


Final Assessment Test – April 2025

Course: BEEE102L - Basic Electrical and Electronics Engineering

Class NBR(s): 4488 / 4489 / 4490 / 4491 / 4493 / 4495

Slot: E2+TE2

Time: Three Hours

Max. Marks: 100

- KEEPING MOBILE PHONE/ANY ELECTRONIC GADGETS, EVEN IN 'OFF' POSITION IS TREATED AS EXAM MALPRACTICE
 ➤ DON'T WRITE ANYTHING ON THE QUESTION PAPER

Answer ALL Questions
 (10 X 10 = 100 Marks)

1. Find the current through $4\ \Omega$ for the circuit shown in fig.1 using mesh method

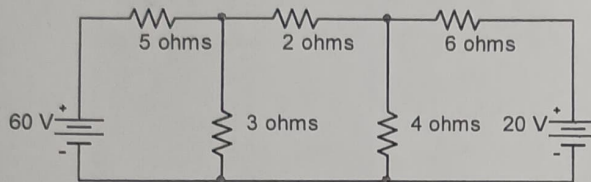


Fig.1

2. For the circuit shown in fig.2 find the value of R_L at which maximum power will be delivered to it and also find the value of the maximum power delivered.

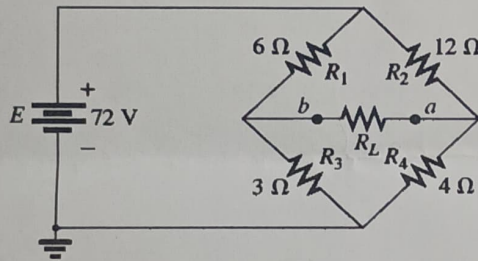


Fig.2

3. A voltage $v(t) = 150\sin 250t$ is applied to the circuit consisting of an inductor having inductive reactance of $j15\ \Omega$ and a resistance of $10\ \Omega$ connected in series as shown in fig.3. Find the (i) Impedance and inductance (ii) current (iii) voltage across inductance and resistance (iv) power factor (v) total power dissipated in the resistance.

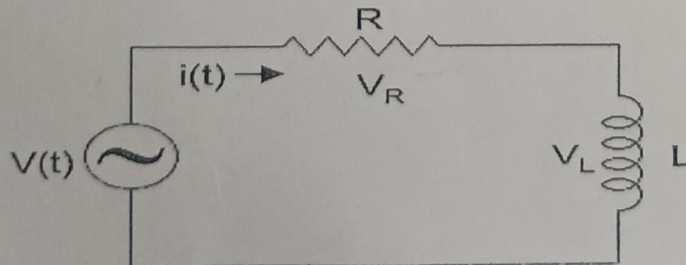


Fig.3

4. A balanced star connected load of $(8 + j6)$ phase is connected to a 3 phase, 230V, 50 Hz supply. Find the line current, power factor, real power, reactive volt amperes and total volt amperes.

5.

i)

Derive the expression for magnetic flux produced by a current I flowing through N number of turns wound on a core made up of magnetic material of length ' l ' with a permeability ' μ ' and area of cross section ' A '.

[4]

ii)

A magnetic circuit with a single air gap is shown in Fig.4. The core dimensions are: Cross-sectional area $A_c = 1.8 \times 10^{-3} \text{ m}^2$, Mean core length $l_c = 0.6 \text{ m}$ Gap length ' l_g ' = $2.3 \times 10^{-3} \text{ m}$, $N = 83$ turns. Assume that the core is of infinite permeability and neglect the effects of fringing fields at the air gap and leakage flux. (a) Calculate the reluctance of the core and that of the gap. For a current of $I = 1.5 \text{ A}$, calculate (b) the total flux ϕ , (c) the flux linkages λ of the coil, and (d) the coil inductance L .

[6]

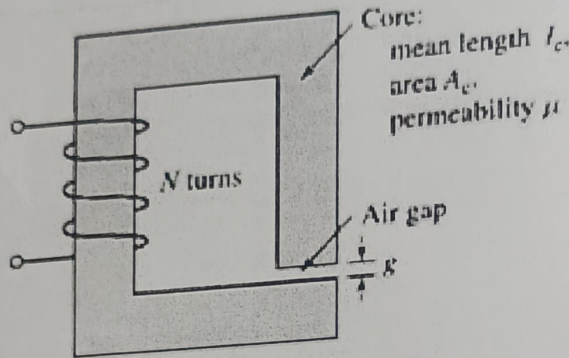


Fig.4

6.

The total inductance of two coils, A and B, when connected in series, is 0.6 H or 0.3 H , depending on the relative directions of the current in the coils. Coil A, when isolated from coil B, has a self-inductance of 0.1 H . Calculate (a) the mutual inductance between the two coils (b) the self-inductance of coil B (c) the coupling factor between the coils. (d) the two possible values of the induced e.m.f. in coil A when the current is decreasing at 500 A per second in the series circuit.

7.a)

With a neat diagram explain the construction and working principle of DC generator. Name the different types of DC machines.

OR

7.b)

With a neat diagram explain the working principle of three phase induction motor and briefly explain why single phase induction motor is not having a self-starting torque.

8.a)

Obtain the simplified expressions in sum of products for the given Boolean Function.

$$F(w,x,y,z) = \sum(0,1,2,4,5,6,8,9,12,13,14)$$

OR

8.b)

- i) Explain the 4×1 MUX with necessary logic circuits & truth table.
- ii) Derive the Boolean expression to obtain the sum and carry for 3-bit addition using truth table. Also, implement appropriate gates and draw the logic circuit to realize the expressions.

[5]

[5]

9.

Based on the static V-I characteristics and application compare the P-N junction diode and zener diode.

10.

With a neat diagram explain the working and the characteristics of N-channel enhancement type MOSFET.