Department of Electronics & Communication Engineering

Faculty of Engineering, Integral University, Lucknow

Home Assignment-1

Basic Electrical Engineering (IEN-101)

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Section : EC-1

Problems :

1. Differentiate between (i) network (ii) network element (iii) passive and active branch (iv) Bilateral and unilateral element (v) linear element.

2. Distinguish between independent and dependent energy sources. Enumerate the various types of dependent sources.

3. A 6V battery having an internal resistance of 0.25 ohm is connected to a load resistance $R_L=2\Omega$. Determine the : (a) total power supplied to the load, (b) power dissipated and lost within the voltage source, (c) load voltage, (d) terminal voltage and power supplied to the circuit when the voltage source is replaced by an ideal source with same magnitude of source voltage.

   [(a) 14.22W, (b) 1.78W (c) 5.33W (d) 6V, 18W]

4. An incandescent light bulb rated at 100W dissipates 100W as heat and light when connected across 230V ideal voltage source. If four such bulbs are connected in series across the same source, determine the power each bulb will dissipate.

5. Define (i) periodic function (ii) cycle (iii) time period (iv) frequency (v) angular velocity

6. Define and drive mathematical expressions for (i) average and (ii) effective values of a periodic waveform.

7. Define (i) form factor (ii) peak factor. What is the significance of the form factor?

8. Two circuits connected in parallel take alternating currents which can be expressed trigonometrically as $i_1=6 \sin(314t)$ and $i_2=8 \sin(314t+\pi/4)$ A. Determine the resultant of these currents using a phasor diagram and express it in trigonometric form. Give the rms value and frequency of the resultant current.

[12.98 <25.98^0, 12.96 sin(314t+25.98^0), 9.16A, 50Hz]

9. Four emfs, e_1=100 sinωt, e_2=80 sin (ωt-π/3), e_3=90 sin (ωt+π/4) and e_4=120 cos ωt,are induced in four coils connected in series, Find the resultant emfs and its phase difference with (i) e_1 and (ii) e_2

[233.54 sin(ωt+29.32^0), 29.32^0, 89.32^0]

10. A voltage v=330 sin(314t+60^0)V is maintain across a coil having a resistance of 30 ohms and inductance of 0.2 H. Determine the RMS valus of the voltage and current phasors in (a) rectangular notation (b) polar notation. Draw the phasor diagram.

[(a) 116.67+j202.08 V, 3.343-j0.261A; (b) 233.32<60^0V, 3.353 <-4.46^0]

Basic Electrical Engineering By T.K.NAGSARKAR AND M.S.SUKHIJA, Oxford University Press