

COMBINED FIRST AND SECOND SEMESTER B.TECH. (ENGINEERING)
DEGREE EXAMINATION, JUNE 2010

AI 2K 109—BASIC ELECTRICAL ENGINEERING

(Common to EE, EC, IC, BM, and BT)

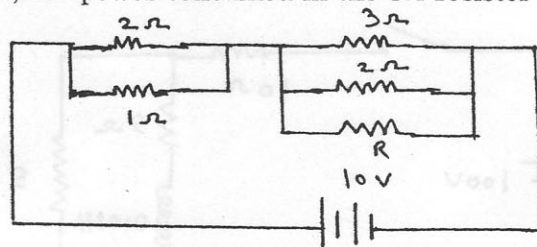
Time : Three Hours

Maximum : 100 Marks

Answer all questions.

Part A

1. (a) In the following circuit, the power consumed in the 3Ω resistor is 12 watts. Find the value of R.

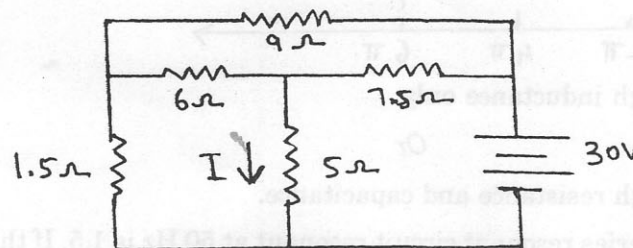


- (b) Define and explain self and mutual inductance.
 (c) State and explain superposition theorem.
 (d) Explain constant charge theorem.
 (e) Explain the generation of sinusoidal alternating voltage.
 (f) A series RLC circuit has $R = 5\ \Omega$, $L = 40\ \text{mH}$ and $C = 1\ \mu\text{F}$. Calculate the half power frequencies.
 (g) Compare star and delta connections.
 (h) Three similar resistors are connected in star across 400 V, 3-phase lines. The line current is 5 A. Calculate the value of each resistor.

(8 × 5 = 40 marks)

Part B

2. (a) (i) Using Thevenin's theorem, find the current I.



(8 marks)

- (ii) Explain BH curve and hysteresis loop.

(7 marks)

Or

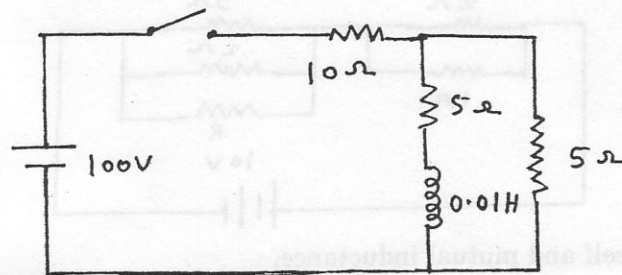
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- (b) (i) Explain production of induced e.m.f. and current. (5 marks)
- (ii) Two long single layer solenoids have the same length and the same number of turns but are placed co-axially one within the other. The diameter of the inner coil is 8 cm. and that of the outer coil 10 cm. Calculate the coefficient of coupling between the coils. (10 marks)

3. (a) (i) Explain the concept of linear and time invariance.
- (ii) Explain passive and active elements.
- (iii) Explain V-I relationship for independent voltage sources.

Or

- (b) (i) The switch in the two mesh circuit shown below is closed at $t = 0$. Obtain the current i_1 and i_2 for $t \geq 0$.



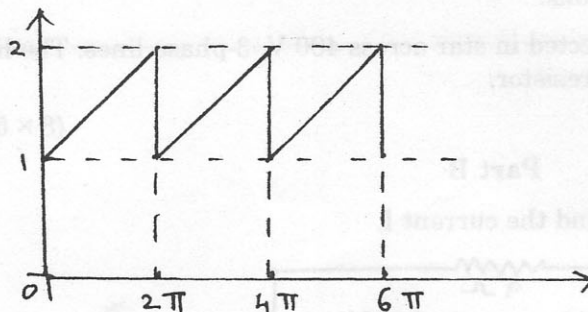
(9 marks)

- (ii) Explain the following terms with respect to transients :—

(1) Time constant ; (2) Rise time ; (3) Fall time.

(6 marks)

4. (a) (i) Find the r.m.s. and average value of the current represented by the figure below :



(8 marks)

- (ii) Explain AC through inductance only.

(7 marks)

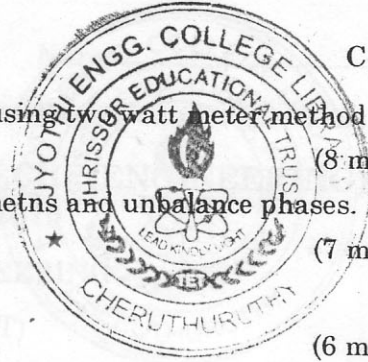
Or

- (b) (i) Explain AC through resistance and capacitance.

(6 marks)

- (ii) The Q factor of a series resonant circuit resonant at 50 Hz is 1.5. If this circuit is supplied with a voltage of constant magnitude and variable frequency, find the frequency at which the capacitor voltage in the circuit is maximum.

(9 marks)

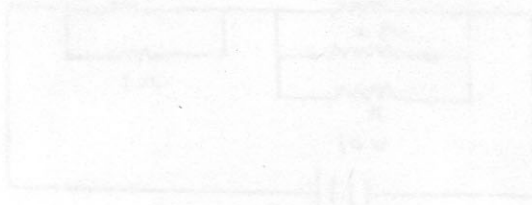


5. (a) (i) Explain the power measurement in balanced load by using two watt meter method. (8 marks)
- (ii) Explain the relationship between symmetrical components and unbalance phases. (7 marks)

Or

- (b) (i) Explain voltages and currents in star connection. (6 marks)
- (ii) Three coils are connected in delta to a 3-phase, 3-wire, 50 Hz supply and take a line current of 5 A at 0.8 power factor lagging. Calculate the resistance and inductance of the coils. (9 marks)

[4 × 15 = 60 marks]



[4 × 15 = 60 marks]

Part B

2. (a) Use Thevenin's theorem, find the current I .



(8 marks)

(7 marks)

Or

Turn over