

+2 Physics * Second revision test (Units – 6 to 10) * Year : 2012 - 13 * Maximum marks : 75**Section : A Answer all the questions****(10 X 1 = 10)**

1. The elliptical orbits of electron in the atom was proposed by
 - a) J.J.Thomson
 - b) Bohr
 - c) Sommerfeld
 - d) de Broglie
2. A Coolidge tube operates at 6200 V. The maximum frequency of the X- rays emitted from the tube is
 - a) 1.5×10^{18} Hz
 - b) 3×10^{18} Hz
 - c) 1.5×10^8 Hz
 - d) 3×10^8 Hz
3. At the threshold frequency, the velocity of electrons is
 - a) Zero
 - b) maximum
 - c) minimum
 - d) infinite
4. According to relativity, the length of the rod in motion
 - a) is the same as its rest length
 - b) is more than its rest length
 - c) is less than its rest length
 - d) zero
5. The mass defect of a certain nucleus is found to be 0.003 amu. Its binding energy is
 - a) 27.93 eV
 - b) 27.93 MeV
 - c) 2.793 eV
 - d) 2.793 MeV
6. The radio isotope used in agriculture is
 - a) $_{15}P^{31}$
 - b) $_{15}P^{32}$
 - c) $_{15}Na^{23}$
 - d) $_{15}Na^{24}$
7. The Colour of the light emitted by a LED depends on
 - a) its reverse bias
 - b) the amount of forward bias current
 - c) its forward bias
 - d) the type of the semiconductor material
8. Improper biasing of a transistor circuit produces
 - a) heavy loading of emitter current
 - b) distortion in the output signal
 - c) excessive heat at the collector terminal
 - d) faulty location of load line
9. The Rf channel in a radio transmitter produces
 - a) audio signals
 - b) high frequency carrier waves
 - c) both audio and high frequency carrier waves
 - d) low frequency carrier waves
10. In phase modulation
 - a) only the phase of the carrier wave varies
 - b) only the frequency of the carrier wave varies
 - c) both the phase and the frequency of the carrier wave vary
 - d) there is no change in the phase and frequency of the carrier wave

Section : B Answer any TEN questions**(10 X 3 = 30)**

11. Define modulation factor.
12. What is phase modulation.
13. What are the different types of wire and cable used for tele communication ?
14. What is zener break down ?
15. Define band width of the amplifier.
16. Give the Barkhausen criteria for oscillations.
17. Calculate the radius of the $_{13}Al^{27}$ nucleus.
18. Define 1 amu.
19. State any two Soddy - Fajan's radioactive displacement law.
20. What is threshold frequency ?
21. What are matter waves ?
22. At what speed is a particle moving if the mass is equal to three times its rest mass ?
23. What are cathode rays ?
24. State Bragg's law.
25. Calculate the mass of the electron from the known values of the specific charge and the charge of electron.

Section : C Answer any THREE questions (Question number 28 is compulsory)**(3 X 5 = 15)**

26. Explain the various spectral series of hydrogen.
27. Explain Hallwachs experiment on photo electric effect.
28. Calculate the energy released in the reaction : $_{13}Al^{27} + {}_1H^2 \rightarrow {}_{12}Mg^{25} + {}_2He^4$

Mass of $_{13}Al^{27}$ = 26.981535 amu ;		Mass of ${}_1H^2$ = 2.014102 amu
Mass of $_{12}Mg^{25}$ = 24.98584 amu ;		Mass of ${}_2He^4$ = 4.002 604 amu

(OR)

The decay constant of a radio-active element is 0.000231 per day . Calculate the half life and the mean life.

29. Explain the function of OR and NAND gates.
30. Explain the principle of MODEM.

Section : D Answer any TWO questions**(2 X 10 = 20)**

31. Derive an expression for the energy of an electron in the n^{th} orbit of hydrogen atom.
32. Derive $N = N_0 e^{-\lambda t}$.
33. Explain the action of Colpitt's Oscillator.
34. Explain the action of vidicon camera tube.

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Second Revision Test: 2012– 2013

Register Number :

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PHYSICS (Portion: Unit - 6 to Unit - 10)

Time allowed : 3 hours]

[Maximum Marks : 150

Part - I

Note : (i) Answer all the questions (30 X 1 = 30)
 (ii) Choose the correct answer
 (iii) Each question carries one mark.

