MAASAI MARA UNIVERSITY

UNIVERSITY EXAMINATIONS 2017/2018

THIRD YEAR FIRST SEMESTER EXAMINATION

SCHOOL OF SCIENCE

UNIVERSITY EXAMINATIONS FOR THE DEGREE OF BACHELOR OF EDUCATION (SCIENCE) AND BACHELOR OF SCIENCE

COURSE CODE: PHY 313

COURSE TITLE: ELECTRONICS II

DATE:FRIDAY TIME :

INSTRUCTIONS

- Answer Question ONE [30marks] and any other TWO [20MARKS EACH].
- Use of sketch diagrams where necessary and brief illustrations are encouraged.
- Read the instructions on the answer booklet keenly and adhere to them.

The paper has 5 printed pages

QUESTION ONE [30 MARKS]

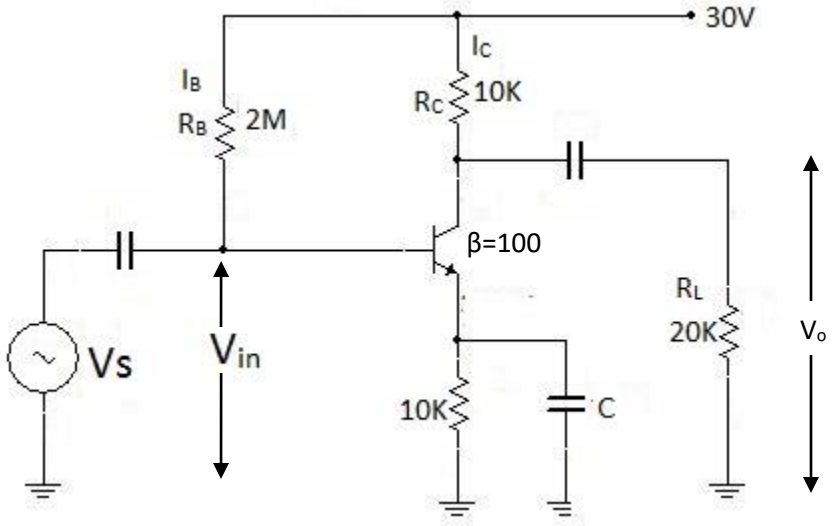
a. Define an ideal amplifier [1marks]

b. Explain why a real transistor can not be a unilateral device [2mark]

c. Draw the d.c and a.c equivalent circuits of an NPN transistor (4 marks)

d. Explain briefly the difference between cascaded amplifier and compound amplifier. [2marks]

e) In the CE amplifier circuit of the figure below, employing emitter feedback, find: r_{in}, r_L, A_v, and G_p Take transistor β= 100. How will these values change if emitter by pass capacitor is removed? (6 marks)



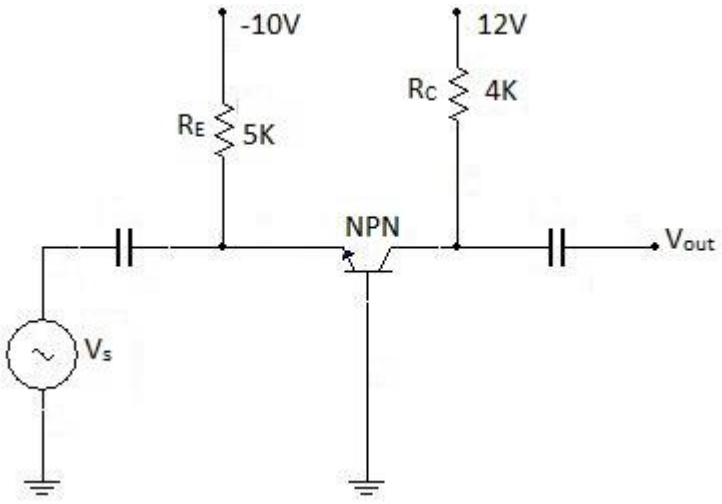
f) For the single-stage CB amplifier shown in the figure below, find

a) Stage input resistance b) stage output resistance

c) Current gain d) voltage gain of the stage and

e) Stage power gain in dB

Assume α =1. Neglect V_{BE} and use r_e=25mV/I_E (2 marks each)



