NATIONAL OPEN UNIVERSITY OF NIGERIA
14/16 AHMADU BELLO WAY, VICTORIA ISLAND, LAGOS
SCHOOL OF SCIENCE AND TECHNOLOGY
MARCH/APRIL 2014 EXAMINATION

COURSE CODE: PHY 308
COURSE TITLE: ELECTRONICS I EXAMINATION
TIME ALLOWED: 2HOURS
INSTRUCTION:ANSWER QUESTION ANY FIVE QUESTIONS

QUESTION ONE

a.

   i.   Name the factors that h-parameters depends on.

   ii.   Determine the voltage gain for the circuit shown in Fig. 1, with R_F = 100KΩ
   and R_1=10 KΩ
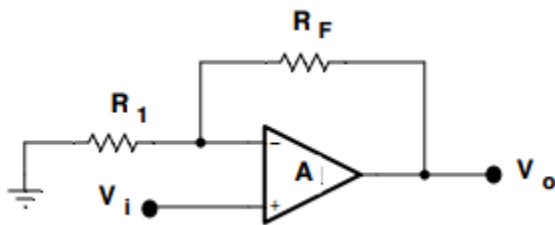

Fig 1

b.

   Define the following:Mark-to-Space Ratio (MSR), Pulse Repetition Time (PRT), and
   Pulse Repetition Frequency (PRF).

QUESTION TWO

a.

     i.   What is common-mode rejection ratio (CMRR) ?

    ii.   The value of CMRR can also be expressed in logarithm term as?

b. Calculate the input power, output power, and the efficiency of the amplifier circuit in Figure 2 for an input voltage that results in a base current of 10mA peak.
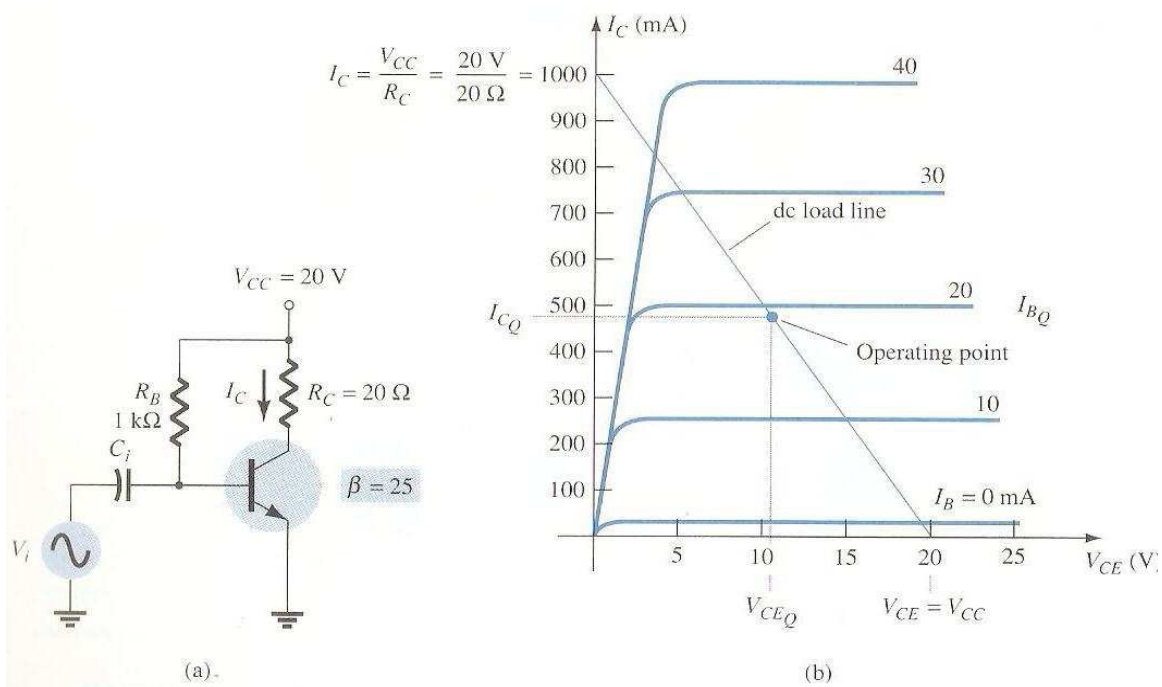
$$I_C = \frac{V_{CC}}{R_C} = \frac{20\ V}{20\ \Omega} = 1000$$

Fig 2

QUESTION THREE

a.

i. Draw a diagram to represent a complete solid state power supply .

ii. In the half-wave rectifier circuit of Fig. 3, determine
   1. Maximum and values of load voltage
   2. Peak values of load current
   3. Power absorbed by the load,
   4. Peak Inverse Voltage (PIV) of the diode
   5. RMSvalue of ripple voltage

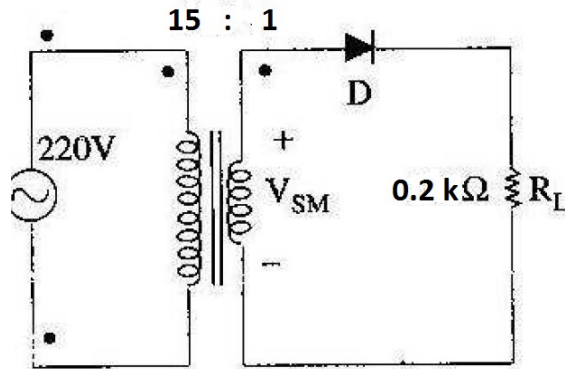Neglect the resistance of transformer secondary winding and that of the diode.

