

NAME OF THE EXAMINATION: B.E CONSTRUCTION ENGINEERING FIRST YEAR SECOND SEMESTER-2017

Subject: BASIC ELECTRICAL & ELECTRONICS ENGINEERING

TIME: 3 HOURS FULL MARKS: 100

ANSWER ANY 5(FIVE)

1. i) Distinguish between conductors, semiconductors and insulators on the basis of band theory of solids.
- ii) A semiconductor has the electron concentration $0.45 \times 10^{12}/m^3$ and hole concentration $5 \times 10^{20} m^{-3}$. Find its conductivity. Given electron mobility = $0.135m^2 V^{-1}s^{-1}$ and hole mobility $0.048 m^2V^{-1}s^{-1}$.
- iii) When the voltage drop across a p-n junction diode is increased from 0.62V to 0.70V, the change in the diode current is 4mA. What is the dynamic resistance of the diode?
- iv) Derive equation for current density of a semiconductor.
- v) What is the position of the fermi energy level in an extrinsic semiconductor?
- vi) Write down about reverse biased characteristics of p-n junction diode. (5+2+2+2+5+4)
2. i) What is diffusion current in semiconductors?
- ii) What is avalanche breakdown in zener diode?
- iii) Determine the range of R_L and I_L that result in voltage across R_L being maintained at 8 V, as shown in Fig A.

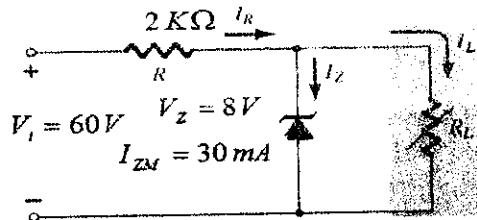


Fig A

- iv) Determine V_o for the network as shown in Fig 1 for the input indicated (Fig 2).

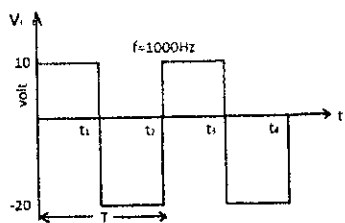


Fig 2

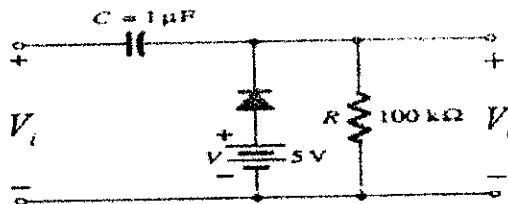


Fig 1

(3+3+8+6)

3. i) Why is a Transistor called a Transistor? 2
- ii) Write the function of base region of a transistor. Why this region is made thin and slightly doped? 4
- iii) Draw a circuit diagram to obtain the characteristics of a N-P-N transistor in common emitter configuration. Describe how you will obtain input and output characteristics. (4+4)

iv) Find out the operating point current I_{CQ} , and voltage V_{CEQ} in the circuit shown (Fig 3).
 ($V_{BE} = 0.7 \text{ V}$, β of transistor is 200).

6

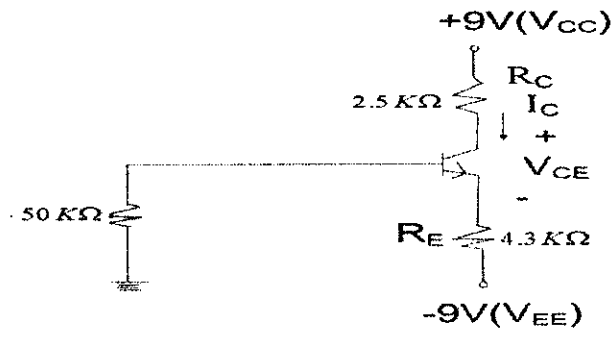


Fig 3

4. i) What is slew rate of an op amp?
- ii) Explain the significance of virtual ground in an operational amplifier?
- iii) How do you use operational amplifier as differentiator and adder?
- iv) Determine the output voltage V_o as shown in Fig 4 .

