21. The graph below shows two curves showing the variation of current with the frequency of an AC through LCR series circuit. The lower curve corresponds to the resonance when resistor R_2 is used and the upper when the resistor R_1 is used.
   a. What do you mean by resonance in LCR circuit? 1
   b. Show that the frequency at which resonance occurs is: $f = \frac{1}{2\pi\sqrt{LC}}$, Where symbols carry their usual meanings. 2
   c. Obtain the resonating frequency from the graph below. 1
   d. Which is greater R_1 or R_2? Justify your answer. 1
   e. The inductor used has an inductance of $0.08H$. Find the capacitance of the capacitor used. 2

   f. What would be the effect in the peak of the upper curve if some resistor is connected parallel to R_1? 1
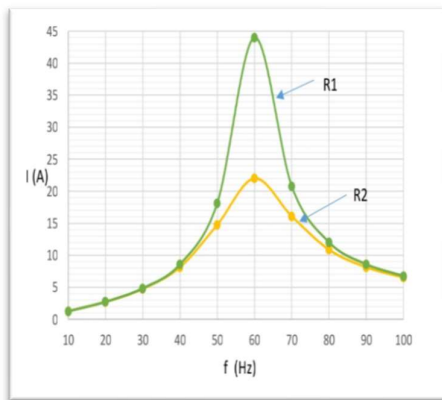
'OR'

Potentiometer is the ideal voltmeter that measures the emf of the cell very accurately.
   a. State the principle of potentiometer. Explain how you compare the emfs of two cells using potentiometer. 4
   b. Why do we prefer a potentiometer with longer wire? 1
   c. The potentiometer wire has resistance of 10Ω. If the resistance R is maintained to be 40Ω, the source of unknown resistance E is balanced by $40\ cm$ length of the potentiometer wire. What is the value of E? 3
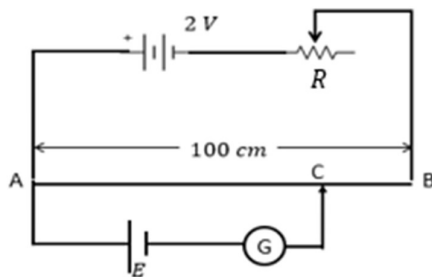
22. Bohr's theory givers the idea of structure of hydrogen atom.
   a. States the postulates of Bohr's atomic model. 2
   b. In the given energy level diagram,
      i. The largest possible energy emission in given condition. 1
      ii. The longest wavelength of emitted photon. 1
      iii. From which atom, the energy levels have been taken. 1
      iv. Explain the significance of the energy levels having negative values. 2
   c. Define ionization potential. 1
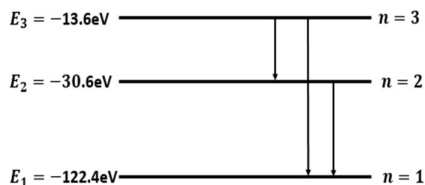
'OR'

Radioactivity is a spontaneously occurring phenomenon in nature.
   a. Define radioactivity. 1
   b. Define radio carbon Dating. Explain the technique to estimate the age of dead organism using carbon-14 isotope 3
   c. How are the atomic and mass number of a radioactive nucleus changed by emission of alpha particle and positive beta particle? 2
   d. Find the half-life of U^{238}, if $1gm$ of it emits 1.24×10^4 α particles per second. 2

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