10^{-2} amp

C. 10 amp

D. 0.025 amp

Answer: B

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34. In case of a p-n junction diode at high value of reverse bias, the current rises sharply. The value of reverse bias is known as

A. cut off voltage

B. zener voltage

C. inverse voltage

D. critical voltage

Answer: B

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35. In a p-n junction diode -

A. the current in the reverse biased condition is generally very small

B. the current in the reverse biased condition is small but the forward biased current is independent of the bias voltage

C. the reverse biased current is strongly dependent on the applied bias voltage

D. the forward biased current is very small in comparison to reverse biased current

Answer: A

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36. p-n junction is said to be forward biased, when -

A. the positive pole of the battery is joined to the p-semiconductor and negative pole to the n semiconductor

B. the positive pole of the battery is joined to the n-semiconductor and negative pole to the p-semiconductor

C. the negative pole of the battery is connected to n-semiconductor and p-semiconductor

D. a mechanical force is applied in the forward direction

Answer: A

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37. Current gain in common emitter configuration is more than 1 because -

A. $I_c < I_b$

B. $I_c < I_e$

C. $I_c > I_e$

D. $I_c > I_b$

Answer: D

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38. Negative feedback

A. increases stability

B. decreases stability

C. produces oscillation

D. stops current in the tube

Answer: A

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39. For a transistor, in a common base arrangement, the alternating current gain α is given by -

A. $\alpha = \left(\frac{\Delta I_C}{\Delta I_B}\right)_{V_C = \text{is constant}}$

B. $\alpha = \left(\frac{\Delta I_B}{\Delta I_C}\right)_{V_C = \text{is constant}}$

C. $\alpha = \left(\frac{\Delta I_C}{\Delta I_E}\right)_{V_C = \text{is constant}}$

D. $\alpha = \left(\frac{\Delta I_E}{\Delta I_C}\right)_{V_C = \text{is constant}}$

Answer: C

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40. The current gain for a transistor used in commonemitter configuration is 98. If the load resistance be 1 $M\Omega$ and the internal resistance is 60Ω , what is the voltage gain -

A. 90

B. 95

C. 100

D. None of the above

Answer: D

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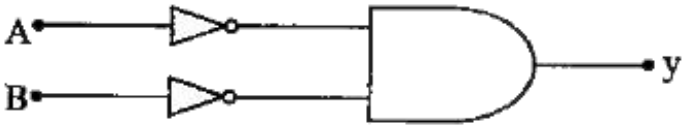
41. What is the output y of the gate circuit shown in figure ?



A. $\overline{AB}$

B. $\overline{A}.\overline{B}$

C. $\overline{\overline{A}.\overline{B}}$

D. $\overline{\overline{A}.\overline{B}.}$

Answer: B

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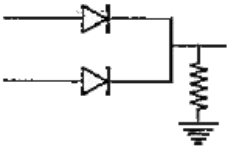
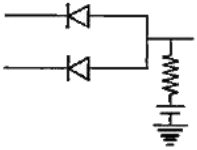
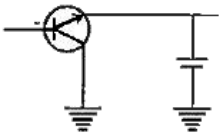
42. Correct circuit for NOT gate is -

A. 

B. 

C. 

D. none of these

Answer: D

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43. The binary number of decimal number $(9.25)_{10}$ is -

A. 1101.01

B. 1001.01

C. 1001.1

D. 1110.01

Answer: B

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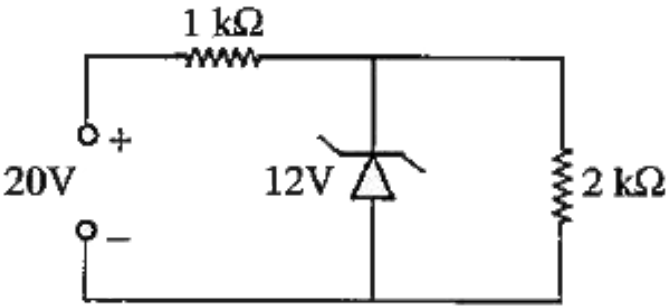
44. In the given circuit, the current through the resistor 2k Ω is:



A. 2mA

B. 4mA

C. 6mA

D. 1mA

Answer: C

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