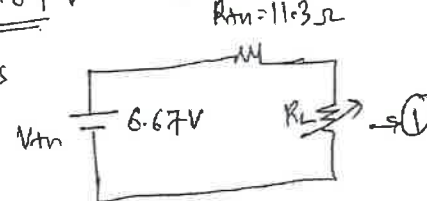
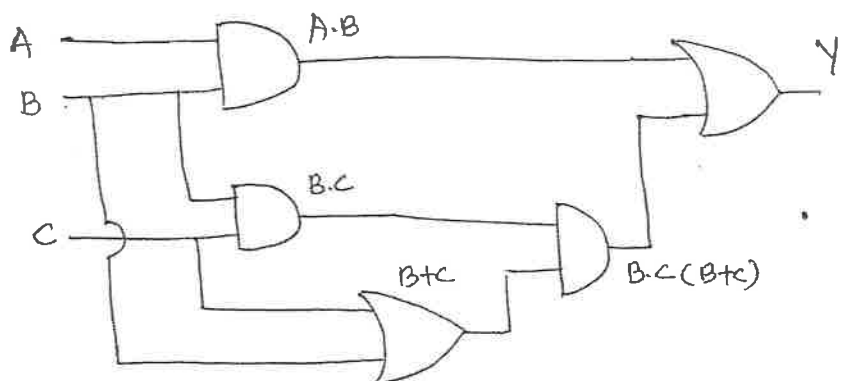


SEM-II	①	F. Y. B. Sc PHYSICS – II	100 MARKS 3 HRS
Q.1	(A) Select the correct option :		12
	i)	(b) inductance	
	ii)	(a) Hay's	
	iii)	(a) 40 %	
	iv)	(c) 0.5	
	v)	(d) all of the above	
	vi)	(b) are zero	
(B) Answer in one sentence :			03
	i)	Since the balancing condition of Wien's bridge depends on the angular frequency, therefore it's source must be a pure sinusoidal?	
	ii)	PIV (peak inverse voltage) rating of a diode is the maximum voltage applied to the diode without damaging it.	
	iii)	Electric potential is potential energy per unit charge.	
(C) Fill in the blanks			05
	i)	Phasor	
	ii)	Q-factor or Q value	
	iii)	Infinite	
	iv)	A	
	v)	Constant	
Q.2	(A) Attempt any one		08
	i)	Circuit diagram of series C-R circuit------(2) Finding the phasor voltages------(2) Obtaining the impedance of the circuit------(2) Phasor Diagram------(2)	
	ii)	Explanation of AC bridge------(2) Obtaining the conditions required to balance AC bridge------(4) Diagram of Maxwell's LC bridge------(2)	
(B) Attempt any one			08
	i)	Circuit diagram of series L-C-R combination------(2) Derivation for impedance of the circuit------(3) Expression for phase difference between the current and the voltage-----(1) Phasor diagrams for voltage in LCR circuit------(2)	
	ii)	Circuit diagram and explanation of Wein's bridge------(3) Obtaining balance condition for Wein's bridge------(4) Formula for angular frequency------(1)	

	(C) Attempt any one	04
i)	$V_{max} = V_{cc} = 15V, \omega = 100\pi, R = 5\Omega, L = 10mH$ <p>Reactance of Inductor $X_L = 2\pi fL = \omega L$ } → ②</p> $\therefore X_L = 100\pi \times 10 \times 10^{-3} \Omega$ $X_L = 3.14 \Omega$ <p>Impedance of the circuit $Z^* = \sqrt{R^2 + X_L^2}$ → ①</p> $\therefore Z^* = 5.9 \Omega$ $I_{rms} = \frac{V_{rms}}{ Z^* } = \frac{V_{max}}{\sqrt{2} Z^* } = \frac{15}{8.34} = 1.80 A \rightarrow ①$	
ii)	$R_2 = 2.2K\Omega, R_4 = 1K\Omega, C_3 = 0.1\mu F$ <p>Balance condition of de Sauty's bridge is } → ①</p> $\frac{C_1}{C_3} = \frac{R_4}{R_2}$ $\therefore C_1 = \frac{R_4}{R_2} \times C_3 = \frac{1}{2.2} \times 0.1 \times 10^{-6} = 0.045 \times 10^{-6} F \rightarrow ②$ $\therefore C_1 = 0.045 \mu F$ <p>The value of other capacitance needed to balance bridge is $0.045 \mu F$ → ①</p>	
Q.3	(A) Attempt any one	08
i)	Diagram of a bridge full wave rectifier------(2) Explanation during positive half cycle -----(3) Explanation during negative half cycle -----(3)	
ii)	Electronic adder explanation------(2) Full adder logical circuit with explanation------(3) Verifying its truth table------(3)	
	(B) Attempt any one	08
i)	Statement of reciprocity theorem------(1) Explanation with the help of network circuit------(2) Finding the value of I_{L1} ------(2) Finding the value of I_{L2} ------(2) Conclusion------(1)	
ii)	Explanation of zener diode------(2) Circuit diagram for zener diode as voltage regulator------(2) Discussing the circuit for input voltage greater than or less than zener voltage -----(4)	
	(C) Attempt any one	04

