

C 57554

(Pages : 2)

Name.....

Reg. No.....

**COMBINED FIRST AND SECOND SEMESTER B.TECH. (ENGINEERING)
DEGREE EXAMINATION, JUNE 2009**

AI 2K 109 EC/EE/IC/PTEC/2K107—BASIC ELECTRICAL ENGINEERING

Time : Three Hours

Maximum : 100 Marks

Answer all questions.

Part A

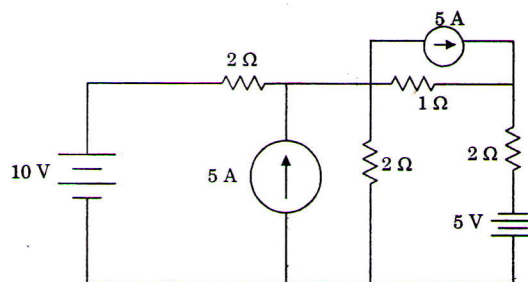
- I. (a) Explain what is meant by dependent and independent sources.
(b) Explain what is dynamically induced e.m.f.
(c) What is linear and time-invariant ? Explain.
(d) Find the impulse response for series RC circuit.
(e) Find the form and peak factors for a square wave of amplitude unity.
(f) State and explain Thevenin's theorem.
(g) Compare single phase and polyphase systems.
(h) A system of unbalanced three-phase voltages are given by
 100 V , $j 200 \text{ V}$ and $(-100 - j 160) \text{ V}$.

Determine the three symmetrical components of the system.

(8 × 5 = 40 marks)

Part B

- II. (a) Find the Thevenin's and Norton's equivalent circuits at terminals AB for the following circuits:—



Or

- (b) (i) State and explain the following laws :
(1) Faraday's law of electromagnetic induction.
(2) Lenz's law.

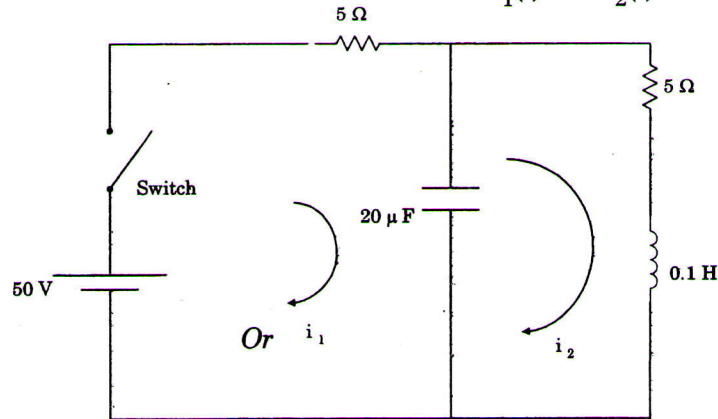
(8 marks)

- (ii) Derive the expression for energy stored in electrostatic field.

(7 marks)

Turn over

- III. (a) In the following circuit the switch t is closed at $t = 0$. Find $i_1(t)$ and $i_2(t)$ for $t \geq 0$.



- (b) (i) Find the initial value of the current whose Laplace transform is :

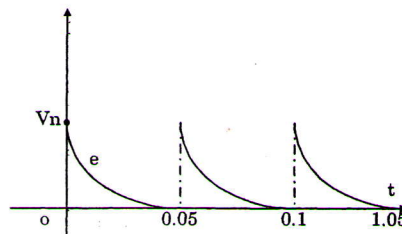
$$I(s) = \frac{3s^2 + 1}{(s^2 + 4)(2s + 3)}$$

(3 marks)

- (ii) A series combination of R and C is in parallel with a resistance of $20\ \Omega$. At a source frequency of 60 Hz , the total current of 7.02 A divides so that the $20\ \Omega$ resistor takes 6 A and the RC branch 2.3 A . Evaluate R and C .

(12 marks)

- IV. (a) (i) Determine the average and r.m.s. values of the waveform shown below :
(where $e = V_n e^{-200t}$)



(9 marks)

- (ii) Explain the relation between S-domain immittance functions and phasor impedance.

(6 marks)

Or

- (b) Derive the expression for Q-factor of a series RLC circuit.

- V. (a) Each branch of a delta connected load has a resistance of $16\ \Omega$ s and an inductive reactance of $12\ \Omega$ in series. Calculate the line current and total power when connected to a 400 V , 3-phase supply.

Or

- (b) A 3-phase, 3-wire system, with a line voltage $V_{BC} = 339.4 \angle 0^\circ\text{ V}$ has a balanced Y-connected load of $Z_Y = 15 \angle 60^\circ$. The lines between the system and the load have impedances $2.24 \angle 26.57^\circ\ \Omega$. Find the live-voltage magnitude at the load.

(4 × 15 = 60 marks)