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CAT FOR WAVES AND OPTICS

FACULTY: FET

PROGRAMME/DEPARTMENT: REE&EPE

OPTION: REE&EPE	**Year: 2026**
MODULE CODE: EEE8126	**MODULE TITLE: Electrical Circuit Analysis**
DATE: 12/10/2026	**SESSION: March Intake**
DURATION: 2.5 h	**TOTAL MARKS: 50**
EXAMINER/LECTURER: Dr NDIZIHIWE Prosper	**MODERATOR(S): Dr. NDIZIHIWE Prosper**

INSTRUCTIONS TO THE CANDIDATE/STUDENT

This Exam has THREE Sections:

SECTION A is compulsory 25%

SECTION B: Choose two questions (give minimum three questions) 50%

SECTION C: Choose one question (give minimum 2 questions to choose from). 25%

SECTION A / 20 marks

1. A) Differentiate the open circuit and short circuit? Characterize the current for the two cases. **(/4marks)**

   B) If the $X_c = \frac{1}{2\pi fC}$, where X_c is the capacitive reactance, C is the capacitor and f is the frequency, in which case of f we can have open circuit and short circuit? **(/4marks)**

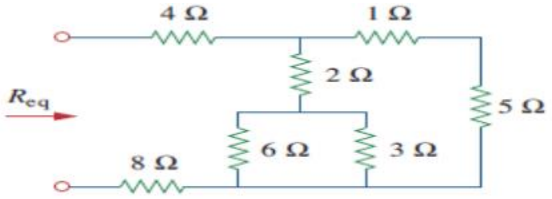
2. Represent the symbol of used for ac and dc voltage source, and the current source **(/3 marks)**

3. For $V(t) = A\cos(\omega t)$, use $i(t) = C\frac{dv}{dt}$ to show that the current leads (comes before) the voltage by $\frac{\pi}{2}$ for the capacitive reactance. **(/4 marks)**

4. A family in the rural area uses a 40W light bulb in 6 hours per day, the electricity price is 89/KWh. How much does the electricity cost within a month (30 days)? **(/5marks)**

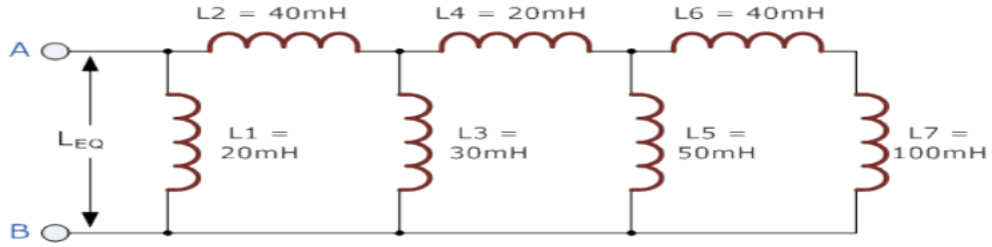
SECTION B/ 20 marks

1. Find the Req for the circuit shown in below figure. **(/10 marks)**

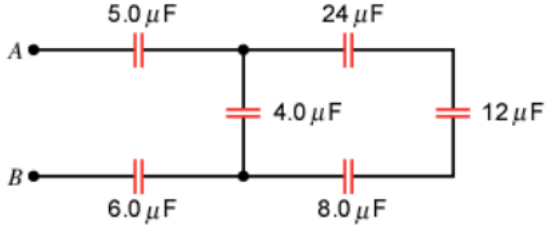


fig(a)

2. Determine the equivalent inductance in the given network. **(/10 marks)**

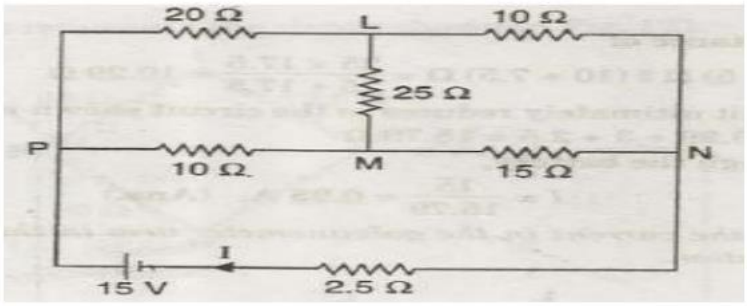


3. Determine the equivalent capacitance between AB in the given circuit. **(/10 marks)**



SECTION C/ 10 marks

1. Use Delta (∇) to Star (Y) transformation to determine the total current I in the given circuit. **(/10 marks)**



2. Write the node voltage equations and find out the currents in each branch of the circuit shown in the figure below. **(/10 marks)**

