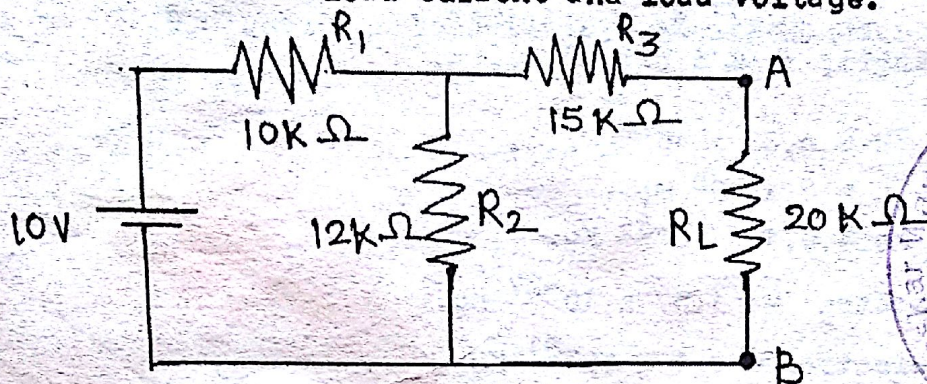


1. Attempt all questions.
2. Draw neat diagrams wherever necessary.
3. Figures to the right indicate full marks.
4. Non-programmable calculator is allowed.

- a. Determine the thevenin equivalent of the following circuit and hence calculate the load current and load voltage. (8)



(OR)

- a. State and explain reciprocity theorem. (8)
- b. Find the condition of balance for wein bridge, how would you determine the frequency of the ac supply ? (7)
- a. Explain the law of successive disintegration. Derive an expression for the number of atoms in the first two daughter elements formed in the process. (8)
- (OR)
- a. Explain the meson theory of nuclear forces. Show that the mass of π -mesons is 275 times mass of electron. (8)
- b. What is Radiometric Dating? Explain how the uranium dating helps to investigate the age of the earth. (7)
- a. Explain the compton effect and derive an expression for the compton shift. (8)
- (OR)
- a. Explain in brief the concept of wave function ψ and derive the expression for wave group formed by the superposition of two waves of wave functions ψ_1 & ψ_2 . (8)
- b. Explain the phenomenon of gravitational red shift. Derive necessary relation. (7)
- a. Obtain the condition of balance for Maxwell's L/C bridge and determine unknown inductance and resistance. (5)
- (OR)
- a. Show how to measure the inductance of a coil using Maxwell's inductance bridge. (5)
- b. Give a brief concept of nuclear size and show that the radius of an atomic nucleus is, $R = R_0 A^{1/3}$ (5)
- (OR)
- b. Define half-life time of a radioactive element. Show that it is inversely proportional to the decay constant. (5)