PHY 601 **Reg No.....**

CREDIT BASED SIXTH SEMESTER B.Sc. DEGREE EXAMINATION APRIL 2013

PHYSICS

PAPER VII: ELECTRONICS

Duration: 3 Hours **Max Marks: 80**

PART –A

1. Answer any <u>TEN</u> of the following. **1x10=10**

(l) Why a transistor is current controlled device?

(m) Give the relation between  and  .

(n) Define Pinch-off voltage in case of FET.

(o) Define efficiency of a rectifier.

(p) What is an operational amplifier?

(q) Define bandwidth of the amplifier.

(r) What type of feedback is required for an oscillator?

(s) Give the truth table of NOR gate.

(t) What is a sequential logic circuit?

(u) Define modulation.

(v) Define trace period.

(w) What is meant by inverting amplifier?

B. Answer any <u>FIVE</u> of the following.
2x5=10

(a) What is the difference between Zener breakdown and avalanche breakdown?

(b) Define unipolar and bipolar devices.

(c) What is meant by operating point of a transistor and what is its significance?

(d) Explain the concept of virtual ground in OPAMP.

(e) Write the truth table and symbol of XOR Gate.

(f) Mention any two limitations of AM.

PART-B
UNIT-I

2. Answer <u>TWO</u> full questions of the following.
10x2=20

(a) Draw and explain the characteristics of a p-n junction diode.

(b) The current gain of a transistor in CE mode is 99. Calculate its common-base current gain. Fin the base current when the emitter current is 3mA.

(6+4)

3. (a) Draw and explain the drain characteristics and transfer characteristics of a JEET.

(b) Determine the value of the collector current and collector to emitter voltage for the voltage divider bias circuit if

$V_{BB} = 0.7V, V_{CC} = 10V, R_1 = 10k\Omega, R_1 = 5k\Omega, R_C = 1k\Omega$ and $R_E = 500\Omega$

(6+4)

4. (a) With a neat diagram explain how a Zenerdiode can be used as a voltage regulator.

(b) Two power supplies A and B are available in the market. Power supply A has no-load and full-load voltages of 30V and 25V respectively whereas these values are 30V & 29V for power supply B. Which is better power supply?

(6+4)

UNIT-II

Answer <u>TWO</u> full questions of the following.
10x2=20

5. (a) What are dc and ac load lines? Describe how dc and ac load lines are drown for a transistor amplifier in CE mode.

(b) For a transistor amplifier $R_1 = 10k\Omega, R_1 = 5k\Omega, R_C = 1k\Omega$ and $R_E = 2k\Omega$.

Draw (i) dc load line and (ii) ac load line.
(6+4)

6. (a) What is meant by inverting amplifier? Derive an expression for its voltage gain and mention the values of input and output resistances.

   (b) For a non-inverting amplifier, with $R_1 = 1k\Omega$ and $R_f = 200k\Omega$, what is the range of output voltage if input varies from 0.1V to 0.5V?
   (6+4)

7. (a) With a neat diagram, explain the working of a Wein-bridge oscillator.

   (b) The gain of an amplifier is 500. Calculate the percentage variation in gain if 10% negative feedback is applied.
   (6+4)

UNIT-III

Answer <u>TWO</u> full questions of the following.
10x2=20

8. (a) Explain the working of two input AND gate with proper diagram. Give the truth table, logical expression and symbol.

   (b) Simply the Boolean expression below and draw the logic diagram for the simplified form – $Y = \bar{A}C + B\bar{C} + \bar{A}BC + AB$.
   (6+4)

10. (a) Describe AM radio receiver with a black diagram.

    (b) An AM broadcast radiotransmitter radiates radio waves at 20KW with modulation index 75% . Calculate the power of the carrier wave.
    (6+4)

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PHY 601.1 **Reg No.....**

CREDIT BASED SIXTH SEMESTER B.Sc. DEGREE EXAMINATION APRIL 2014

PHYSICS

PAPER VII: ELECTRONICS

Duration: 3 Hours **Max Marks: 80**

PART –A

1. (A) Answer any <u>TEN</u> of the following.
1X10=10

(x) Give the symbol of p-n-p transistor and mention the significance of arrow in it.

