PHYSICS

BOOKS - CAREER POINT

UNIT TEST 10

Physics

1. 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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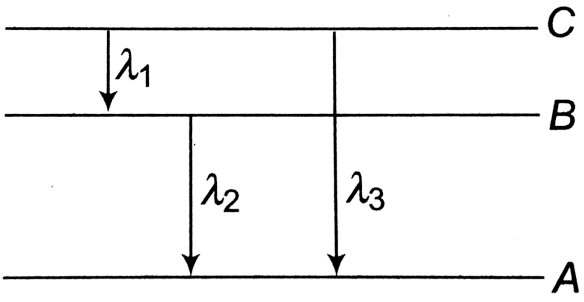
2. Energy levels A, B, C of a certain atom corresponding to increasing values of energy i.e., $E_A < E_B < E_C$. If $\lambda_1, \lambda_2, \lambda_3$ are the wavelengths of radiations correspnding to the transitions C to B, B to A and C to A respectively, which o fthe following statements is correct?



A. $\lambda_3 = \lambda_1 + \lambda_2$

B. $\lambda_3 = \dfrac{\lambda_2 \lambda_1}{\lambda_1 + \lambda_2}$

C. $\lambda_1 + \lambda_2 + \lambda_3 = 0$

D. $\lambda_3^2 = \lambda_1^2 + \lambda_2^2$

Answer: B

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3. If, in a hydrogen atom, radius of nth Bohr orbit is r_n frequency of revolution of electron in nth orbit is f_n and area enclosed by the nth

orbit is A_n , then which of the pollowing graphs are correct?

A. a,b

B. a,b,c

C. a,b,c,d

D. None of these

Answer: B

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4. A particle of mass m moves along a circular orbit in centrosymmetrical potential field $U(r) = kr^2/2$. Using the Bohr quantization condition, find the permissible orbital radii and energy levels to that particle.

A. $\frac{nh}{2\pi}\sqrt{\frac{K}{m}}$

B. $\frac{2nh}{\pi}\sqrt{\frac{K}{m}}$

C. $\frac{nh}{2}\sqrt{\frac{K}{m}}$

D. None of these

Answer: A

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5. In rutherford's experiment, the mumber of alpha-particles scattered through an angle of 90° is 28 per minute. Then,the number of particles scattered through an angle of 60° per minute by the same nucleus is

A. 28 per minute

B. 112 per minute

C. 12.5 per minute

D. 7 per minute

Answer: B

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6. A Hydrogen atom and Li^{++} ion are both in the second excited state. If L_H and L_{Li} are their respective angular momenta, and E_H and E_{Li} 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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7. An e-m wave of wavelength λ is incident on a photo sensitive surface of negligible work function. If the photoelectrons emitted from

this surface have the de-Broglie wavelength λ_1 . Find relation between $'\lambda'$ and $'\lambda_1$'-

A. $\lambda = \left(\frac{2mc}{h}\right)\lambda_1^2$

B. $\lambda = \left(\frac{mc}{2h}\right)\lambda_1^2$

C. $\lambda_1 = \left(\frac{2mc}{h}\right)\lambda^2$

D. None of these

Answer: A

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8. A 100 W light bulb is placed at the centre of a spherical chamber of radius 20cm. Assume that 60% of the energy supplied to the bulb is converted into light and that the surface of the chamber is perfectly absorbing. Find the pressure exerted by the light on the surface of the chamber.

A. $4.0 \times 10^{-6} Pa$

B. $4.0 \times 10^{-7} Pa$

C. $2.0 \times 10^{+7} Pa$

D. $4.0 \times 10^{+7} Pa$

Answer: B

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9. In Davisson-Germer experiment, the correct relation between angle of diffraction ϕ and glancing angle θ is-

A. $\theta = 90^\circ - \frac{\phi}{2}$

B. $\theta = 90^\circ + \frac{\phi}{2}$

C. $\theta = \frac{\phi}{2}$

D. $\theta = \phi$

Answer: A

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10. The longest wavelength that can be analysed by a sodium chloride crystal of spacing $d = 2.82\text{Å}$ in the second order is -

A. 2.82Å

B. 5.64Å

C. 8.46Å

D. 11.28Å

Answer: A

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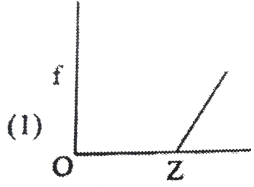
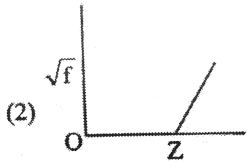
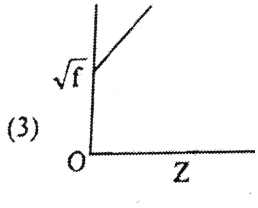
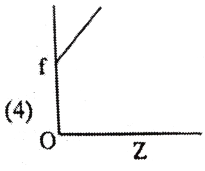
11. Identify the graph which correctly represent the Moseley's law-

A. 

