Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER I
SESSION 2013/2014

COURSE NAME	:	ELECTRONICS II
COURSE CODE	:	BWC 20203
PROGRAMME	:	2 BWC
EXAMINATION DATE	:	DECEMBER 2013 / JANUARY 2014
DURATION	:	3 HOURS
INSTRUCTION	:	ANSWER **ALL** QUESTIONS

THIS QUESTION PAPER CONSISTS OF **SIX (6)** PAGES

Q1 (a) Determine three advantages of integrated circuit (ICs) over conventional circuit.
(6 marks)

(b) Determine the voltage gain for the circuit shown in Figure **Q1**, with $R_f = 100\ K\Omega$ and $R_1 = 10\ K\Omega$.

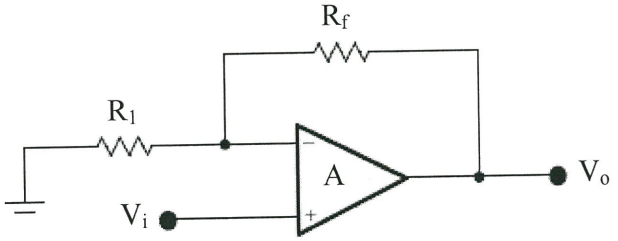

FIGURE Q1

(4 marks)

(c) In an amplifier with negative feedback, the gain of basic amplifier is 100 an it employs a feedback factor of 0.02. If the input signal is 40mV, determine,

(i) Voltage gain with feedback
(2 marks)

(ii) Output voltage
(2 marks)

(d) A negative feedback of $\beta = 2.5 \times 10^{-3}$ is applied to an amplifier of open loop gain 1000. Calculate the change in overall gain of the feedback amplifier if the gain of the internal amplifier is reducing by 20%.
(6 marks)

Q2 (a) Figure **Q2** shows inverting op-amp circuit. The op-amp has an open loop gain, $\mu = 10^4$ V/V, $R_{id} = 100\ k\Omega$ and $r_o = 1\ k\Omega$. By using shunt-shunt feedback method, calculate;

(i) the voltage gain, V_o/V_S.
(4 marks)

(ii) input resistance, R_{in}.
(4 marks)

(iii) output resistance, R_{out}.
(6 marks)

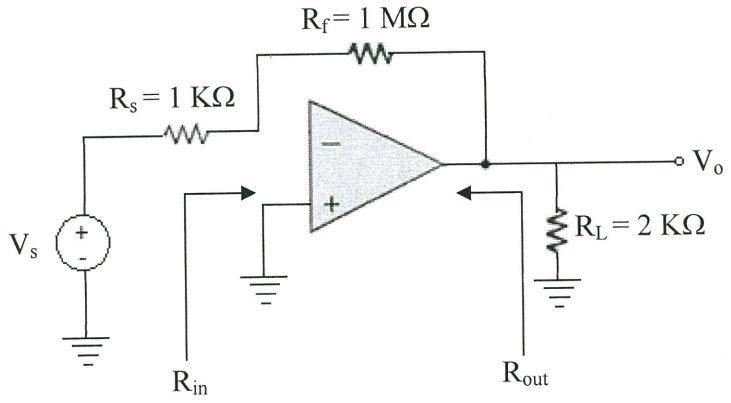

FIGURE Q2

(b) State three differences between Field Effect Transistor (FET) and Bipolar Junction Transistor (BJT).

(6 marks)

Q3 (a) Write the circuit of current mirror used in an op-amp design and explain its operation.

(8 marks)

(b) Figure **Q3 (a)** and Figure **Q3 (b)** shows a base current compensation current mirror and Wilson mirror configuration respectively. Describe,

(i) The equation for output current for both configurations.

(6 marks)

(ii) The equation for output resistance for both configurations.

(6 marks)

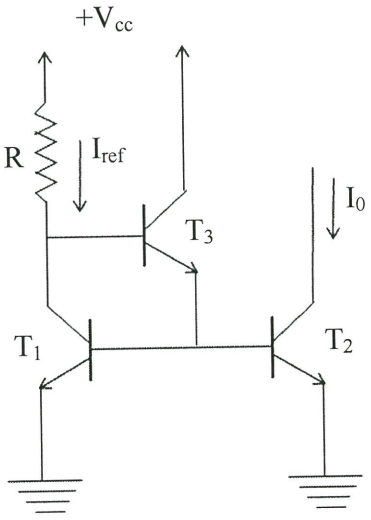

FIGURE Q3 (a)

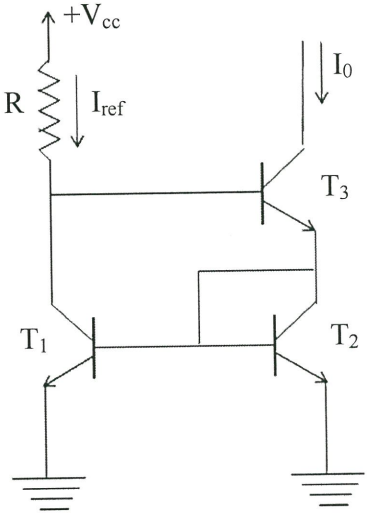

FIGURE Q3 (b)

Q4 (a) The transistors in the differential amplifier circuit shown in Figure **Q4 (a)** have an identical characteristics and their $\beta = 100$. Given $V_{BE} = 0.7$ V, determine,

(i) Output voltage (2 marks)

(ii) Base currents (3 marks)

(iii) Base voltages taking into account the effect of the R_B and V_{BE}. (3 marks)

