



MACHAKOS UNIVERSITY

University Examinations 2017/2018

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

SECOND YEAR FIRST SEMESTER EXAMINATION DIPLOMA IN ELECTRICAL
ENGINEERING

EED 206: ANALOGUE ELECTRONICS ENGINEERING

DATE: 13/12/2017

TIME: 8:30 – 10:30 AM

INSTRUCTIONS:

Answer question one and any other two questions of your choice.

QUESTION ONE (COMPULSORY) (30 MARKS)

- a) Explain four Factors affecting Oscillator Performance (8 marks)
- b) Explain three advantages of using LEDS in Electronics industry. (6 marks)
- c) With the aid of diagrams explain the nature of the following sinusoidal oscillations
 - i. Damped oscillations (2 marks)
 - ii. Un-damped oscillations (2 marks)
- d) The collector voltage of a Class B push pull amplifier with $V_{CC}=40$ Volts swings down to a minimum of 4 volts. The total power dissipation in both the transistors is 36 watts. Compute the total dc power input and conversion efficiency of the amplifier. (10 marks)

QUESTION TWO (20 MARKS)

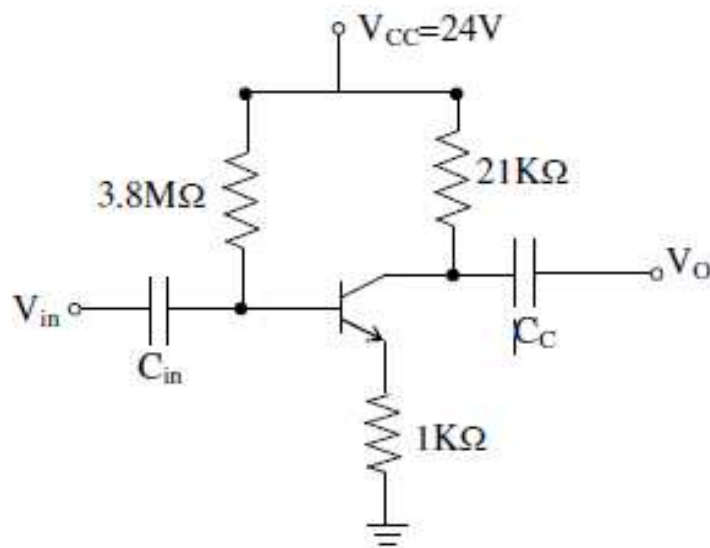
- a) with the aid of a well labeled diagram, explain the construction and operation of a phototransistor (10 marks)
- b) What is the fundamental difference between audio amplifiers and tuned amplifiers? How is bandwidth related to resonant frequency (f_r) and the quality factor (Q). (10 marks)

QUESTION THREE (20 MARKS)

- a) State any three advantages of a phase shift oscillators (6 marks)
- b) Highlight the common causes of drift in DC amplifiers (4 marks)
- c) Explain five characteristics of an ideal operational amplifier (10 marks)

QUESTION FOUR (20 MARKS)

- a) With the aid of clear and well labeled graph, explain the gain frequencies characteristics of an operational amplifier (10 marks)
- b) The transistor in the feedback circuit shown below has $\beta=200$.



- c) Determine
 - (i) Feedback factor,
 - (ii) Feedback ratio,
 - (iii) Voltage gain without feedback and
 - (iv) Voltage gain with feedback in the circuit. In the transistor, under the conditions of operation, V_{BE} may be assumed to be negligible. (10 marks)

QUESTION FIVE (20 MARKS)

- a) Discuss the terminal properties of an ideal operational amplifier. (10 marks)
- b) With the aid of a circuit diagram of a collector tuned amplifier, derive the expression for the voltage gain at the tuned frequency. (10 marks)