B. 

C. 

D. 

Answer: B

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12. In X-ray tube , when the accelerating voltage V is halved, the difference between the wavelength of K_α line and minimum wavelength of continuous X-ray spectrum

A. remain constant

B. increases

C. becomes half

D. decreases

Answer: B

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13. Light of wavelength λ strikes a photoelectric surface and electrons are ejected with kinetic energy K. If K is to be increased to exactly twice its original value, the wavelength must be changed to λ' such that

A. $\lambda' < \lambda/2$

B. $\lambda > \lambda/2$

C. $\lambda > \lambda' > \lambda/2$

D. $\lambda' = \lambda/2$

Answer: C

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14. Photoelectric emission is observed from a metallic surface for frequencies v_1 and v_2 of the incident light rays $(v_1 > v_2)$. If the maximum values of kinetic energy of the photoelectrons emitted in the two cases are in the ratio of $1 : k$, then the threshold frequency of the metallic surface is

A. $\frac{v_1 - v_2}{n - 1}$

B. $\frac{nv_1 - v_2}{n - 1}$

C. $\frac{nv_2 - v_1}{n - 1}$

D. $\frac{v_1 - v_2}{n}$

Answer: B

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15. If K_1 and K_2 are maximum kinetic energies of photoelectrons emitted when light of wavelength λ_1 and λ_2 respectively are

incident on a metallic surface. If $\lambda_1 = 3\lambda_2$ then

A. $K_1 > \frac{K_2}{3}$

B. $K_1 < \frac{K_2}{3}$

C. $K_1 = 3K_2$

D. $K_2 = 3K_1$

Answer: B

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16. Given that a photon of light of wavelength 10,000 angstrom has an energy equal to $1.23eV$. When light of wavelengths 5000 angstrom and intensity I_0 falls on a photoelectric cell, the saturation current is 0.40×10^{-6} ampere and the stopping potential is 1.36 volt, then the work function is-

A. $0.43eV$

B. $1.10eV$

C. $1.36eV$

D. $2.47eV$

Answer: B

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17. In an α -decay, the kinetic energy of α-particles is $48MeV$ and Q value of the reaction is $50MeV$. The mass number of the mother nucleus is (assume that daughter nucleus is in ground state)

A. 96

B. 100

C. 104

D. none of these

Answer: B

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18. Carbon -14 decays with half-life of about $5,800$ years. In a sample of bone, the ratio of carbon -14 to carbon -12 is found to be $\frac{1}{4}$ of what it is in free air. This bone may belong

to a period about x centuries ago. Where x nearest to

A. 2×58

B. 58

C. $58 / 2$

D. 3×58

Answer: A

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19. A radioactive element decays by $\beta - emission$. A detector records n beta particles in $2s$ and in next $2s$ it records $0.75n$ beta particles. Find mean life correct to nearest whole number. Given ln $|2| = 0.6931$, ln $|3| = 1.0986$.

A. $17s$

B. $7s$

C. $5s$

D. $15s$

Answer: B

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20. Find the Q value of the reaction $P + .^{7} Li \rightarrow .^{4} He + .^{4} He.$ Determine whether the reaction is exothermic or endothermic. The atomic masses of $.^{1} H, .^{4} He$ and $.^{7} Li$ are $1.007825u, 4.002603u,$ and $7.016004u,$ respectively.

A. $17eV$

B. $17keV$

C. $17MeV$

D. $170MeV$

Answer: C

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21. A nuclear fission is represented by the following reaction: $U^{236} = X^{111} + Y^{122} + 3n$

If the binding energies per nucleon of

X^{111}, Y^{122} and U^{236} are $8.6MeV, 8.5MeV$ and $7.6MeV$ respectively, then the energy released in the reaction will be-

A. $200MeV$

B. $202MeV$

C. $195MeV$

D. $198MeV$

Answer: D

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22. The alongside 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.