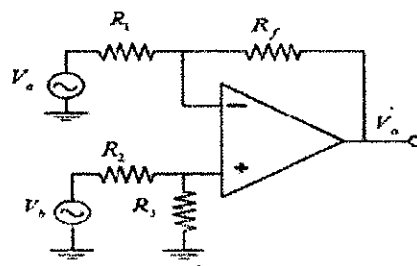


Fig 4

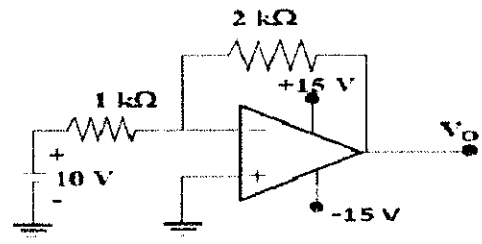


Fig 5

v) Find the output voltage in volt shown in above Fig 5. (2+3+7+6+2)

5.i) Determine the R.M.S value, average value and form-factor of the Waveform shown in Fig. 6 .

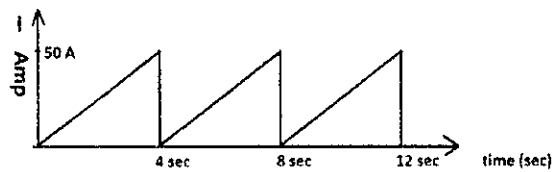


Fig 6

(2+2+1)

ii) For series RLC circuit find out resonance frequency, half power frequency, power factor, quality factor and bandwidth. [9]

iii) In Fig 7 find voltage drop across x-y terminals.

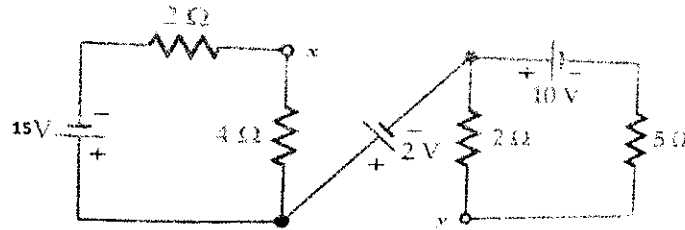


Fig 7

- 6) i) What is superposition theorem? 6
 ii) What is the maximum power transfer theorem? What will be the efficiency under this condition? 3
 iii) Find the power loss in 8Ω resistor by superposition theorem in Fig 8. 3

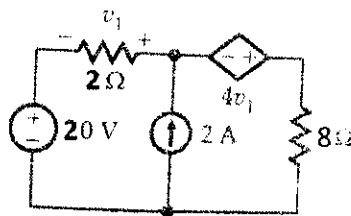


Fig 8

- iv) The four arms of a Wheatstone bridge as shown in Fig 9 have the following resistances: $AB = 100\Omega$, $BC = 10\Omega$, $CD = 4\Omega$, $DA = 50\Omega$. A galvanometer of 20Ω resistance is connected across BD . Find the current through the galvanometer when a supply voltage of $20V$ is maintained across AC . 7

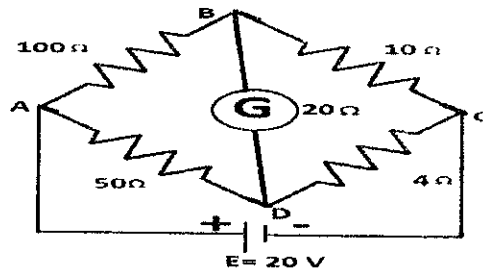


Fig 9

- 7) i) What is the gauge factor? 7
 ii) How does the Linear Variable Differential Transducer (LVDT) work? 4
 iii) What are the different types of transformers? 7
 iv) How Does an Electric Motor Work? how many types of electric motors are there? (5+2) 2
- 8) Write short note on any four:- 4 × 5 = 20
- i) Effect of temperature on mobility in semiconductors. ii) Hall effect in semiconductors.
 iii) P N junction diode capacitance. iv) Full wave rectifier by p-n junction diode.
 v) Working principle of Generator. vi) Working principle of transformer.