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	i)	$R_{th} = \frac{R_1 R_2}{R_1 + R_2} + R_3 = \frac{10 \times 5}{10 + 5} + 8 = 11.33 \Omega \rightarrow \textcircled{1}$ <p>for V_{th},</p> $I = \frac{V}{R_1 + R_2} = \frac{20}{15} = 1.33 \text{ A} \quad \textcircled{2}$ $\therefore V_{th} = I R_2 = 1.33 \times 5 = 6.67 \text{ V}$ <p>\therefore Thevenin equivalent circuit is</p> 	
	ii)	$V_{in} = 50 \text{ V}$, Series resistance $R = 1 \text{ k}\Omega$, load resistance $= 2.2 \text{ k}\Omega$ $V_Z = 25 \text{ V}$ Voltage across series resistance R , $V_R = V_{in} - V_Z = 50 - 25 = 25 \text{ V} \quad \textcircled{1}$ Current through series resistance R is $I_R = \frac{V_R}{R} = \frac{25 \text{ V}}{1 \text{ k}\Omega} = 25 \text{ mA} \quad \textcircled{1}$ $\therefore V_Z = V_L = 25 \text{ V} \quad \textcircled{1}$ $\therefore I_L = \frac{V_L}{R_L} = \frac{25 \text{ V}}{2.2 \text{ k}\Omega} = 11.36 \text{ mA}$ we have, $I_R = I_Z + I_L$ $\therefore I_Z = I_R - I_L = 25 - 11.36 = 13.64 \text{ mA} \quad \textcircled{1}$	
Q.4	(A)	Attempt any one	08
	i)	Expression for discrete charge distribution------(2) Explanation of linear charge distribution------(2) Explanation of surface charge distribution------(2) Explanation of volume charge distribution------(2)	
	ii)	Construction of Helmholtz coil with diagram------(2) Obtaining the magnetic field produced by it------(2) Finding its value at midpoint of the line joining the centres-----(2) Explaining the magnetic field with the help of graph------(2)	
	(B)	Attempt any one	08
	i)	Assumption of point charges distribution ------(2) Finding the work done to bring the charges------(4) Conclusion------(2)	
	ii)	Explaining the solenoid------(2) Obtaining the magnetic field of current carrying solenoid------(2) Proving the value at the end is half the field at a point well inside------(2) Plot of the magnetic field along the axis of solenoid------(2)	

(C)	Attempt any one	04
i)	<p>Let $q_0 = 1C, q_1 = 2\mu C, q_2 = 3\mu C, q_3 = 5\mu C$ } \rightarrow ① $x_1 = 2cm, x_2 = 3cm, x_3 = 5cm$</p> <p>Using superposition principle,</p> $F = \frac{q_0}{4\pi\epsilon_0} \left[\frac{q_1}{r_1^2} + \frac{q_2}{r_2^2} + \frac{q_3}{r_3^2} \right] \rightarrow$ ① $= 9 \times 10^9 \times 1 \times \left[\frac{2 \times 10^{-6}}{4^2} + \frac{3 \times 10^{-6}}{3^2} + \frac{5 \times 10^{-6}}{5^2} \right] \times 10^{-4} \rightarrow$ ① $F = 9.27 \times 10^{-7} N \rightarrow$ ①	
ii)	<p>for straight long conductor carrying current, } \rightarrow ② $B = \frac{\mu_0 I}{2\pi x}$</p> <p>Here, $I = 12A, x = 25cm = 25 \times 10^{-2}m$</p> $\therefore B = \frac{\mu_0 \times 2I}{4\pi x} = 10^{-7} \times \frac{2 \times 12}{25 \times 10^{-2}} = 0.96 \times 10^{-5} \text{wb} \rightarrow$ ② $\therefore B = 0.96 \times 10^{-5} \text{wb.}$	
Q.5 Attempt any four		20
i)	<p>Statement of Superposition theorem------(2) Basic steps for solving a network circuit------(3)</p>	
ii)	<p>$Y = A.B + B.C (B+C)$</p>  <p style="text-align: right;">---(5)</p>	
iii)	<p>Importance of capacitor as a filter------(2) Explanation with the help of graph------(3)</p>	
iv)	<p>Explanation of EX-OR gate------(2) It's construction using basic gates------(3)</p>	

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	v)	Discussion of electric field-----(2) Obtaining expression in terms of force and charge-----(3)	
	vi)	Statement of Biot-Savarts law-----(2) It's explanation-----(3)	

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Abdul Set I