1. According to Bohr's postulates, which of the following quantities take discrete values?
 a) kinetic energy b) potential energy c) angular momentum d) momentum
2. The first excitation potential energy or the minimum energy required to excite the atom from ground state of hydrogen atom is
 a) 13.6 eV b) 10.2 eV c) 3.4 eV d) 1.89 eV
3. A Coolidge tube operates at 24800 V. The minimum wavelength of X-rays emitted is
 a) 0.5 \AA^0 b) 2.5 \AA^0 c) 1.5 \AA^0 d) 0.05 \AA^0
4. In hydrogen atom, which of the following transitions produce a spectral line of maximum frequency?
 a) $2 \rightarrow 1$ b) $6 \rightarrow 2$ c) $4 \rightarrow 3$ d) $5 \rightarrow 2$
5. A crystal diffracts monochromatic X-rays, If the angle of diffraction for the second order is 90° , then for the first order the angle of diffraction is
 a) 60° b) 45° c) 30° d) 15°
6. The wave number is defined as the number of waves
 a) produced in one second b) in a distance of one metre
 c) in a distance of 3×10^8 metre d) in a distance of λ metre
7. The stopping potential of a metal surface is independent of
 a) frequency of incident radiation b) intensity of incident radiation
 c) the nature of the metal surface d) velocity of electrons emitted
8. At the threshold frequency, the velocity of the electrons is
 a) zero b) maximum c) minimum d) infinite
9. The photoelectric effect can be explained on the basis of
 a) corpuscular theory b) wave theory c) electromagnetic theory d) quantum theory
10. The mass defect of a certain nucleus is found to be 0.03 amu. Its binding energy is
 a) 13.96 MeV b) 10.2 eV c) 27.93 MeV d) 13.6 eV
11. The radio-isotope used in agriculture is
 a) $_{15} \text{P}^{31}$ b) $_{15} \text{P}^{32}$ c) $_{11} \text{Na}^{23}$ d) $_{11} \text{Na}^{24}$
12. Atom bomb is based on
 a) uncontrolled fusion reaction b) thermonuclear reaction
 c) uncontrolled fission reaction d) controlled fission reaction
13. The nuclear force is due to the continuous exchange of particles called
 a) leptons b) mesons c) hyperons d) photons
14. The binding energy of $_{26} \text{Fe}^{56}$ nucleus is
 a) 88 MeV b) 493 MeV c) 41.3 MeV d) 8.8 MeV
15. The time taken by the radioactive element to reduce to $(1/e)$ times is
 a) half life b) mean life c) half life / 2 d) twice the mean life
16. In a forward bias characteristic curve, a diode appears as
 a) a high resistance b) a capacitor c) an OFF switch d) an ON switch

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17. The colour of light emitted by a LED depends on
 - a) its reverse bias
 - b) the amount of forward current
 - c) its forward bias
 - d) type of semiconductor material
18. Improper biasing of a transistor circuit produces
 - a) heavy loading of emitter current
 - b) distortion in the output signal
 - c) excessive heat at collector terminal
 - d) faulty location of load line
19. An oscillator is
 - a) an amplifier without feedback
 - b) a converter of ac to dc energy
 - c) nothing an amplifier
 - d) an amplifier with feedback
20. According to the laws of Boolean algebra, the expression ($A + AB$) is equal to
 - a) A
 - b) AB
 - c) B
 - d) \bar{A}
21. In CE single stage amplifier, the voltage gain at the mid frequency is 10. the voltage gain at the upper cut-off frequency is
 - a) 10
 - b) 14.14
 - c) 7.07
 - d) 20
22. In common emitter amplifier, the phase reversal between the input and output voltages is
 - a) 0°
 - b) 90°
 - c) 270°
 - d) 180°
23. Avalanche breakdown is primarily dependent on the phenomenon of
 - a) collision
 - b) ionization
 - c) doping
 - d) recombination
24. High frequency waves follow
 - a) ground wave propagation
 - b) the line of sight direction
 - b) ionospheric propagation
 - d) the curvature of the earth
25. The main purpose of modulation is to
 - a) combine two waves of different frequencies
 - b) acquire wave shaping of the carrier wave
 - c) transmit low frequency information over long distances efficiently
 - d) produce side bands
26. In amplitude modulation, the bandwidth is
 - a) equal to the signal frequency
 - b) twice the signal frequency
 - c) thrice the signal frequency
 - d) four times the signal frequency
27. The purpose of dividing each frame into two fields so as to transmit 50 views of the picture per second is
 - a) to avoid flicker in the picture
 - b) that 50 Hz is the power line frequency
 - c) that higher frequencies are easy to handle
 - d) to avoid unwanted noise in the signals
28. Printed documents to be transmitted by fax are converted into electrical signals by the process of
 - a) reflection
 - b) scanning
 - c) modulation
 - d) light variation
29. In television, blanking pulse is applied to
 - a) horizontal plates
 - b) vertical plates
 - c) control grid
 - d) filament
30. The principle used for transmission of light signals through optical fiber is
 - a) refraction
 - b) diffraction
 - c) total internal reflection
 - d) polarisation

