



NATIONAL OPEN UNIVERSITY OF NIGERIA
PLOT 91, CADASTRAL ZONE, NNAMDI AZIKIWE EXPRESSWAY, JABI - ABUJA
FACULTY OF SCIENCES
DEPARTMENT OF PURE AND APPLIED SCIENCES
SEPTEMBER 2020_1 EXAMINATION

COURSE CODE: PHY 308
COURSE TITLE: ELECTRONICS I
CREDIT UNIT 2
TIME ALLOWED (2 HRS)
INSTRUCTION: *Answer question 1 and any other three questions*

Question one

- (a) Define (i) an amplifier (**2 mark**) (ii) Define the gain of an amplifier (**2 marks**)
- (b). List the three basic properties of an amplifier (**3 mark**)
- (c). What are the three basically possible ways to connect a Bipolar Transistor within an electronic circuit? (**3 mark**)
- (d). List the three elements of the two-junction transistor (**3 mark**)
- (e). List the two classes of Integrated Circuits (ICs) based on the function (**2 marks**)
- (f). The input and output voltages of a filter network are 16 mV and 8 mV respectively. (**2 marks**)
- (g). Differentiate between negative feedback and positive feedback (**2 marks**)
- (h). What are the determining factors in judging the stability of a feedback amplifier as a function of frequency? (**2 marks**)
- (i). Differentiate between the gain margin and phase margin of an amplifier (**2 marks**)
- (j). When is the resonance effect said to occur in an LC circuit? (**2 marks**)

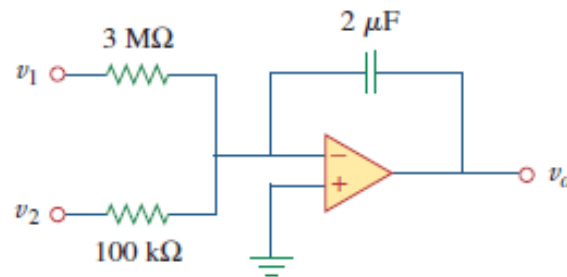
Question two

- (a) List the different classes of amplifier operations (**5 mark**).
- (b). Write short notes on any two of the classes of amplifier operation (**10 mark**).

Question three

- (a) What is an operational amplifier? (**2 mark**)
- (b) Determine the output voltage of an op-amp for input voltages of $V_{i1} = 150 \mu\text{V}$ and $V_{i0} = 140 \mu\text{V}$. The amplifier has a differential gain of $A_d = 4000$ and the value of CMRR is (i) 100 and (ii) 10^5 (**13 mark**)

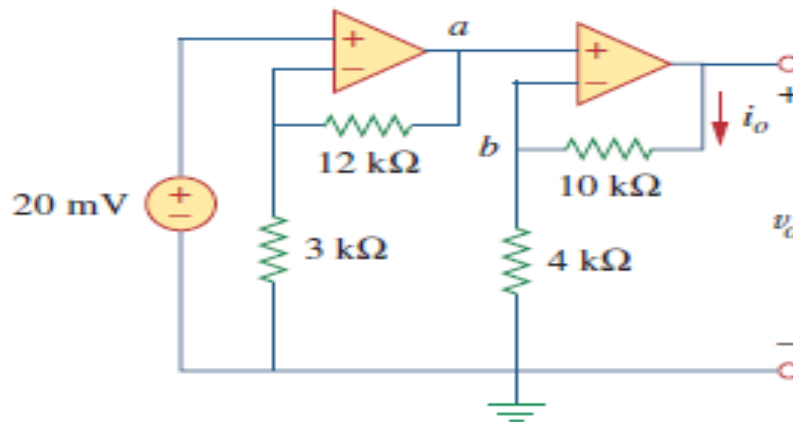
Question four



(a) Differentiate between an integrator and a differentiator **(6 marks)**

(b) If $v_1 = 10\cos 2t$ mV and $v_2 = 0.5t$ mV, find v_o in the op amp circuit shown. Assume that the voltage across the capacitor is initially zero **(9 marks)**

Question five



(a) Define (i) an oscillator (ii) a noninverting amplifier **(4 marks)**

(b). In the circuit shown, find (i) input voltage v_o and (ii) i_o **(11 marks)**

Question six

(a) What range of variable capacitor can be used in a tuned-collector oscillator which has a fixed inductance of $100 \mu\text{H}$ for it to be tunable over the frequency band of 500 kHz to 1500 kHz?

(7 marks)

(b). Calculate the oscillation frequency for an FET Colpitts oscillator having the following circuit value: $C_1 = 750$ pF, $C_2 = 2000$ pF and $L = 40 \mu\text{H}$ **(4 marks)**

(c). Calculate the oscillator frequency for an FET Hartley oscillator having the following circuit values: $C = 250$ pF, $L_1 = L_2 = 1.5$ mH, and $M = 0.5$ mH. **(4 marks)**