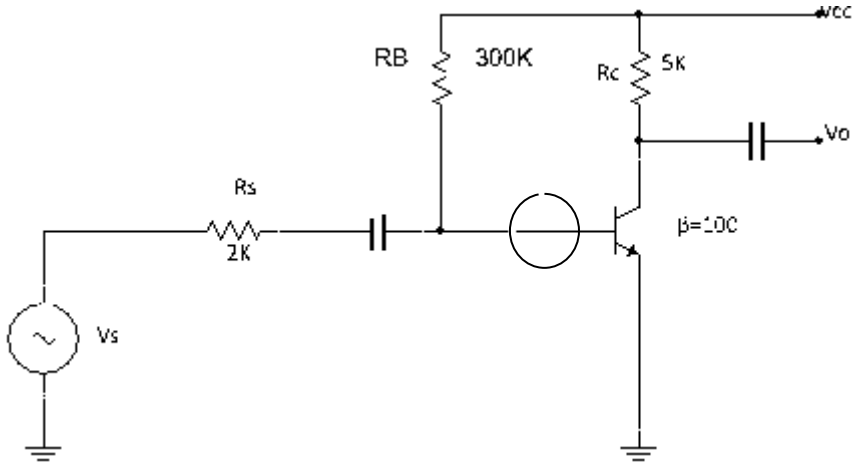
g) Explain how a transformer helps in impedance matching in transformer coupled amplifiers [4marks]

H) i) What are h parameters? (1 mark)

QUESTION TWO [20MARKS]

a. State four factors on which the h-parameters depends on [2marks]

b. A transistor used in CE connection in fig below



Has the following set of h-parameters :h_{ie}=1K,h_{fe}=100,h_{re}=5x10^{-4} and h_{oe}=2x10^{-5}s with R_s=2K and R_c=5K,determine

i. R_{in}(input impedence) [3marks]
ii. R_o(outpout impedence) [3marks]
iii. A_i(current gain) [3marks]
iv. A_v(voltage gain) [3marks]
v. Power gain [2marks]
vi. Explain the significance of the negative value of the voltage gain. [2marks]

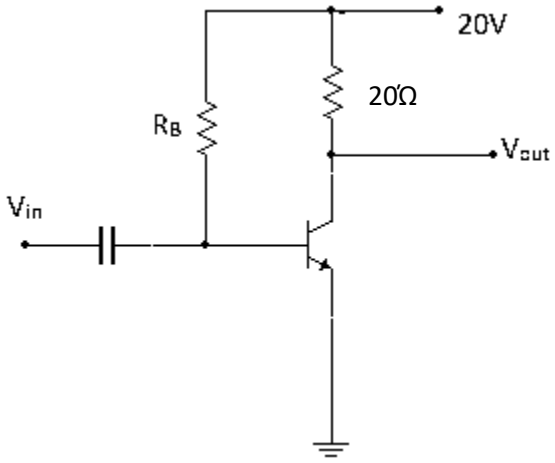
c. Why are h-parameters referred as hybrid parameters [2marks]

QUESTION THREE [20MARKS]

a. A three-stage amplifier has a voltage gain of its three stages as 40,50,and 60,respectively.Find the total gain of the system. Express the gain in dB. 4marks]
b. Explain briefly the operation of RC coupled amplifier [4marks]
c. The output resistance of a transistor is 2K.The primary of a transformer has a resistance of 400ohm and the load across its secondary is 8Ω.Calculate the turn ration of the transformer required for impedance matching [6marks]
d. What role does the coupling transformer perform in transformer coupled amplifier [6marks]

QUESTION FOUR [20MARKS]

a. For the class A, CE amplifier circuit shown in the figure below, V_{CEQ} = 10V and I_{CQ}=500mA. If collector i.e output current varies by $\pm 250mA$ when an input signal is applied at the base, compute,
   i) total dc power taken by the circuit
   ii) dc power dissipated by the collector load
   iii) ac power developed across the load



   iv) power delivered to the transistor
   v) dc power wasted in transistor collector (2 marks each)

b. Distinguish between negative feedback and positive feedback [2marks]
c. In a negative feedback amplifier, A=100, β=0.04 and V_i= 50mV. Find,
   a. Gain without feedback
   b. Output voltage
   c. Feedback factor
   d. Feedback voltage (2 marks each)