(i) A + B $\rightarrow$ C +ε (ii) C $\rightarrow$ A + B + ε

(iii) D + E $\rightarrow$ F + ε (iv) F $\rightarrow$ D + E + ε where ε is the energy released. In which reactions , is ε positive?

A. i and iv

B. i and iii

C. ii and iv

D. ii and iii

Answer: A

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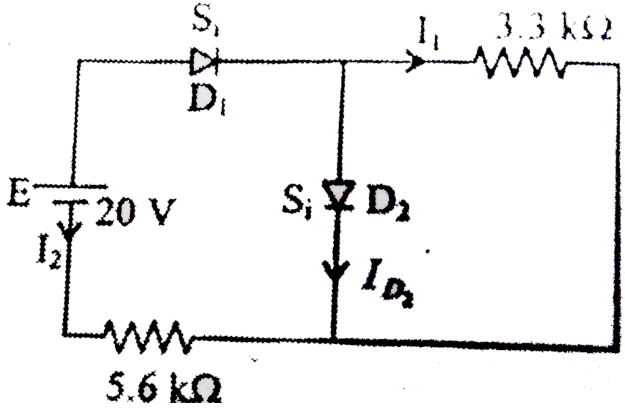
23. In the circuit shown in figure I_1, I_2 and I_{D_2} are respectively-



A. $0.212MA, 3.32mA, 3.108mA$

B. $2.12mA, 3.32mA, 3.108mA$

C. $0.212mA, 0.332mA, 3.108mA$

D. None of these

Answer: A

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24. In a common emitter amplifier, using output resistance of 5000 ohm and input resistance of 2000 ohm, if the input signal voltage is $10mV$ and $\beta = 50$, calculate output volatge & power gain

A. $1.25V, 6250$

B. $3V, 6250$

C. $1.5V, 3050$

D. None of these

Answer: B

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25. In semiconductor the concentrations of electron and holes are $8 \times 10^{18} / m^3$ and $5 \times 10^{18} / m$ respectively. If the mobilities of electrons and hole are $2.3 m^2 /$ volt-sec and $0.01 m^2 /$ volt-sec respectively, then semicondutor is

A. n-type and its resistivity is $0.34 \Omega - m$

B. p-type and its resistivity is $0.034 \Omega - m$

C. n-type and its resistivity is $0.034 \Omega - m$

D. p-type and its resistivity is $3.4\Omega - m$

Answer: A

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26. If $\alpha = 0.98$ and current through emitter $i_e = 20mA$, the value of β is

A. 4.9

B. 49

C. 96

D. 9.6

Answer: B

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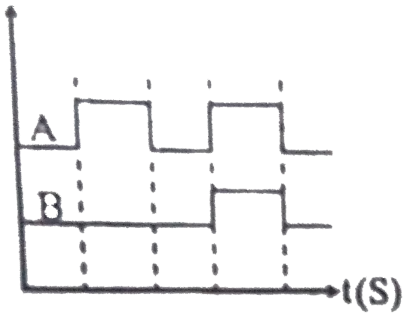
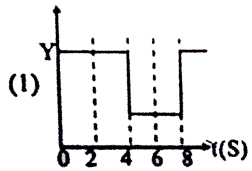
27. The real time variation of input signals A & B are as shown below. If the inputs are into NAND gate, then select the output signals

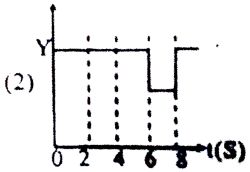
from the following-



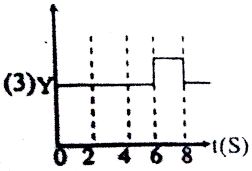
A.



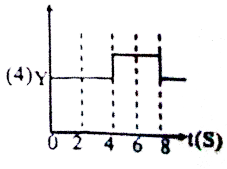
B.



C.



D.



Answer: B

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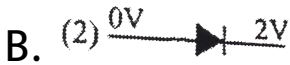
28. Which of the following is forward biased?

A. 

B. 

C. 

D. None of these

Answer: C

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29. If α and β are the current gain in the CB and CE configuration respectively of the transistor circuit, then $(\beta - \alpha)/\alpha\beta =$ .....

A. ∞

B. 1

C. 2

D. 0.5

Answer: B

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30. A screw gauge has a least count of 0.005 mm and its head scale is divided into 200 equal division. The distance between consecutive threads on the screw is:

A. $0.25mm$

B. $0.5mm$

C. $1.00mm$

D. $2.00mm$

Answer: C

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