

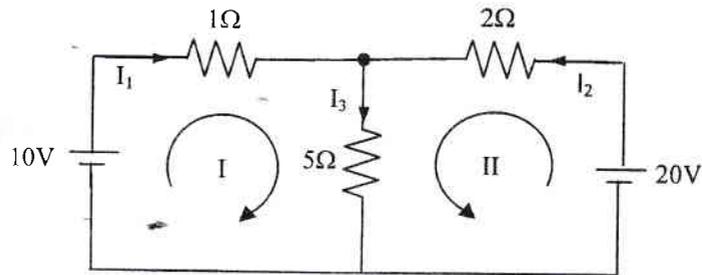
Bago University
Department of Physics
First Semester Examination, March 2019

Third Year (BSc)
(Physics Specialization)

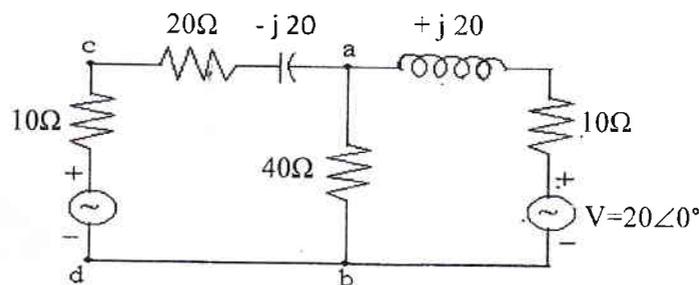
Phys 3101
AC Circuits & Electronics
Time Allowed: (3) Hours

Answer any Six questions.

- 1 (a) State Kirchoff's rules in words as well as in mathematical form.
 (b) Find the currents I_1 , I_2 and I_3 shown in Figure.

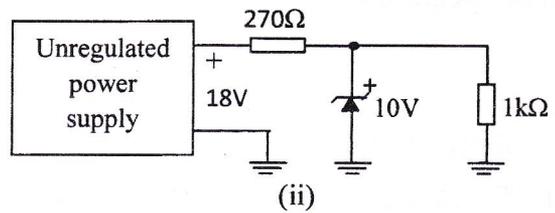
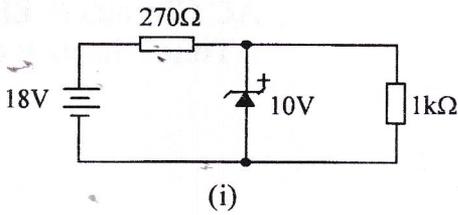


- 2 (a) Calculate the instantaneous current and the average power per cycle for pure R circuit.
 (b) An air core coil which has a self inductance L of 0.1H is connected to a $110\text{V}-60\text{Hz}$ source. Find the current flowing through the coil. If the current $i(t)$ through the coil is expressed as $i(t) = I_m \sin \omega t$, find the energy stored in the magnetic field from the instant $\omega t_1 = \pi / 6$ to the instant $\omega t_2 = 3\pi / 2$.
- 3 (a) Calculate the impedance and the total voltage in a series R-L circuit.
 (b) In the series R-L-C circuit, the voltage and the current are given by $v(t) = 353.5 \cos (3000t - 10^\circ)$ and $i(t) = 12.5 \cos (3000t - 55^\circ)$. Find the values of R and C. ($L = 0.01\text{H}$)
- 4 (a) Explain the superposition theorem, Thevenin's theorem and Norton's theorem.
 (b) Find the current flowing through the 40Ω resistor shown in figure by applying Thevenin's theorem.



- 5 (a) Explain ripple factor. Calculate the capacitance needed to produce a specified ripple factor for a given load resistance in a full-wave rectifier.
 (b) In the bridge full-wave rectifier with capacitor filter, a power supply transformer has a turn ratio of 10:1, if the primary is connected to a $115\text{ V}_{\text{rms}}$, filter capacitance has $50\ \mu\text{F}$ and load resistance is $2.2\ \text{k}\Omega$, determine the ripple factor.
- 6 (a) Discuss the operation of bridge full-wave rectifier with diagrams.
 (b) Draw seven-segment indicator and explain seven-segment display.

- 7 (a) How many regions can operate the zener diode and explain? Draw ideal zener diode and explain.
- (b) Is the zener diode of figure (i) operating in the breakdown region? What does the zener current equal in figure (ii)?



- 8 (a) Draw voltage-divider bias and write down its equation.
- (b) A npn transistor is connected in a common-collector configuration. Determine I_B , I_C , I_E and the voltage at each transistor terminal with respect to ground (V_E , V_B , and V_C). ($V_{BB} = 10\text{ V}$, $V_{CC} = 20\text{ V}$, $R_E = 10\text{ k}\Omega$, $\beta_{dc} = 200$)
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