Total No. of printed pages = 7

CAI-301/POE&EE/3rd Sem/2017/N

PRINCIPLES OF ELECTRICAL AND ELECTRONICS ENGINEERING

Full Marks – 70

Pass Marks – 28

Time – Three hours

The figures in the margin indicate full marks for the questions.

PART – A

1. Pick up the right answer : 10×2=20

   (a) Kirchhoff's Current law is applicable only in
   - (i) closed loops in a network
   - (ii) electronic circuit
   - (iii) junctions in a network
   - (iv) electric circuits.

   (b) Kirchhoff's voltage law is concerned with
   - (i) IR drops
   - (ii) Battery emf
   - (iii) Junction voltages
   - (iv) Both (i) and (ii) above.

[Turn over

(c) According to KVL, the algebraic sum of all IR drops and emfs in any closed loop of a network is always

(i) zero

(ii) positive

(iii) negative

(iv) determined by battery emfs.

(d) The algebraic sign of an IR drop is primarily dependent upon the

(i) amount of current flowing through it

(ii) value of R

(iii) direction of current flow

(iv) battery connection.

(e) What is the relation between energy and power ?

(i) Energy = Power – Time

(ii) Energy = Power × Time

(iii) Energy = Power + Time

(iv) Energy = Power ÷ Time.

(f) The unit of work is

(i) Watt

(ii) Joule

(iii) Calorie

(iv) Second.

(g) The unit of power is

(i) Watt

(ii) Joule

(iii) Calorie

(iv) Second.

(h) The polar form of $-5-6j$ is

(i) $7.81\angle 50.18°$

(ii) $11\angle 30.8°$

(iii) $10.7\angle -11.8°$

(iv) $7.81\angle -129.8°$.

(i) If a 220 V heater is used on 110 V supply, heat produced by it will be

(i) One-half

(ii) Twice

(iii) One-fourth

(iv) Four times.

(j) Active materials of a lead acid cell are :

(i) Lead peroxide

(ii) Sponge lead

(iii) Dilute sulphuric acid

(iv) All of the above.

2. Fill in the blanks : $5 \times 1 = 5$

(a) The capacity of a cell is measured in _____.

(b) After doping semiconductor, material is known as _____ material.

(c) Two windings of a transformer are designated as primary winding and _____ winding.

(d) Transformer action requires _____ magnetic flux.

(e) Rating of transformers is expressed in _____.

PART – B

Answer any *five* questions from the following : 5×9=45

3. (a) What do you mean by phase difference ? Explain with suitable example. 4

(b) An alternating current of frequency 50Hz has a maximum value of $200\sqrt{2}$ A. Reckoning the time from the instant the current is zero and becoming positive. Find the time taken by the current to reach a value of 141.4 A for a first and second time. 5

4. Do the following operation : 3×3=9

(a) $(5\angle 150°) \div 4j$

(b) $(5\angle 30°) + (-3 + 4j)$

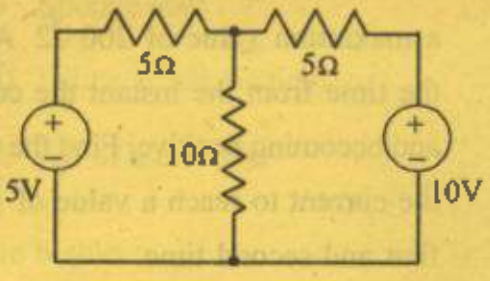
(c) $(-5 + 5j) - (5\angle -30°)$.

5. (a) What is an ideal transformer ? 4

(b) The emf per turn for a single phase, 2310/220V, 50 Hz transformer is approximately 13 volts. Calculate the number of primary and secondary turns. 5

6. (a) Write the statement of KCL and KVL. 4

(b) Calculate the current flowing through the 10Ω resistance of the following figure : 5



7. (a) Write about the different parts of a lead-acid battery. 4

(b) Write the chemical changes during discharging and charging of a lead-acid cell. 5

8. (a) Draw the circuit diagram of a bridge rectifier, together with its input and output waveforms. 4

(b) Calculate the values of collector current I_C and emitter current I_E for a BJT with emitter-to collector current gain $\alpha_{dc} = 0.97$ and base current $I_B = 50\mu A$. Determine base-to collector gain β_{dc} for the device. 5