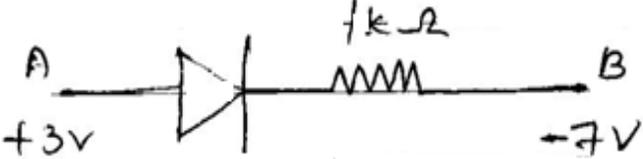


I. Choose the correct answer:

15x1=15

- The alloys used for muscle wires in Robots are \_\_\_\_\_.  
 a) Shape memory alloys    b) Gold copper alloys  
 c) Gold silver alloys        d) Two dimensional alloys
- The method of making nano material by assembling the atoms is called \_\_\_\_\_.  
 a) Top down approach        b) Bottom up approach  
 c) Cross down approach      d) Diagonal approach
- The internationally accepted frequency deviation for the purpose of FM broadcasts \_\_\_\_\_.  
 a) 75 KHz    b) 68 KHz    c) 80 KHz    d) 70 KHz
- Consider an ideal junction diode. Find the value of current flowing through AB is \_\_\_\_\_.  


- When a transistor is fully switched on, it is said to be \_\_\_\_\_.  
 a) shorted    b) saturated    c) cut-off    d) open
- The principle in which a solar cell operates \_\_\_\_\_.  
 a) Diffusion    b) Recombination    c) Photo voltaic action  
 d) Carrier flow
- The barrier potential of a silicon diode is approximately \_\_\_\_\_.  
 a) 0.7V    b) 0.3V    c) 2.0V    d) 2.2V
- $A \cdot \bar{A} =$  \_\_\_\_\_.  
 a) A    b)  $\bar{A}$     c) 1    d) 0
- The electric potential between a proton and an electron is given by  $V = V_0 \ln \left( \frac{r}{r_0} \right)$ , where  $r_0$  is a constant. Assume that Bohr atom model is applicable to potential, then variation of radius of nth orbit  $r_n$  with the principal quantum number n is \_\_\_\_\_.  
 a)  $r_n \propto \frac{1}{n}$     b)  $r_n \propto n$     c)  $r_n \propto \frac{1}{n^2}$     d)  $r_n \propto n^2$
- The ratio between the first three orbits of hydrogen atom is  
 a) 1:2:3    b) 2:4:6    c) 1:4:9    d) 1:3:5

- Find the angular momentum in the 5<sup>th</sup> orbit of hydrogen atom  
 a)  $52.5 \times 10^{-34} \text{ Kg m}^2\text{s}^{-1}$     b)  $5.25 \times 10^{-36} \text{ Kg m}^2\text{s}^{-1}$   
 c)  $5.25 \times 10^{-34} \text{ Kg m}^2\text{s}^{-1}$     d)  $0.52 \times 10^{-34} \text{ Kg m}^2\text{s}^{-1}$
  - The radius of the 5<sup>th</sup> orbit of hydrogen atom is  $13.25A^0$ . Calculate the wavelength of the electron in the 5<sup>th</sup> orbit.  
 a)  $1.664 A^0$     b)  $16.64 A^0$     c)  $166 A^0$     d)  $0.166 A^0$
  - In photo electric emission, a radiation whose frequency of a certain metal is incident on the metal. Then the maximum possible velocity of the emitted electron will be \_\_\_\_\_.  
 a)  $\sqrt{\frac{h\nu_0}{m}}$     b)  $\sqrt{\frac{6h\nu_0}{m}}$     c)  $2\sqrt{\frac{h\nu_0}{m}}$     d)  $\sqrt{\frac{h\nu_0}{2m}}$
  - If a light of wavelength 330 nm is incident on a metal with work function 3.55 eV, the electrons are emitted. Then the wavelength of the emitted electron is \_\_\_\_\_. (Take  $h=6.6 \times 10^{-34} \text{ Js}$ )  
 a)  $< 2.75 \times 10^{-9} \text{ m}$     b)  $\geq 2.75 \times 10^{-9} \text{ m}$   
 c)  $\leq 2.75 \times 10^{-12} \text{ m}$     d)  $< 2.5 \times 10^{-10} \text{ m}$
  - In a Young's double-slit experiment, the slit separation is doubled. To maintain the same fringe spacing on the screen, the screen-to-slit distance D must be changed to,  
 a) 2D    b)  $\frac{D}{2}$     c)  $\sqrt{2}D$     d)  $\frac{D}{\sqrt{2}}$
- II. Answer any 6 of the following: 6x2=12
- Q.No.17 is compulsory
- Define stopping potential.
  - Find the de broglie wavelength associated with an alpha particle which is accelerated through a potential difference of 400V. Given that the mass of the proton is  $1.67 \times 10^{-27} \text{ Kg}$ .
  - Define de broglie wave length of electrons.
  - Write down the drawbacks of Bohr atom model.
  - How electron-hole pairs are created in a semiconductor material?
  - State the applications of Global positioning system.
  - Mention any 2 advantages and disadvantages of Robotics.
  - Define skip distance and skip zone.

III. Answer any 6 of the following:

6x3=18

Q.no.25 is compulsory

24. State and explain Brewster's law.

25. A proton and an electron have same de broglie wavelength.

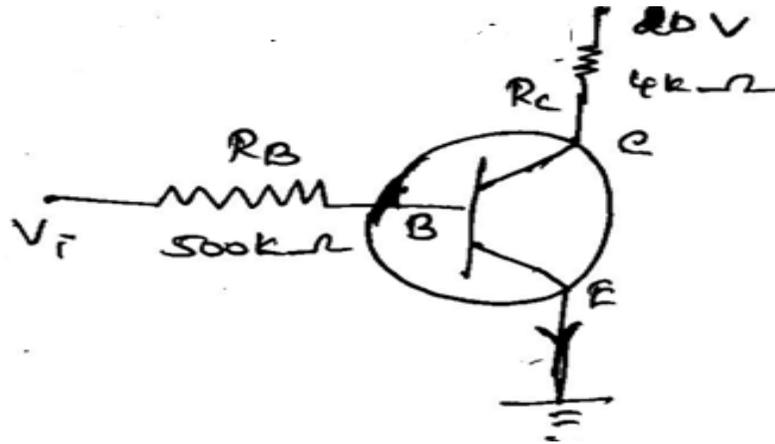
Which of them moves faster and which possesses more kinetic energy?

26. State and explain postulates of Bohr atom model.

27. State and explain De morgan's theorem with necessary diagram.

28. In the circuit shown in the figure, the input voltage  $V_i$  is 20V,

$V_{BE}=0V$  and  $V_{CE}=0V$ . What are the values of  $I_B$ ,  $I_C$ ,  $\beta$ ?



29. State three Application of Information and Communication Technology in Agriculture and mining.

30. Explain the idea of carbon dating.

IV. Answer any 5 of the following:

5x5=25

31. Discuss the spectral series of hydrogen atom.

32. Describe the function of a transistor as an amplifier with the neat circuit diagram. Sketch the input and output wave form.

33. Explain the construction and working of full wave rectifier.

34. Obtain lens maker's formula and mention its significance.

35. Obtain the equation for band width in Young's double slit experiment.

36. Explain the construction and working of an electron microscope.

37. Explain Einstein's photo electric equation and explanation in detail.