(y) What are the majority carriers in a n-p-n transistor?

(z) Why a FET is voltage controlled device?

(aa) Draw the circuit of [illegible] filter.

(bb) Define bandwidth of an amplifier.

(cc) What is slew rate?

(dd) Write the formula for gain of a feedback amplifier.

(ee) What is a positive logic?

(ff) Give the Boolean equation representing X-OR gate.

(gg) Define frequency modulation.

(hh) What is interlaced scanning?

(ii) What is a binary counter?

(b) Answer any <u>FIVE</u> questions of the following.
2X5=10

i) Draw the diagram of transistor shunt regulator.

ii) Derive the relation between [illegible] and [illegible].

iii) What is an operating point of a transistor and what is its significance?

iv) How does an amplifier differ from an oscillator?

v) What are side band frequencies in AM? What are the frequency components in them?

vi) Draw the block diagram of a CRO.

PART-B

UNIT-I

Answer any TWO full questions from the following:
10x2=20

2. (a) What is dc load line of a transistor and how do you obtain it? Explain how a Q point is located?

(b) Find [illegible] of transistor having [illegible] $2\,mA$ and [illegible]. **(6+4)**

3. (a) Explain the working of MOSFET in enhancement mode. Draw the necessary structural diagram.

(b) Find the value of R and R in a transistor circuit to set the operating point [illegible]

Given [illegible] **(6+4)**

4. (a) Define efficiency and ripple factor of a bridge rectifier and derive the expressions for the same.

(b) AC voltage of 6V rms is applied at the input of a bridge rectifier.

What is the a) average output dc voltage?

b) ripple factor of the rectifier? **(6+4)**

UNIT-II

Answer any TWO of the following. **10x2=20**

5. (a) Explain the frequency response of an amplifier in CE mode. Explain the effect of coupling and bypass capacitor at low frequencies.

   (b) A CE amplifier has

   and . Draw the dc and ac load line and mark the operating point.

   (6+4)

6. (a) What is a non-inverting amplifier? Derive the expression for voltage gain and mention its input and output resistances.

   (b) An inverting amplifier with operating with split power supply . What is the output voltage when

   i) ii) **(6+4)**

7. (a) With a circuit diagram, explain the working of wein bridge oscillator.

   (b) Amplifier has a voltage gain of 200 without feedback. The gain reduces to 50 when the feedback circuit is connected. What is the value of feedback fraction?

   (6+4)

UNIT-III

Answer any TWO of the following. **10x2=20**

8. (a) What are universal gates? Realise OR, AND, NOT and EXOR gate using NAND gates only.

   (b) Reduce the following Boolean equation and draw the logic diagram for the reduced equation

   (6+4)

9. (a) Explain the working of a 4-bit serial shift register.

   (b) If show that . **(6+4)**

10. (a) Describe AM radio receiver with a block diagram.

    (b) How many AM stations can be accommodated within a frequency band of 500 kHz to 1600 kHz if each station has a bandwidth of 5kHz. What is the range of local oscillator frequency for this band? **(6+4)**

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PHY601.1 **Reg. No.....**

CREDIT BASED SIXTH SEMESTER B.Sc. DEGREE EXAMINATION APRIL 2015

PHYSICS – VII

Electronics

Duration: 3 Hours **Max Marl**

PART – A

1. A. Answer any TEN of the following: **10×**

i) What is a transistor?
ii) What is the main advantage of FET over BJT?
iii) Define efficiency of a rectifier.
iv) What is a voltage regulator?
v) What is meant by ac equivalent circuit of CE amplifier?
vi) Define common mode rejection ratio.
vii) What is a full adder?
viii) What is a shift register?
ix) What is the need for modulation?
x) What is progressive scanning?
xi) What is an oscillator?
xii) Define band width of an amplifier.