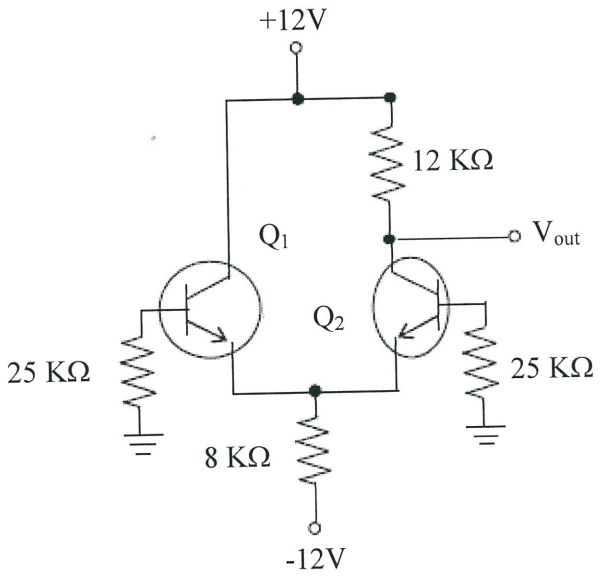

FIGURE Q4

(b) i. Describe a 'multistage amplifier' (2 marks)

ii. Give two requirements to be fulfilled for an ideal coupling network. (4 marks)

(c) Calculate the capacitance values required to produce a 3 kHz critical frequency in the low pass filter as in Figure **Q4 (b).** (6 marks)

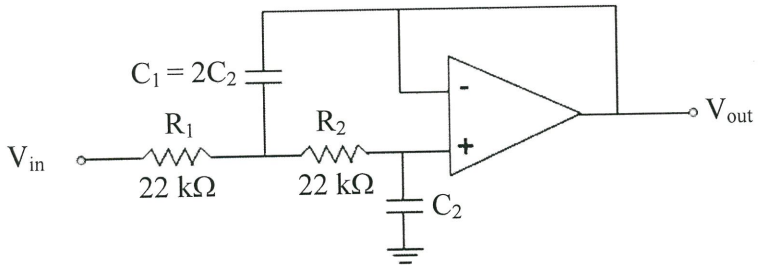

FIGURE Q4 (b)

Q5 (a) Figure **Q5 (a)** shows a circuit for the combination of high pass and low pass filter. Determine,

i. the bandwidth of the circuit (4 marks)

ii. center of the frequency (4 marks)

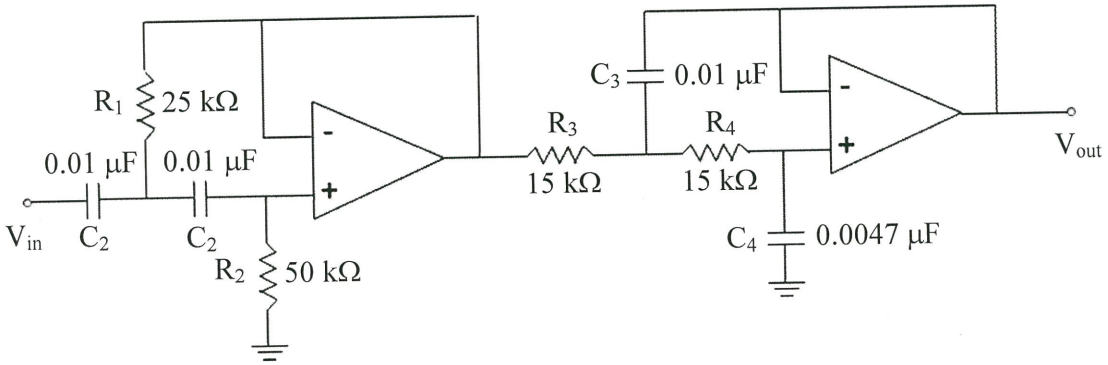

FIGURE Q5 (a)

(b) A digital high pass infinite impulse response (IIR) filter is required to fulfill the specifications given in Figure **Q5 (b)**. The sampling frequency F_s is 8:0 kHz. The filter is to be designed with Chebyshev filter using bilinear transformation method.

(i) Calculate the order of the filter. (6 marks)

(ii) Determine the system function H(z) of the filter. (6 marks)

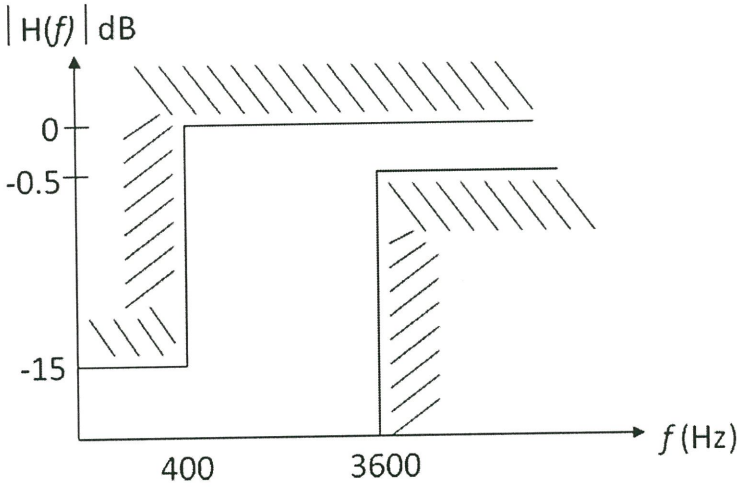

FIGURE Q5 (b)

END OF QUESTION