Prob.1 (a) Derive the expressions for the elements of Y-network in terms of Δ-network and vice-versa.

(b) Compute the equivalent impedance, current I and current I_R for the circuit given (Fig.1)

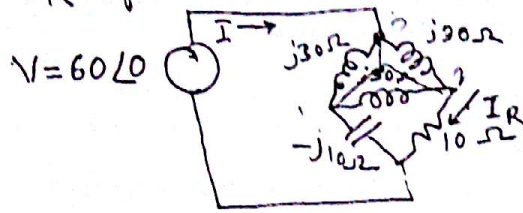$V = 60 \angle 0$

⑤

Fig.1

Prob.2 Switch S is closed at t=0. Determine the initial and final values of i, v, $\frac{di}{dt}$ and $\frac{dv}{dt}$. Also find $i(t)$. (Fig.2) v_L across R_2
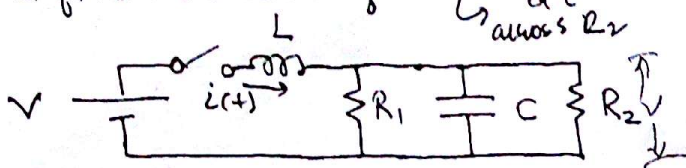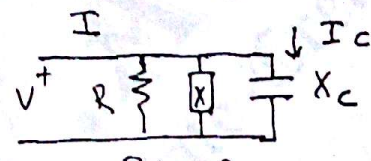
⑤

Fig.2   Fig.3

Prob.3 A current $i_c = 6\sqrt{2} \cos 1000t$ Amp. flows in $250\mu F$ capacitor (Fig.3). (i) Find V_c; (ii) Show V_c and I on phasor diagram and specify R and X. ($I = 10 \angle -37°$) ⑤

Prob.4 Using a $50\mu A$ movement with a $10,000\Omega$ internal resistance (a) Design a multirange d.c. ammeter with range of 1 mA, 10 mA and 100 mA (b) Design a multistage voltmeter with ranges of 3V, 10V, 50V and 150V. ⑤

Prob.5 The total core loss (hysteresis & eddy current) for a magnetic sheet steel is found to be 1800 watts at 60 Hz. If the flux density is kept constant and the frequency of the supply increased by 50%, the total core loss is found to be 3000 watts. Compute the separate hysteresis and eddy current losses in both the frequencies ⑤

P.T.O.

①