PART – A

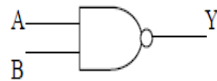**Answer ALL questions. Each question carries one mark.**   **1 x 10 = 10**

1. How many electrons supplied to a neutral conductor makes it to be charged to -1C?
2. Write an equation for specific resistance of cylindrical conductor in terms of radius.
3. What is the significance of time constant of LR series circuit?
4. What type of extrinsic semiconductor will be obtained when Indium impurity is added to Germanium semiconductor?
5. What is the reason for choosing Silicon over Germanium semiconductor?
6. Which region of transistor is moderately doped?
7. Draw the circuit symbol of photo transistor.
8. What is an OR gate?
9. Write the Boolean expression for the output Y of the gate shown.

10. What makes the charge to move from one conductor to another?

PART – B

**Answer any FIVE questions. Each question carries two marks.**   **2 x 5 = 10**

11. Mention the uses of Sphygmomanometer, Glucometer, Pulse oximeter and Digital Thermometer.
12. Briefly explain the determination of frequency of an AC using CRO.
13. Draw the circuit diagram of RC high pass filter. Write an expression for its cut off frequency.
14. What are the factors on which width of depletion layer depend?
15. Current gain β of a transistor is 100. Its base current is 20μA. Calculate α and I_E of the transistor.
16. What is an optocoupler? Draw its circuit.
17. What is the need of 2's compliment method of subtraction? Mention any two advantages of digital technology.
18. Convert $(317)_{10}$ into equivalent hexadecimal number.

PART – C

Answer any FIVE questions. Each question carries three marks.   **3 x 5 = 15**

19. Explain the role of Electronics in the day to day life.
20. State and explain Kirchhoff's voltage law.
21. Calculate I_3 and R_3 in the following circuit.
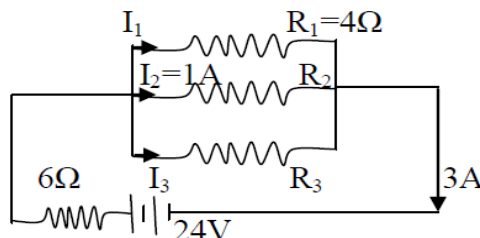
22. What is the principle of parallel plate capacitor? Briefly explain the construction of electrolytic capacitor.
23. Explain the formation of PN-junction and its working under forward biased condition.
24. What is a ripple? With a circuit diagram explain the working of capacitor shunt filter.
25. With a circuit diagram explain the working of series positive clipper.
26. Mention the steps involved in developing PCB. On SMD resistor it is printed as 222. What is its resistance?
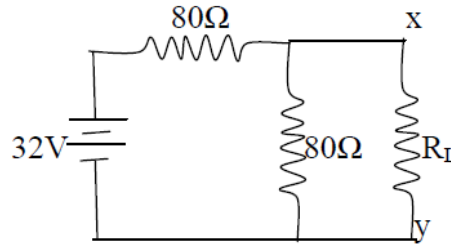
PART – D

(a) Answer any THREE questions. Each question carries five marks.   5 x 3 = 15

27. Calculate current through 3Ω resistor using superposition theorem.
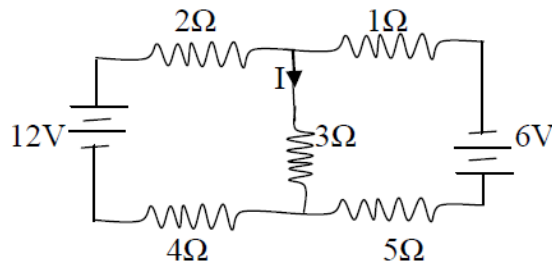
Convert the following circuit into Thevenin's equivalent circuit.

28. An AC of 125V is applied to the primary of an ordinary transformer of power efficiency η=60% so that secondary current is 500mA. If the loss of power in the core & coil of it is 10W, calculate primary current, secondary voltage, output power and input power.

29. The following components are used in the LRC series circuit. R=100Ω, L=1mH & C=1000μF. An AC, v = 200 sin100πt is applied to it. Calculate impedance, power factor and resonant frequency of the LRC circuit.

30.
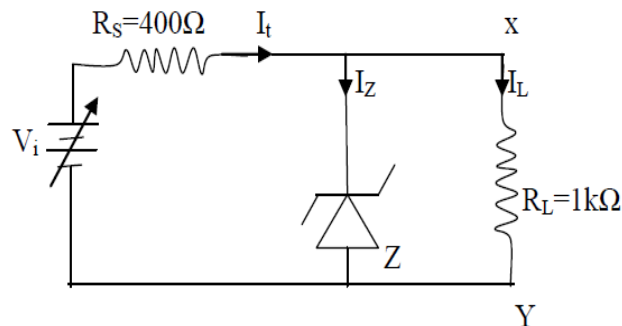
Where Z – zener diode of V_Z=10V, P_Z=2W; I_Z min for voltage regulation is 5mA. Calculate I_Z max , I_L , Vi min & V_i max for voltage regulation. Suppose in the above circuit if V_i = 20V, what should be the minimum load resistance (R_L) required for voltage regulation?

31. Convert $(A1F)_{16}$ into equivalent binary number. Subtract $(101)_2$ from $(1010)_2$ using 2's compliment method.

(b) Answer any FOUR questions. Each question carries five marks.   5 x 4 = 20

32. a) With a circuit diagram derive an expression for effective resistance of parallel combination of resistors.

b) When do we prefer this combination?   **4+1**

33. a) What are active and apparent powers? Give the relation between them.

b) Explain charging and discharging of a capacitor in RC circuit when DC is applied.   **2+3**

34. a) Derive an expression for effective capacitance of parallel combination of capacitors.

b) What happens to capacitance when a dielectric medium is introduced between plates of a capacitor?   **3+2**

35. a)What is an active component?

b) With a diagram explain the working of dynamic (moving coil) loudspeaker. **1+4**

36. What is a rectifier? Draw the circuit diagram of full wave rectifier, explain its working. Draw the input and output wave forms. **5**

37. State and explain De-Morgans theorems with appropriate truth tables **5**

****