2011 (A)

Time: 3 Hours

Full marks - 70

Candidates are required to give their answers in their own word as far as practicable.

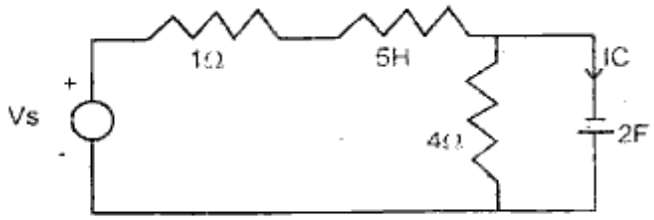
The questions are of equal value

Answer any five questions

1. (a) State and explain Kirchoff's laws. Also verify.

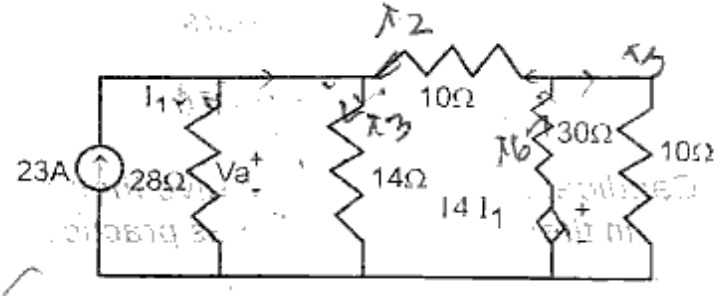
   (b) For the circuit given below. find Vs, if

   Ie = $2e^{-t}$amp



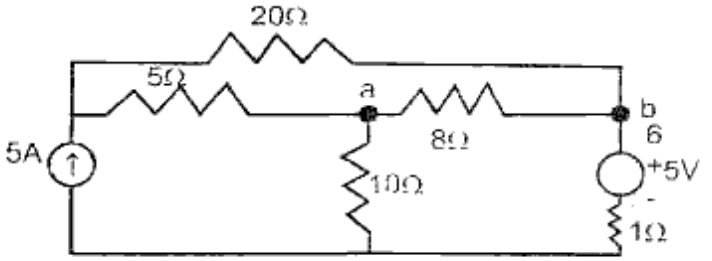
2. (a) State and explain Superposition theorem.

   (b) Using node voltage method, delirmine the voltage Va in the circuit shown below. Also find the current delivered by the controlled source.



3. (a) State and Explain Thevenin's theorem. How it is related Norton's theorem.

   (b) Find the thevenins equivalent across terminal ab in the circuit shown below:



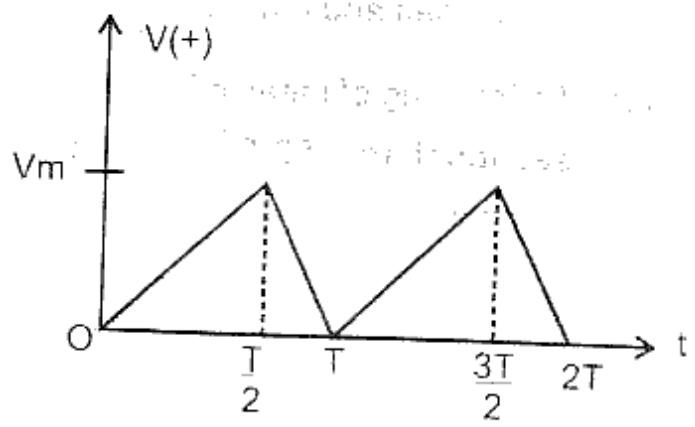
4. (a) Define the following related to AC:
   (i) Period
   (ii) Phase difference

(iii) Average value

(iv) RMS value

(v) Form factor

(b) Determine the form factor of the following waveform.



5. (a) Explain Two wattmeter method for measurement of power in a 3-φ circuit.

(b) Comment on the following:-

(i) Under what condition will the two wattmeters read equal?

(ii) When will one of the wattmeters read negative.

(c) Define the following:

(i). Active power

(ii) Reactive power

(iii) Apparent power

6. (a) State and explain Ampere's circuital law.

(b) Define self and mutual Inductance.

(c) An Iron ring of mean dia 10 cm and a cross sectional are of 2.5 cm^2 has an air gap of 2 mm width. It is wound with 1500 turns of wire carrying a current of 0.15 Amp. Assuming $\mu r = 800$. Determine the flux density in the air gap. Neglect leakage and fringing.

7. The resistance and leakage reactance of a 10 KVA, 50 Hz 2300/230V distribution transformer are as:

$r_1 = 4.2\ \Omega$; $r_2 = 0.042\ \Omega$

$xl_1 = 5.5\ \Omega$; $xl_2 = 0.55\ \Omega$

Subscript 1 & 2 denotes H.V. & L.V. side respectively

(a) Give the total leakage impedance referred to H.V side and L.V. side.

(b) Consider the transformer to deliver the rated KVA at 0.8 p.f. (lag) to a load on L.V. side with 230 V across the load. Find the high tension terminal voltage.

(c) consider the core less to be 70W, find the efficiency under the condition of part (b).

8. (a) Deduce the expression for voltage indnced in the armature of DC machine.

(b) Classify different types of DC motors. Give their circuit diagram. Also draw speed torque characteristics for these.

9. (a) How rotating magnetic field is produced in the Introduction motor.

(b) Define slip & Draw torque-speed characteristics of IM.

(c) Why it is not possible to sum the induction motor at synchronous speed.

10. Write notes on any two of the following:

(i) Maximum power transfer theorem.

(ii) Auto transformer

(iii) Speed control of DC motor

(iv) Star-delta conversion