RAJARATA UNIVERSITY OF SRI LANKA
FACULTY OF APPLIED SCIENCES

Bachelor of Science in Applied Sciences
Second Year - Semester I Examination – July/August 2023
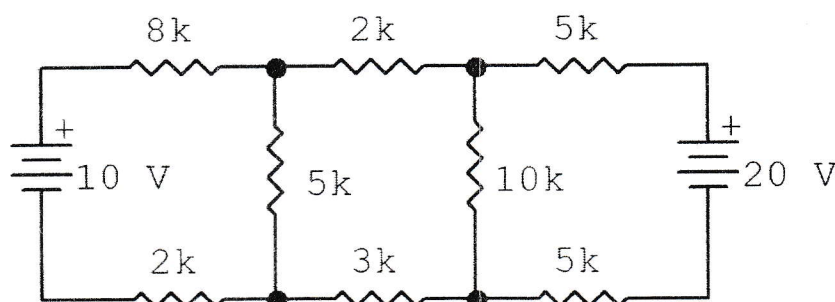
PHY 2103 – ELECTRONICS I

Time: One (01) hour

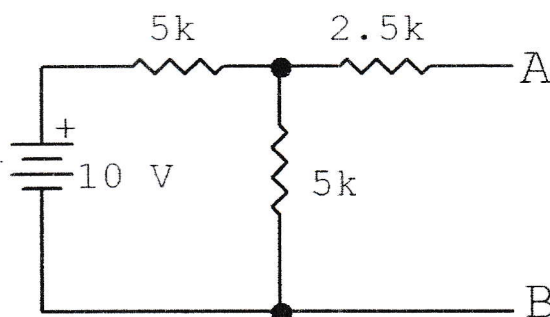**Answer only two Questions.**
Calculators will be provided.

1. a) Using the Kirchhoff's rules, determine the current through the 10V DC voltage source.

(05 marks)

b) Using the Norton's theorem, draw Norton equivalent circuit for the following figure.

(05 marks)

c) Explain using a diagram and the appropriate laws of physics, why an energy band is present in a bulk material instead of a single energy level.

(05 marks)

Contd.

d) Using a plot, illustrate the output signal produced by the circuit shown in the figure below, for a 2V (peak) sinusoidal input signal.
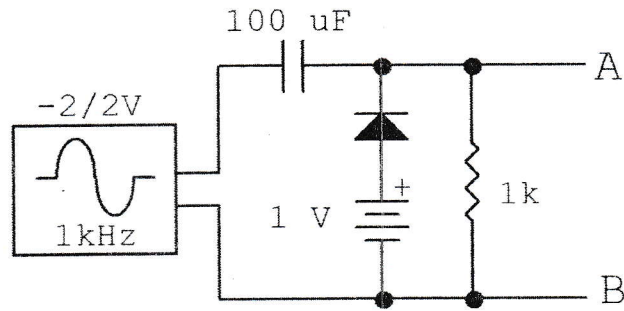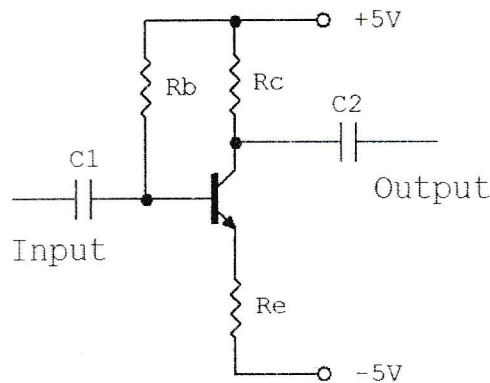

(05 marks)