Fig. 3

QUESTION FOUR

a.

i. State three uses of multivibrator.

ii. List the difference(s) between fixed negative voltage regulator and adjustable voltage regulator. Give one example of each.

b.

i. The output voltage of a three-terminal voltage regulator is 5 V @ 5 mA load, and 4.96 V at 1.5 A load. What is the regulator's load regulation?

ii. For the circuit below in fig 4, what is the numerical value for the two-port y-parameter
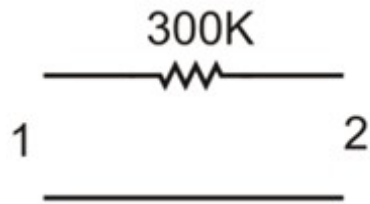
$$y_{12} \cdot y_{12} = \frac{i_1}{v_2} |v_1 = 0$$

300K

1   2

Fig 4.

QUESTION FIVE

a.

    i.   What is an op-amp?

    ii.   State three uses of op-amp

b.

    i.   With the help of a neat diagram, explain the operation of a Bridge Rectifier.

    ii.   What is Peak Inverse Volatge?

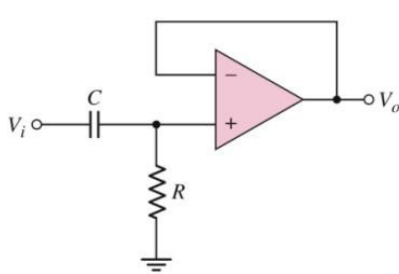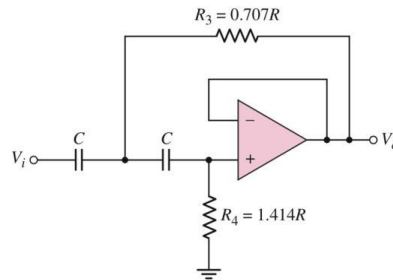Classify the following filter as active/passive and low pass/high-pass as appropriate
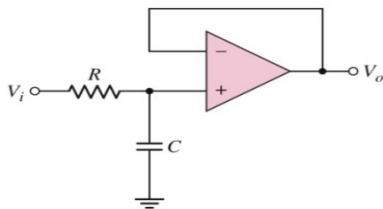

Fig. 6

Fig. 5

Fig. 7

QUESTION SIX

a. The Zener diode of Fig.8 has the following ratings:

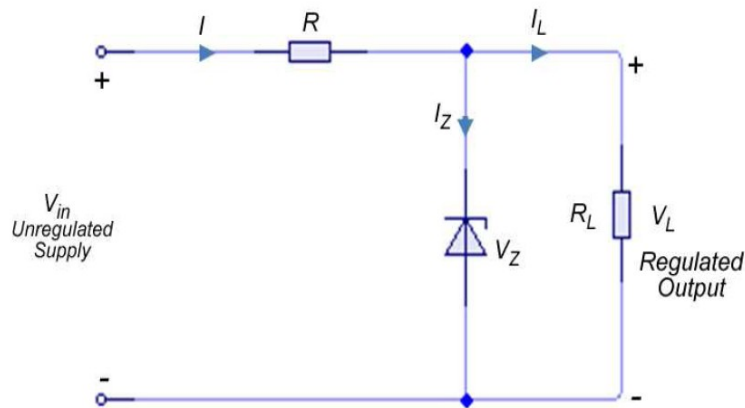$V_{Z} = 6.8$ V , $I_Z = 50$ mA@ $r_z = 2\Omega$. $I_{Z(min)} = 5$mA , $I_{Z\,(max)} = 150$mA

Fig.8

What would be the load voltage when load current I_L varies from 10 mA to 120 mA? Also, calculate voltage regulation of the regulator.

b.

State advantages and disadvantage of class A amplifier.

QUESTION SEVEN

a. List the main characteristics of an ideal Op-amp.

b. What is an Integrated Circuit ? What are its special features? Why is it so commonly used in
electronic circuits ?

c. Sketch the CE-configuration transistor output characteristics of a transistor and indicate the active, cut-off and saturation regions.

d. Mention the applications of Common Emitter, Common Base and Common Collector configurations of BJT's