



NATIONAL OPEN UNIVERSITY OF NIGERIA
PLOT 91, CADASTRAL ZONE, NNAMDI AZIKIWE EXPRESSWAY, JABI - ABUJA
FACULTY OF SCIENCES

DEPARTMENT OF PHYSICS

2023_1 POP EXAMINATION.

COURSE CODE: PHY 308
COURSE TITLE: ELECTRONICS 1
CREDIT UNIT: 2
TIME ALLOWED: (2 HRS)

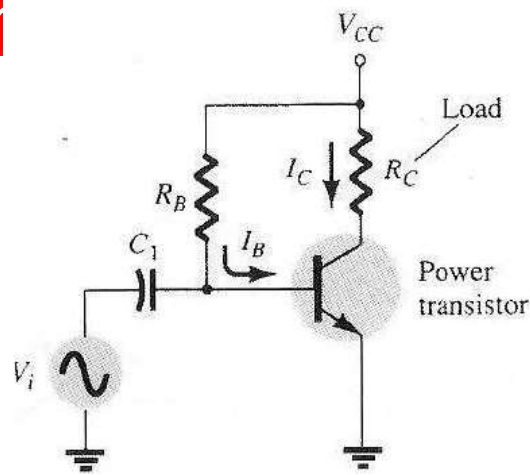
INSTRUCTION: *Answer question 1 and any other TWO questions*

QUESTION ONE

- A. A voltage amplifier is fed with 20 mV input signal.
- (i) How much voltage amplifier gain in dB is required for the amplifier to produce 120V output signal. **(5 marks)**
- (ii) If the amplifier have an input signal of 10mA with the same amplification as (i) above. Calculate the output current signal **(5 marks)**
- (iii) Calculate the amplifier Power gain in dB **(5 marks)**
- B Explain the working principle of an PNP transistor **(5 marks)**
- C Differentiate between Regenerative and Degenerative feedback **(4 marks)**
- D Define a Filter circuit **(2 marks)**
- E. A half-wave rectifier has a peak output voltage of 6 V at 50 Hz and feeds a resistive load of 50 Ω . Determine:
- The value of the shunt capacitor to give 1 percent ripple factor **(4 marks)**

QUESTION TWO

- 2(a) Mention and describe briefly four different classes of amplifier operations and their efficiency **(8 marks)**
- 2b The DC current gain β of an NPN transistor is 100, how much base current I_B is required to switch a resistive load of 8 mA **(4 marks)**
- 2(c) Briefly describe the operations and advantage of the class A amplifier **(8 marks)**



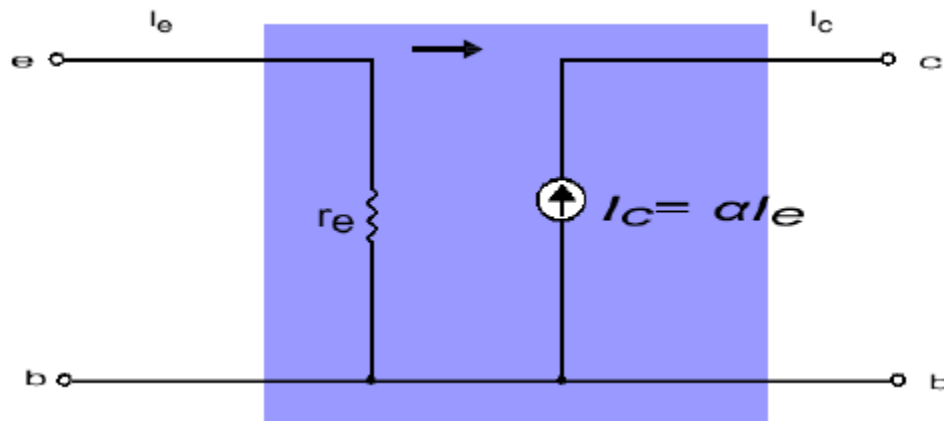
QUESTION THREE

- 3(a) The above class A signal amplifier has a power supply $V_{CC} = 20V$, which result in a base currents of $10\text{ mA}_{\text{peak}}$, if $R_B = 1000\Omega$, $R_C = 20\Omega$ and $\beta = 20$. Calculate
- The Input power **(5 marks)**
 - Output power **(4 marks)**
 - Efficiency of the amplifier circuit **(4 marks)**
- 3(b) Calculate the base current of an NPN transistor with a DC bias voltage $V_B = 20V$ and input base resistor $R_B = 50K\Omega$ **(4 marks)**
- 3(c) Define a linear network **(3 marks)**

QUESTION FOUR

- 4 A transistor has the following values: $\beta = 100$, $I_C = 8\text{ mA}$ and $I_B = 10\mu\text{A}$.
- Calculate the Base resistor (R_B) required to switch the load "ON" when the input terminal voltage exceeds 5.0 V . **(5 marks)**
 - Find the minimum Base current required to turn the transistor fully "ON" (Saturated) for a load that requires 200 mA of current. **(5 marks)**
- 4(b) To identify if a transistor is NPN or PNP, the resistance of the Emitter-Collector, Emitter-base and Base collector is measured. Tabulate the expected resistance in the Emitter-Collector, Emitter-base and Base collector terminals **(5 marks)**
- 4(c) Define a complementary transistor and give one example **(5 marks)**

QUESTION FIVE



- 5(a) The Common-Base configuration in the circuit above has emitter current $I_E = 8 \text{ mA}$, $\alpha = 0.90$ and an ac signal of 2 mV applied between the base and emitter terminals.
- (I) Calculate the input impedance **(4 marks)**
- (II) Calculate the voltage gain if the load of $0.66 \text{ k}\Omega$ is connected to the output terminals. **(3 marks)**
- (III) Find the output impedance and current gain. **(3 marks)**
- 5(b) State three factors affecting h-parameters **(3 marks)**
- 5(c) Define the term h-parameters **(2 marks)**
- 5d What are the conditions for a Bipolar Junction Transistor operating in Cut-off Region and Active Region **(5 marks)**