2. a) What are the three configurations of a bipolar junction transistor? State and discuss on voltage gain, current gain giving one application for each configuration.
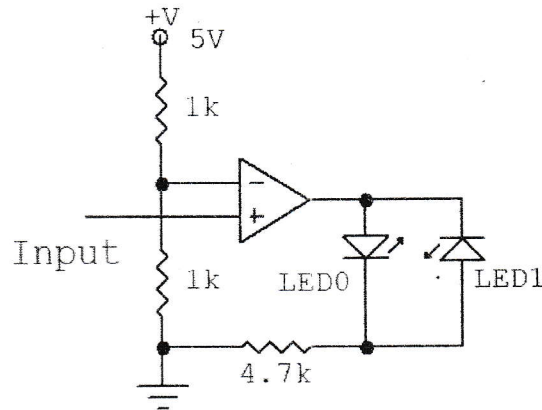
(06 marks)

b) Use the given fixed base biasing Transistor circuit to perform the following calculations.

i. Choose a suitable collector voltage value for the V_c to design a class A amplifier for obtaining a sinusoidal output signal of 4V peak voltage.

ii. Calculate R_c for a 2 mA collector current.

iii. Calculate base current I_B when the current gain (β) is 200.

iv. Determine a suitable value for R_E to bias the transistor into active region.

v. Assuming transistor is made from Germanium, calculate suitable values for the R_B.

vi. What is the main disadvantage of fixed base biasing arrangement?

vii. Give one suggestion to avoid above-mentioned (part vi.) draw back.

(14 marks)

3. a) What is the difference between positive and negative feedback of Op-amp circuits?

    (02 marks)

    b) Explain the functioning of an op-amp circuit shown below (supply voltage of the Op-amp is 5V and -5V).
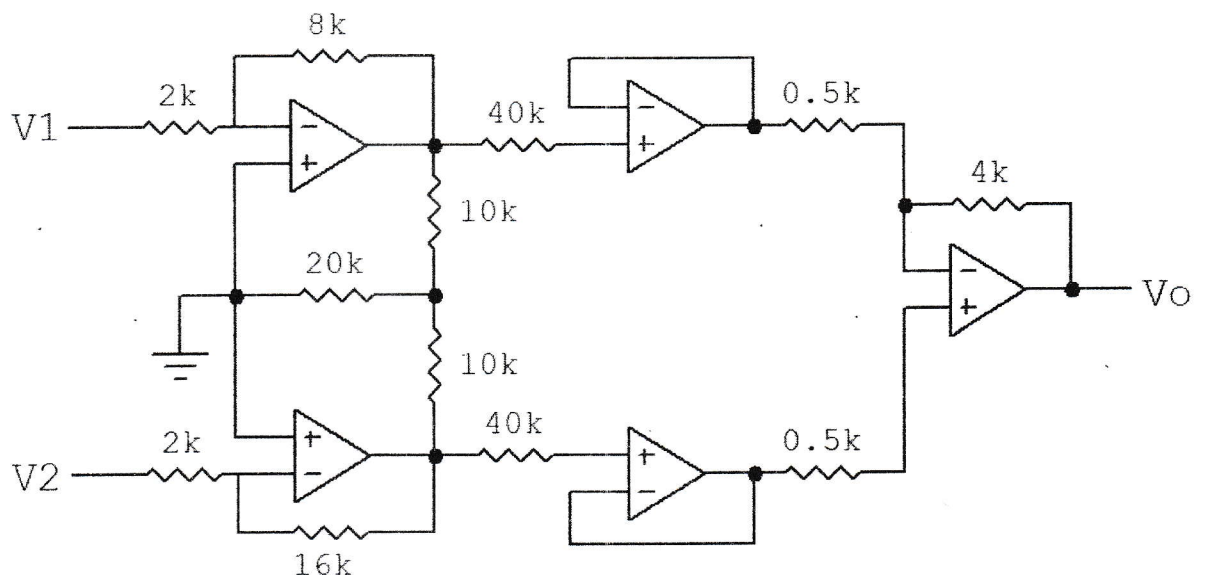

    (04 marks)

    c) Explain the deviation of an op-amp from the ideal behaviour based on its input/output impedances, open loop voltage gain, and the op-amp slew rate.

    (06 marks)

    d) Using ideal Op Amp model, show that the output voltage of the following circuit is given by, $V_o = 32V_1 - 72V_2$

    (10 marks)

End.