Part – II

Note :

Answer any fifteen questions.

(15 X 3 = 45)

31. What are the drawbacks of Rutherford's atom model?
32. What is meant by normal population?
33. Give the differences between hard X-rays and soft X-rays?
34. Calculate the mass of the electron from the known values of specific charge and charge of the electron.
35. Find the accelerating potential of the electron, if its de Broglie wavelength is 1 \AA .
36. Define: stopping potential.
37. Give the applications of electron microscope.
38. State the fundamental postulates of special theory of relativity.

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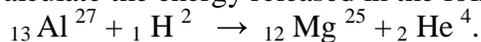
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39. Calculate the energy equivalence of 1 amu.
40. Define: curie.
41. What are isotones? Give an example.
42. What is nuclear fission? Give an example.
43. What is rectification?
44. Define: bandwidth of an amplifier.
45. What are the advantages of negative feedback?
46. The base current of the transistor is 50 μ A and the collector current is 25 mA. Calculate β value.
47. What is skip distance?
48. Define: modulation factor.
49. What are the advantages of fiber optical communication system?
50. What is Fax? Give its uses.

Part – III

- Note :**
- (i) **Answer the question 58 compulsory.** (7 X 5 = 35)
 - (ii) **Of the remaining 11 questions, answer any six questions.**
 - (iii) **Draw diagrams wherever necessary.**

51. Derive Bragg's law in X-ray diffraction.
52. State any five properties of canal rays.
53. State the laws of photoelectric effect.
54. Explain Hallwachs experiment on photoelectric effect.
55. How fast would a rocket have to go relative to an observer for its length to be corrected to 99% of its length at rest?
56. Write a short notes on latitude effect of cosmic rays.
57. Derive $N = N_0 e^{-\lambda t}$.
58. Calculate the energy released in the following reaction.



Given , mass of ${}_{13}\text{Al}^{27}$ nucleus = 26.981535 amu; mass of ${}_1\text{H}^2$ nucleus = 2.014102 amu;
 mass of ${}_2\text{He}^4$ nucleus = 4.002604 amu & mass of ${}_{12}\text{Mg}^{25}$ = 24.98584 amu.

(OR)

A reactor is developing energy at the rate of 32 MW. Calculate the required number of fissions per second of ${}_{92}\text{U}^{235}$. Assume that energy per fission is 200 MeV.

59. Explain the working of bridge rectifier.
60. Explain the principle of feedback amplifier and deduce the equation for voltage gain with feedback.
61. Write a short notes on modem.
62. Write a short notes on amplitude modulation.

Part – IV

- Note :**
- i) **Answer any four questions in detail.** (4 X 10 = 40)
 - ii) **Draw diagrams wherever necessary.**

63. Explain J.J. Thomson's experiment to find the specific charge of an electron.
64. Derive an expression for the energy of an electron in the n^{th} orbit of hydrogen atom.
65. Explain the method to find the isotopic masses using Bainbridge mass spectrometer.
66. Explain the discovery of the neutron and give the properties of neutrons.
67. Explain the working of Colpitt's oscillator.
68. Explain the working of a single stage CE amplifier.
69. Explain the working of a vidicon camera tube.
70. Explain the analytical treatment of amplitude modulated wave.

* Best wishes *