B.E.(with Credits)-Regular-Semester 2012- All Branches Sem. I & II

104 - Basic Electrical Engineering

P. Pages : 4 **GUG/W/16/3667**

Time : Three Hours * 3 9 3 8 * Max. Marks : 80

Notes : 1. All questions carry equal marks.
2. Illustrate your answers wherever necessary with the help of neat sketches.
3. Due credit will be given to neatness and adequate dimensions.
4. Assume suitable data wherever necessary.
5. Use of non programmable calculator is permitted.

1. a) Determine the Resistance between point A and B in the figure 1(a) shown below, All values of resistor's are in ohms. **6**

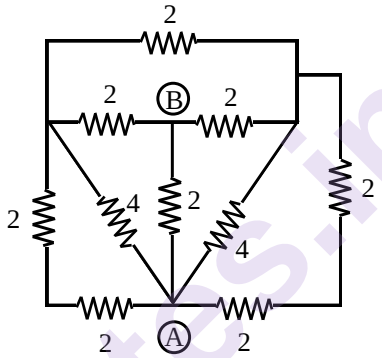
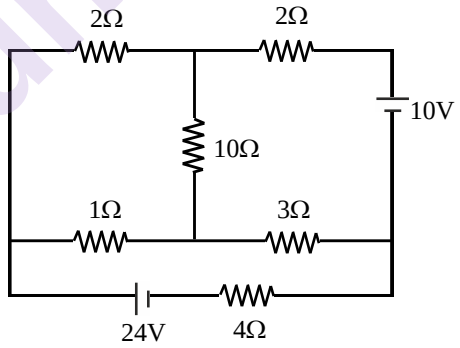
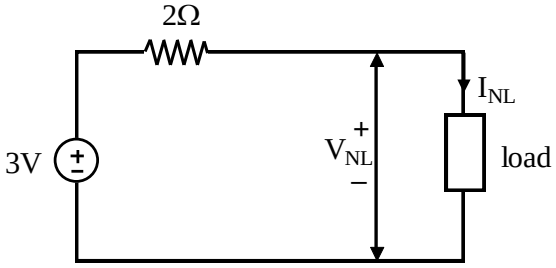


figure 1(a)

b) State and Explain Superposition theorem with an Example, and also determine the current in 4 ohm resistor using super position theorem in the circuit shown below. **6**

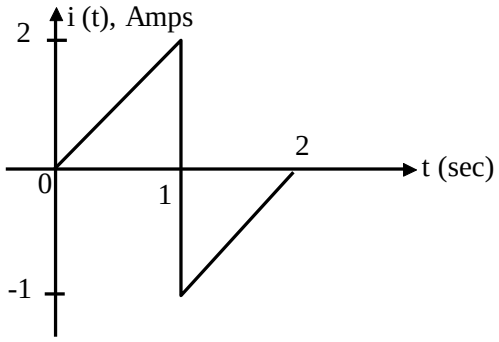


c) A 3V dc supply with an internal resistance of 2Ω supplies a passive non - linear resistance characterized by the relation $V_{NL} = I^2_{NL}$, the power dissipated in the non - linear resistance is **4**



OR

2. a) Figure shows the current flowing through a capacitor, the charge acquired by the capacitor during the interval t = 0 to t = 2 sec. **6**

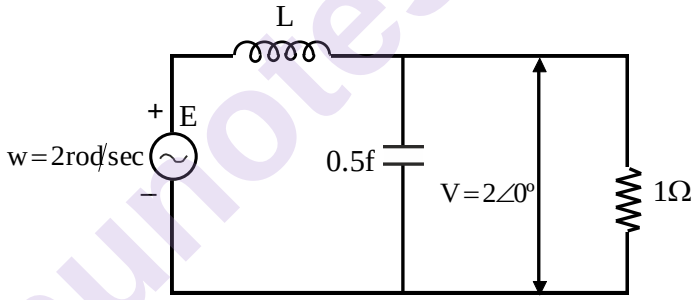


b) An RLC series circuit has a resistance R of 20Ω and a current which lags behind the applied voltage by 45º, if the voltage across the inductor is twice the voltage across the capacitor, what is the value of Inductive reactance? **4**

c) Define, **6**

i) Instantaneous Value,
ii) Cycle
iii) Frequency
iv) Amplitude

and also consider the following circuit below, that by how much the voltage across the Inductor lead's the voltage across the capacitor? Justify it.