B. Answer any FIVE questions of the following: **5×**

i) Define α_{dc}, β_{dc} of a transistor and obtain the relation between them.

ii) What is a rectifier? Why junction diode is used as a rectifier?

iii) Explain why the voltage gain of an amplifier falls at very low frequencies.

iv) Explain the Barkhausen criterion for oscillations.

v) Write the logic circuit for XOR gate and give its truth table.

vi) Explain briefly SSB transmission?

PART - B

UNIT - I

Answer any TWO of the following: **2×1**

2. (a) What is dc load line of a transistor and how do you obtain it? Explain how Q – point is located?

   (b) For a transistor voltage divider bias circuit draw the dc load line and find the operating point.
   Given $R_1 = 15k\Omega, R_2 = 5k\Omega, R_c = 2k\Omega, R_E = 3k\Omega, V_{cc} = 20V, V_{BE} = 0.7V$ **(6+4)**

3. (a) Explain working of MOSFET in enhancement mode. Draw the necessary structural diagrams.

   (b) Find α and β of transistor having $I_c = 2mA, I_B = 1\mu A$. **(6+4)**

4. (a) With a neat diagram explain the working of a bridge rectifier.

   (b) In the bridge type rectifier circuit, transformer input voltage is 230V, 50Hz. Ratio of primary to the secondary turns is 4:1. The diodes are assumed to be ideal. Find dc output voltage, peak inverse voltage and output frequency.

UNIT - II

Answer any TWO of the following: **2×1**

5. (a) Obtain the expressions for input impedance, current gain, voltage gain, power gain, output impedance of CE amplifier using r_e transistor model.

   (b) In an amplifier, when the signal changes by 0.02V, the base current changes by 20μA and the collector current changes by 2mA. If $R_c = 6K$ and $R_L = 12K$, find

   a) input impedance b) ac load c) current gain d) voltage gain

6. (a) What is meant by non-inverting amplifier? How OPAMP can be used as non-inverting amplifier. Derive expression for its voltage gain and mention the values of input and output resistances.

   (b) For an inverting amplifier with $R_1 = 20K\Omega$ and $R_f = 200K\Omega$, what is the range of the output voltage if the input voltage varies from 0.1 to 0.5V.

7. (a) With a neat circuit diagram, explain the working of a Wein-bridge oscillator.

(b) The frequency range of wein bridge oscillator varies from 500 Hz to 4000Hz. Find the ratio of maximum to minimum value of the variable capacitor with 10KΩ resistor.

(6+4)

UNIT - III

Answer any <u>TWO</u> full questions from the following: **2×1**

8. (a) Explain the working of AND gate with proper circuit and give the truth table, logic expression and logical symbol.
   (b) Simplify the following Boolean expression $A\bar{B}\bar{C} + A\bar{B}\,\bar{C} + \bar{A}BC + ABC + A\bar{B}C$. **(6+4)**

9. (a) Explain the working of 3 bit binary counter using JK flip flop and write the timing diagram.
   (b) A modulated carrier wave has maximum and minimum amplitudes of 750mV and 250mV. Calculate the value of percentage of modulation.

10. (a) Draw the block diagram of a CRO. Briefly explain its various parts.
    (b) The total power content of an AM wave is 1500W. For a 100 percent modulation, determine
        i) Power transmitted by carrier
        ii) Power transmitted by each side-band.

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PHY 601.1 Reg. No. .....

CREDIT BASED SIXTH SEMESTER B.Sc. DEGREE EXAMINATION APRIL 2016
PHYSICS
PAPER – VII: ELECTRONICS

Time: 3 Hrs. **Max. Marks: 80**

PART – A

I. A. Answer any TEN of the following: **10×1=10**

a. Define active region of a transistor.
b. Give the relation between α and β of a transistor.
c. Why FET is called unipolar device?
d. Define efficiency of a rectifier.
e. What is an ac load line?
f. What is the function of bypass capacitor in an amplifier?
g. Define common mode rejection ratio.
h. What is an oscillator?
i. Draw the logic gate symbol of a 3 input NOR gate.
j. Name the fundamental logic gates.
k. What is the function of preset input in a flip flop?
l. What is the function of electron gun in a CRO?

