

Name of the Examinations: B.CHEM. 2ND YR 1ST. SEM. EXAM.-2018

Subject : ELEMENTARY ELECTRONICS

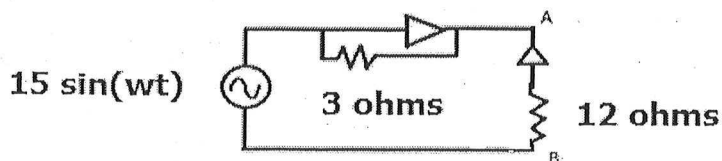
Time: 3 hours

Full Marks:100

Instructions: Answer question 1 and four other questions. (5X20=100). Write to the point and handwriting should be clean and clear else marks will be deducted.

1. For each of the statements below indicate whether the statement is true or false.
 - i) Electron is a Boson particle.
 - ii) The output of the common emitter is in phase with the input voltage.
 - iii) The emitter of pnp transistor is lightly doped.
 - iv) Phosphorus is used as donor in semiconductor doping.
 - v) JFET is unipolar device.
 - vi) When J and K is joined in J-K flip-flop, it is called D flip-flop.
 - vii) When the inputs of R-S flip-flop are joined it is called D flip-flop.
 - viii) If the base current of CE BJT, $I_c=20\text{Amp}$, $\beta=100$ then base current $I_b=0.2\text{Amp}$.
 - ix) Flip-flop is an example of combinational logic circuit.
 - x) $AB+AB=AB$
 - xi) In reverse bias breakdown condition current does not flow through zener diode.
 - xii) Avalanche diode is more doped w.r.t. zener diode.
 - xiii) Zener diode has positive temperature coefficient.
 - xiv) Current direction is same as the direction of flow of the electron.
 - xv) Drift current flows due to movement of carriers under electric field.
 - xvi) Rectifier output is pulsating DC.
 - xvii) Current density of any carrier=conductivity X Voltage applied
 - xviii) At forward bias voltage across depletion region of diode decreases from built in potential.
 - xix) CMRR of OMAMP is ideally zero.
 - xx) Biasing is done by applying DC voltage or current.

2. i) Find the voltage curve across AB . Mark the different voltage amplitudes in the curve. The diodes are normal diodes.

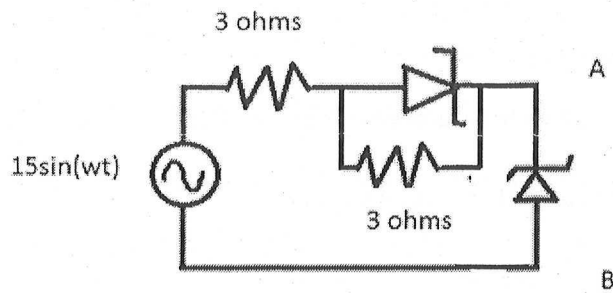


ii) A semiconductor bar has intrinsic carrier concentration 1.5×10^{10} /cc. It is doped with Arsenic atom with concentration 10^{14} /cc. Find the concentration of hole after doping. 3

iii) What is clipper? Draw and explain positive and negative clipper. 1+2+1

iv) Find current curve across AB for the period $\omega t = 0$ to 2π . Mark the different current amplitudes. Consider the forward voltage drop across zener diodes are 0 and zener breakdown voltages are 0.5 volt.

7



3. i) What is ripple factor for rectifier? What is the ripple factor for half wave rectifier?

2+1

ii) Calculate the following for centre tapped full wave rectifier:

4X3

a) DC output current

b) RMS output current

c) Ripple Factor

iii) Draw and explain how bridge rectifier converts ac voltage to pulsating dc.

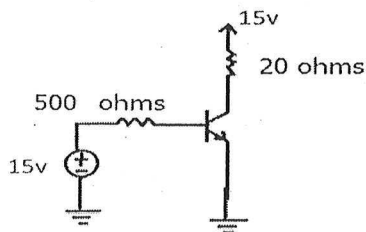
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4. i) Draw the circuit for common collector BJT.

3

ii) Find the current I_c for the following CE BJT. Consider $\beta = 100$, $V_{BE} = 0$ volt.

4

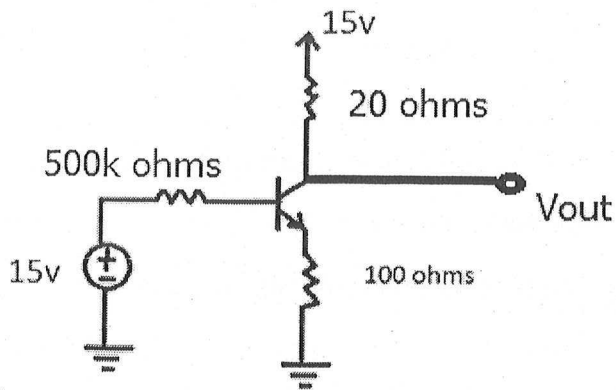


iii) Draw base bias, base with emitter bias and voltage divider bias circuits of common emitter BJT.

2X3

iv) Find I_c , V_{ce} and V_{out} for the circuit below. Consider $V_{BE}=0.7$ volts, $\beta =100$.

7



5. i) Draw output characteristics and transfer characteristics curve for JFET.

2+2

ii) Find the current through JFET when $V_{GS}=2V, V_p=0.2V, V_{DS}=2V, I_{DSS}=0.7$ mA.

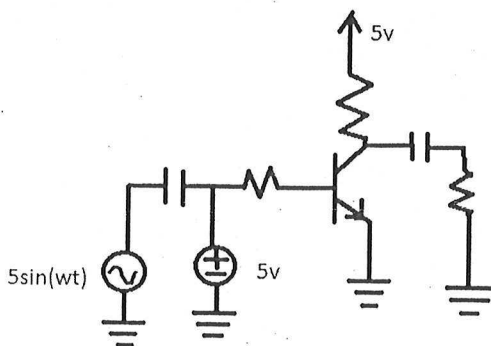
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iii) What is pinch off voltage? Draw and explain.

4

iv) What is the purpose of bypass and coupling capacitor? Draw the small signal high frequency equivalent circuit of the following BJT circuit.

2+2+4



6. i) Convert decimal to binary: $(127)_{10}=(?)_2, (0.25)_{10}=(?)_2$

2+2

ii) Simplify the expression of Y using k map.

$$Y=f(A,B,C,D)=\sum(m_0,m_1,m_6,m_8,m_9,m_{14},m_{15})$$

5

iii) Write the expression for Z [f(A,B,C)] in canonical POS form. 4

$$\overline{ABC + \overline{A}\overline{B}\overline{C}}$$

iv) Draw and explain how OPAMP can be used for sum operation of 2 voltages. 4

v) Simplify the expression: $X = (AB+1)(AB+A) + ABC + ABC + (AB+A)(AB+A)$

3

7. i) What is the difference between latch and flip flop? Draw R-S flip-flop. 1+2

ii) Draw the a) truth table, b) present state-next state table, c) excitation table, d) k map and

e) Characteristic equation for this flip-flop. 2+2+2+2=10

ii) What is the meaning of "T" in T flip-flop? 1

iii) What is the advantage of J-K flip-flop over R-S flip-flop (Draw the truth tables for both)? 4

iv) What is the difference between sequential and combinational logic circuit? 2