

PROGRAM : NATIONAL DIPLOMA
ENGINEERING: COMPUTER SYSTEMS
ENGINEERING: ELECTRICAL

SUBJECT : **ELECTRONICS II**

CODE : **EEL2211**

DATE : YEAR-END MAIN EXAMINATION
25 November 2017

DURATION : 08:30 - 12:00

WEIGHT : 40 : 60

FULL MARKS : 100

TOTAL MARKS : 100

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MODERATOR : MR PJJ VAN ZYL 2024

NUMBER OF PAGES : 4 PAGES

INSTRUCTIONS : CALCULATORS ARE PERMITTED (ONLY ONE PER STUDENT)
: USE ONLY THE ANSWER SHEET PROVIDED WITH THIS PAPER

INSTRUCTIONS TO CANDIDATES:

1. 100 MARKS = 100%
 2. ATTEMPT ALL QUESTIONS.
 3. THEORY TYPE QUESTIONS MUST BE ANSWERED IN POINT FORM BY CAREFULLY CONSIDERING THE MARK ALLOCATION.
 4. QUESTIONS MAY BE ANSWERED IN ANY ORDER, BUT ALL PARTS OF QUESTION MUST BE KEPT TOGETHER.
 5. ALL DIAGRAMS AND SKETCHES MUST BE DRAWN NEATLY AND IN PROPORTION.
 6. ALL DIAGRAMS AND SKETCHES MUST BE LABELLED CLEARLY.
 7. ALL WORK DONE IN PENCIL EXCEPT DIAGRAMS AND SKETCHES WILL BE CONSIDERED AS ROUGH WORK.
 8. NOTE: MARKS WILL BE DEDUCTED FOR WORK WHICH IS POORLY PRESENTED.
 9. NEGATIVE MARKING APPLIES IF YOUR ANSWER DOES NOT COMPLY WITH THE DETAIL REQUIRED AS REQUESTED IN CERTAIN QUESTIONS.
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QUESTION 1

- 1.1 The input voltage $V_{in} = 25\pi \cos(500t)$ can be supplied to a full-wave or half-wave rectifier.
 - 1.1.1 What is the average voltage of V_{in} ? (2)
 - 1.1.2 What is the RMS value of the ripple voltage (V_{rip}) at the output of the full-wave rectifier? (2)
 - 1.1.3 What is the efficiency of the half-wave rectifier if the load resistor is $10\ \Omega$? (2)
 - 1.1.4 What is the DC value (V_{dc}) at the output of a half-wave rectifier? (2)
- 1.2 Sketch the following circuits, in relation to DC power supplies. Label the circuits:
 - 1.2.1 A complete DC power supply which includes a transformer, a bridge rectifier, a smoothing capacitor, a zener diode regulator and a load resistor. (10)

1.2.2 A transistor Shunt voltage regulator? (6)

1.2.3 A transistor Series voltage regulator? (6)

[30]

QUESTION 2

Consider the circuit diagrams in Figure 2.1, Figure 2.2 and Figure 2.3. For each circuit diagram answer the following questions:

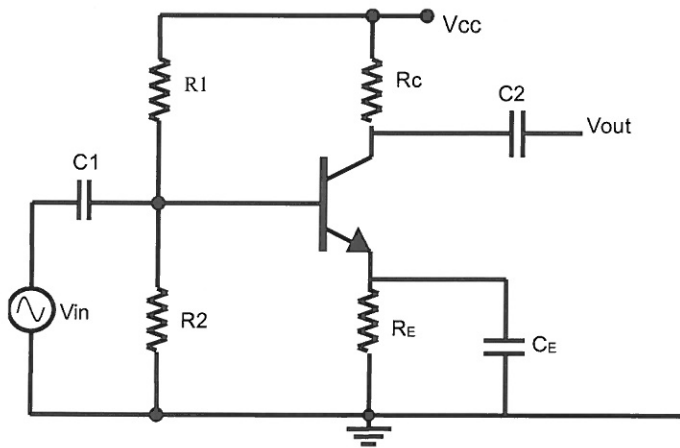


Figure 2.1

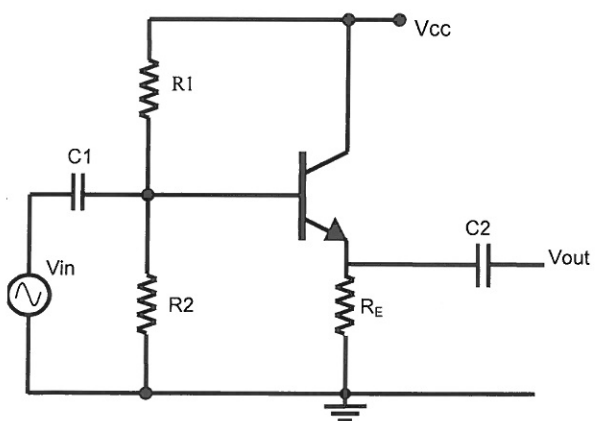


Figure 2.2

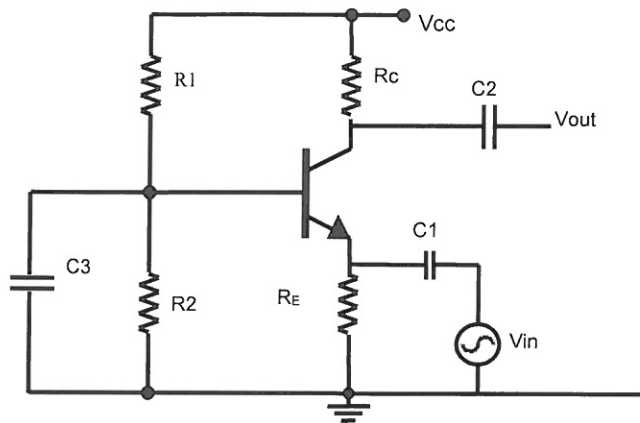


Figure 2.3

- 2.1 Identify each circuit if it is a *common-emitter*, *common-base* or *common-collector*. Justify your answer in each case. (2)
- 2.2 Sketch and label the simple h -parameter small signal model circuit for each of the given figures above. (7)
- 2.3 Derive expressions for Z_{in} , Z_{out} , A_i and A_v for each of the circuits (clearly show all working). (8)

[17+17+17]

QUESTION 3

- 3.1 Sketch and label a circuit diagram of a hybrid- π model of a common emitter stage amplifier. (5)
- 3.2 Show the relationship between h_{fe} of h -parameter model, and g_m of the hybrid- π model of a common emitter stage amplifier. (5)
- 3.3 A Low Pass Filter circuit consisting of a resistor of $10\text{ k}\Omega$ and a capacitor of 100 nF is connected across a 10 V sinusoidal supply. Calculate the output voltage (V_{out}) at a frequency of:
 - 3.3.1 100 Hz , (3)
 - 3.3.2 10 kHz . (3)
 - 3.3.3 What do you observe in 3.3.1 and 3.3.2? Make a conclusion for each observation. (3)

[19]

TOTAL MARKS : 100