3. a) What is B - H curve, compare Magnetic and Electrical Circuit. **8**

b) Two bars of same Material with $\mu r = 800$, having equal mean length of 10 cm But area of cross sections $2cm^2$ and $1cm^2$ are bent in the form of semicircle and joined to form a close ring. Calculate 'AT' required to produce $1wb/m^2$ flux density in the smaller ring, Neglect airgap leakage and fringing effect, **8**

OR

4. a) What do you mean by efficiency of a Transformer? Derive the load at Maximum efficiency. **6**

b) The following readings were obtained from OC and SC tests on a 10 KVA, 450/120V, 50Hz, 1 - ph transformer. **6**

OC test : V = 120V, I = 4.2A, W = 80W on L.V side withe H.V. open circuit,
SC test : $V_{SC} = 9.65V$, $I_{SC} = 22.2A$, $W_{SC} = 120W$, on H.V side.
with L.V. short circuited,
Calculate :

i) The approx equivalent circuit constants referred to primary side.
ii) Efficiency and voltage regulation at 0.8 p.f. full load (lagging)
iii) Efficiency at half full load 0.8 p.f. lagging.

c) What will happen if we give the D.C. voltage at the input side of two winding single phase transformer instead of A.C. supply? **4**

5. a) Draw and Explain Speed torque characteristics of d.c. series motor, what are it's application's. **4**

b) At 50% of full load, the armature current drawn by a d.c. shunt motor is 40 Amp, when connected to a 200V d.c mains, By decreasing the field flux, its speed is raised by 20% this also causes a 10% increase in load torque, calculate the percentage change in field current, the armature resistance including the brushes is 1 ohm, Neglect saturation and armature reaction. **8**

c) "DC series motor is always started with some load connected to it" Justify? **4**

OR

6. a) Derive the condition for Maximum torque in three Phase Induction Motor. **6**

b) A 500V, 6 pole, 50 Hz, 3 - phase Induction motor develops 20 HP, when running at 995 rpm. the p.f. and η being 0.87 and 80%, the stator losses are 150W. **6**

Calculate :

i) Slip
ii) Rotor cu - loss
iii) Total input power
iv) Line current
v) Nos of cycles / min of the rotor emf.

c) i) Why 3ϕ I.M. cannot run at synchronous speed. **4**

ii) 1ϕ I.M. is not self starting Justify?

7. a) Explain attraction type moving Iron Instrument with it's merit's and demerit's. **4**

b) A moving coil ammeter has a fixed shunt of 0.02Ω with a coil circuit resistance $R = 1K\Omega$ and need potential difference of 0.5V across it for full scale deflection **4**

i) To what total current does this correspond to?
ii) Calculate the values of shunt to give full scale deflection when the total current is 10A and 75A.

c) How does the Neutral wire developed in electrical power distribution system, Also explain the plate earthing, state the factor's influencing the earth resistance. **8**

OR

8. a) Three non - inductive resistances, each of 100Ω, are connected in star to a three phase, 440 V supply. **4**

Three inductive coils, each of reactance 100Ω connected in delta are also connected to the same supply.

Calculate :

i) Line currents and
ii) Power factor of the system.

b) Show that the power consumed by three identical phase loads connected in delta is three times the power consumed when these phase load's are connected in star. **8**

c) Draw the single line diagram of Electrical power flow from the source to consuming point's and mark various voltage levels on it. **4**

9. a) Draw and explain the V - I characteristics of a PN Junction diode when it is in - **8**
(i) forward biased (ii) reversed biased.

b) Draw the output characteristics of transistor, when it is in common emitter configuration and mark active region, saturation region, cutt off region. **4**

c) Draw full wave center - tapped rectifier circuit with input and output waveforms with load resistance. **4**

OR

10. a) The simplified form of the Boolean expression **4**
$Y = \left(\overline{A} \cdot BC + D\right)\left(\overline{A} \cdot D + \overline{B} \cdot \overline{C}\right)$ can be written as?

b) Minimise the four variable logic function using K - map. **4**
$f(A, B, C, D) = \Sigma m(0, 1, 2, 3, 5, 7, 8, 9, 11, 14)$

c) Derive all basic gates using universal gates. **8**

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