B. Answer any FIVE of the following: **5×2=10**

a) Why a transistor cannot be used as a rectifier?
b) Mention any 4 advantages of JFET over BJT.
c) Explain how phase reversal of 180° is obtained in CE amplifier.
d) Explain the concept of virtual ground in OP AMP.
e) Why NAND gate is called a universal gate?
f) Give the diagram of diode detector.

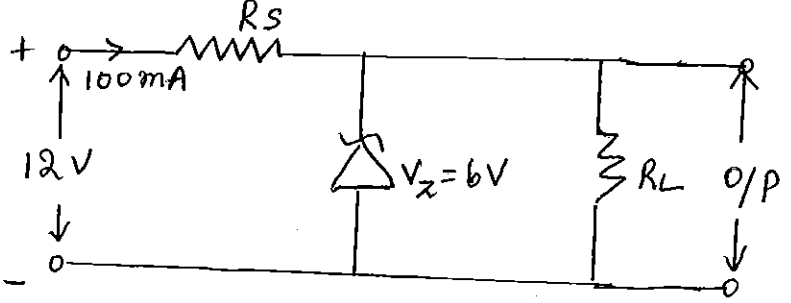
PART – B
UNIT - I

Answer any TWO full questions of the following: **2×10=20**

2. a) Draw and explain the input and output characteristics of a transistor in CE mode.
   b) Calculate α and I_E given $\beta = 100$, $I_C = 2$ mA. **(6+4)**

3. a) Explain the working of n-channel JFET. Draw the necessary structural diagram.
   b) Determine the operating point in a transistor circuit having $R_1 = 47k\Omega$, $R_2 = 12k\Omega$, $R_E = 1k\Omega$, $R_C = 2.2k\Omega$, $B_{BE} = 0.6V$, $V_{CC} = 12V$ **(6+4)**

4. a) With a diagram, explain the working of a bridge type rectifier.
   b) Calculate the value of R_S needed in the following circuit. What is the minimum value of load R_L that can be connected in this circuit to obtain the regulated output.



(6+4)

UNIT – II

Answer any TWO full questions of the following: **2×10=20**

5. a) Draw the circuit of a CE amplifier and explain the role of each component.
   b) Draw the d.c and a.c load line of a transistor amplifier in CE mode with $R_1 = 100k\Omega$, $R_2 = 27k\Omega$, $R_L = R_C = 2k\Omega$, $R_E = 1k\Omega$, $V_{CC} = 12V$, $V_{BE} = 0.7V$ **(6+4)**

6. a) What is an inverting amplifier? Derive an expression for voltage gain and mention its input and output resistances.
   b) Design a non-inverting amplifier with $R_1 = 1k\Omega$ for a voltage gain of 20. What is the range of output voltage if the input voltage varies from –0.1V to 0.1v? **(6+4)**

7. a) What is meant by feedback in amplifier? Why is it needed? Derive an expression for the voltage gain in feedback amplifier.
   b) Amplifier has a voltage gain of 100 without feedback. With feedback, having a feedback fraction 0.15, Calculate the value of gain. Find the output voltage of the amplifier with and without feedback for an input of 0.1V. **(6+4)**

UNIT – III

Answer any TWO of the following: **2×10=20**

8. a) Explain the working of 2 input OR gate using diodes. Give the truth table, Boolean equation and symbol.
   b) Simplify the Boolean equation and draw the logic diagram for the reduced equation. $Y = \bar{A}B + A\bar{B} + AB + C$ **(6+4)**

9. a) Explain the working of a 3 bit Counter using JK Flip - flop and write the timing diagram.
   b) Reduce the following Boolean expression and write the truth table $Y = A\bar{B}C + \bar{A}BC + ABC$. **(6+4)**

10. a) Obtain a relation for the total power of AM wave in terms of power of the carrier wave and the modulation index.
    b) An AM transmitter has power of 100kW operating with modulation index 0.5. Calculate the power of the carrier wave. **(6+4)**

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