END SEMESTER/ RETEST EXAMINATION, 2020

PRINCIPLES OF ELECTRICAL AND ELECTRONICS ENGINEERING

CAI – 301

MARKS: 70

Time 3 hrs.

PART A

1. Fill in the blanks: **1X10=10**

(a) In a series R-L circuit, V_L leads V_R by _____ degrees.
(b) The number of depletion layers in a transistor is _____
(c) Duration of one cycle is known as_____.
(d) The process of adding impurities to pure semiconductor is called _____.
(e) Every mesh is a loop but every loop is not a_____.
(f) The minimum number of wattmeter(s) required to measure 3-phase,3 wire balanced or unbalanced power is _____.
(g) A transformer works on _____only
(h) A Zener diode is a _____device.
(i) The NAND gate is AND gate followed by _____gate.
(j) If e_1=A sin ωt and e_2=Bsin$(\omega t - \emptyset)$, then e_2 _____e_1 by $\emptyset$.

2. Write True or False: **1X10=10**

(a) Semiconductor materials have covalent bonds.
(b) A transistor is a current operated device.
(c) When an input signal 1 is applied to a NOT gate, the output is 0.
(d) KCL is applied in the mesh.
(e) An n-type semiconductor is positively charged.
(f) A semiconductor has generally 4 valence electrons.
(g) A pn junction acts as a unidirectional switch.
(h) A pentavalent impurity has 6 valence electrons
(i) The base of a transistor is lightly doped.
(j) Kirchhoff's voltage law is applied at node or junction.

3. Choose the correct answer: **1X5=5**

(a) A semiconductor has _____temperature coefficient of resistance.
  (i) positive (iii) negative
  (ii) zero (iv) none of the above
(b) Without a d.c. source, a clipper acts like a
  (i) rectifier (iii)demodulator
  (ii) clamper (iv) chopper

(c) The following relationships between α and β are correct except

(i) $\beta = \frac{\alpha}{1-\alpha}$ (iii) $\alpha = \frac{\beta}{1+\beta}$

(ii) $\alpha = \frac{\beta}{1-\beta}$ (iv) $1-\alpha = \frac{1}{1+\beta}$

(d) A trivalent impurity has _____valence electrons

(i) 4 (iii) 6

(ii) 5 (iv) 3

(e) If the arrow of crystal diode symbol is positive w.r.t bar, then diode is _____biased

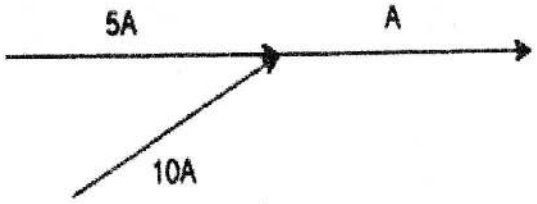
(i) forward (iii)either forward or reverse

(ii) reverse (iv) none of the above

PART B

Answer Q.No.8 and any three from the rest

4. (a) Calculate the Current A2



(b) Define the following terms:

Cycle, Phase difference, Current 3

(c) Compute the average and rms values of the square voltage wave shown in fig(i) 5

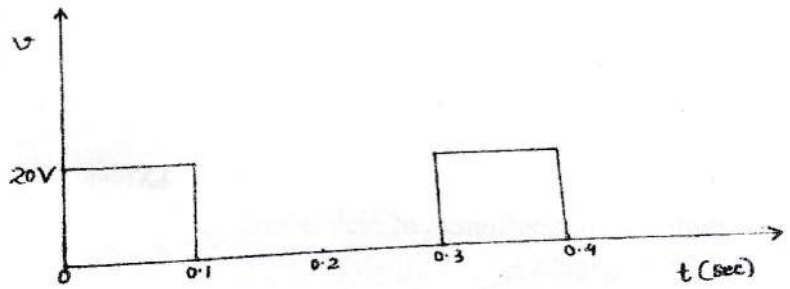
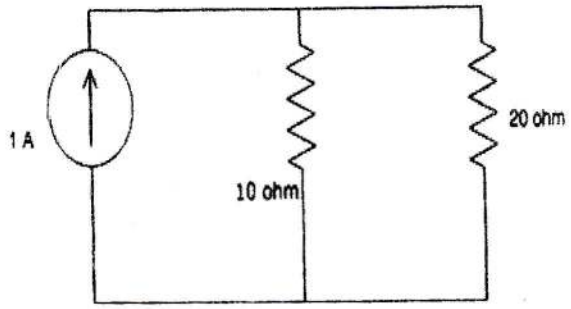


fig (i)

5. (a) Describe the working principle of transformer? 2

(b) Calculate the current across the 20Ω resistor 3



(c) A transformer takes a current of 0.6A and absorbs 64W when primary is connected to its normal supply 200V,50 Hz;the secondary being open-circuit. Find the magnetising and iron loss currents. 5

6. (a)What is intrinsic and extrinsic semiconductor? 2

(b) Describe forward and reverse biasing of a pn junction. 3

(c) A crystal diode having internal resistance $r_f = 20\,\Omega$ is used for half-wave rectification. If the applied voltage $v = 50 \sin \omega t$ and load resistance R_L=800Ω. Find:

(i) I_m, I_{dc}, I_{rms}(iii) a.c. power input and d.c. power
(ii) D.C. output voltage (iv) efficiency of rectification 5

7. (a) What are the basic logic gates? What are universal gates? 2

(b) Describe the centre-tapped full-wave rectifier. 3

(c) In a common base connection, current amplification factor is 0.9. If the emitter current is 1 mA, determine the value of base current. 5

8. Write short note on (any three): 3X5=15
   (a) R-L series circuit
   (b) Relation between line current and phase currents in star connected 3-phase system.
   (c) Zener diode as voltage stabiliser
   (d) Full-wave bridge rectifier
   (e) Power measurement by two wattmeter method