



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

DEPARTMENT OF PURE AND APPLIED SCIENCE

2021\_2 EXAMINATIONS

**COURSE CODE:** PHY310  
**COURSE TITLE:** ELECTRONICS II  
**CREDIT UNIT:** 2  
**TIME ALLOWED:** (2 HRS)

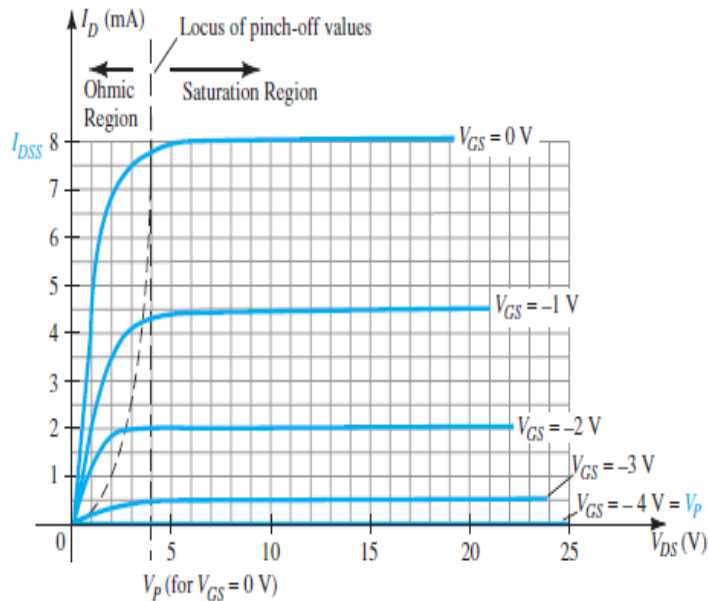
**INSTRUCTION:** Answer question 1 and any other three questions

**QUESTION 1**

(a). When does the maximum and minimum currents of JFET occur? (4 marks)

(b). Using the characteristics in the given figure, determine  $I_D$  for the following levels of  $V_{GS}$  (with  $V_{DS} > V_P$ ): (6 marks)

- (i).  $V_{GS} = 0 \text{ V}$ .
- (ii).  $V_{GS} = 1.0 \text{ V}$ .
- (iii).  $V_{GS} = 1.5 \text{ V}$ .
- (iv).  $V_{GS} = 1.8 \text{ V}$ .
- (v).  $V_{GS} = 4.0 \text{ V}$ .
- (vi).  $V_{GS} = 6.0 \text{ V}$ .



(c). In what mode of operation is an enhancement MOSFET likely to be cut off? (2 marks)

(d). Which class amplifier would be the best for an audio sound system, and how would it be configured for minimal distortion of the input signal? (4 marks)

(e). List the three common terminal classifications of Bipolar Junction transistors (3 marks)

(f). What is skin effect? (2 marks)

(g). Why is alternating current from the public main supply very impure? (2 marks)

(h). What are filters basically used for in an electronic circuit? (2 marks)

**QUESTION 2**

- (a). Describe what is meant by a depletion-type MOSFET. (3 marks)
- (b). Define Gain of an amplifier (2 marks)
- (c). For a class B amplifier providing a 20-V peak signal to a 16 Ω load (speaker) and a power supply of  $V_{CC} = 30$  V, determine: (i) the input power (4 marks)
- (ii) output power (3 marks) (iii) circuit efficiency. (3 marks)

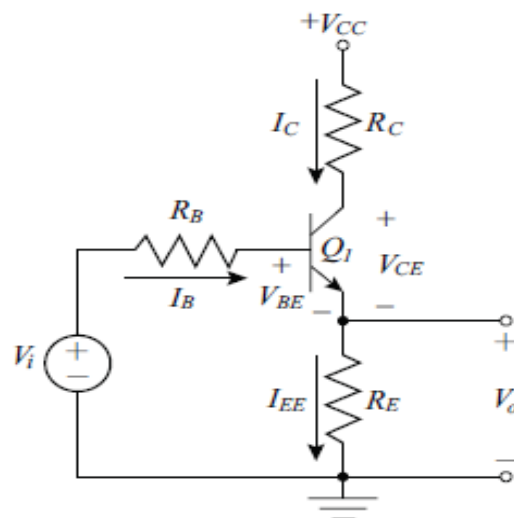
**QUESTION 3**

(a). In terms of output stage conduction, differentiate between the amplifier classes. (8 marks)

(b). The common-collector power amplifier shown in the figure has the following circuit element and transistor parameter values:

$V_{CC} = 15$  V;  $R_C = 100$  Ω;  $R_E = 100$  Ω;  $R_B = 10$  k Ω;  $\beta_F = 160$ .

Determine the maximum efficiency of the power amplifier assuming no additional losses due to thermal effects. (7 marks)



**QUESTION 4**

- (a). List the five basic passive filters types (5 marks)
- (b). For a class B amplifier providing a 22 V peak signal to an 8 Ω load and a power supply of  $V_{CC} = 25$  V, determine: (i) Input power (4 marks) (ii) Output power (4 marks)
- (iii) Circuit efficiency. (3 marks)

**QUESTION 5**

- (a). Mention three merits and three demerits of switch-mode power supplies. (6 marks)
- (b). How do we reduce transmission losses ( $I^2R$  loss) in power transmission? (2 marks)
- (c). Briefly describe how a transistor is used to provide amplification. (2 marks)
- (d). How is a simple passive filter created? (2 marks)
- (e). Calculate the cut-off frequency of an RC low pass filter of  $R = 8.20$  kΩ and  $C = 0.0033$  μF (3 marks)