



GENERAL INSTRUCTIONS TO THE CANDIDATES

1. Candidates are instructed to answer the questions as per Bloom's Taxonomy knowledge level (K_1 to K_6)
2. Candidates are strictly instructed not to write anything in the question paper other than their roll number.
3. Candidates should search their pockets, desks and benches and handover to the Hall Superintendent/ Invigilator if any paper, book or note which they may find therein as soon as they enter the examination hall.
4. Candidates are not permitted to bring electronic watches with memory, laptop computers, personal systems, walkie-talkie sets, paging devices, mobile phones, cameras, recording systems or any other gadget / device /object that would be of unfair assistance to him / her.
5. Corrective measures as per KCT examination policies will be imposed for malpractice in the hall like copying from any papers, books or notes and attempting to elicit the answer from neighbours.

B.E DEGREE EXAMINATIONS: JUNE 2015

(Regulation 2014)

Second Semester

ELECTRICAL AND ELECTRONICS ENGINEERING

U14EET201: Circuit Theory

Time: Three Hours

Maximum Marks: 100

Answer all the Questions:-

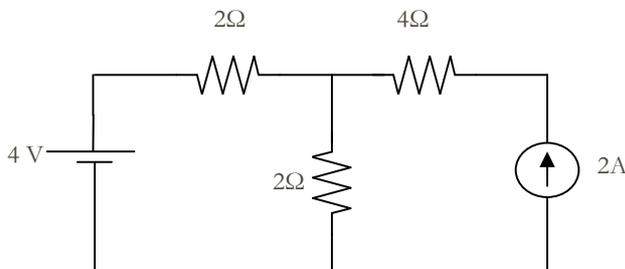
PART A (10 x 1 = 10 Marks)

1. A certain series circuit has $100\ \Omega$, a $270\ \Omega$ and a $330\ \Omega$ resistor in series. [K₃]
Assertion (A): If the $270\ \Omega$ resistor is removed, the current increases
Reason (R): Resistance value increases with removal of $270\ \Omega$ resistor
 a) both A and R are individually true and R is the correct explanation of A b) both A and R are individually true but R is not the correct explanation of A
 c) A is true but R is false d) A is false but R is true.
2. Determine total inductance of a parallel combination of $100\ \text{mH}$, $50\ \text{mH}$ and $10\ \text{mH}$. [K₂]
 a) $7.69\ \text{mH}$ b) $160\ \text{mH}$
 c) $60\ \text{mH}$ d) $110\ \text{mH}$
3. Maximum Power is transferred when the load impedance is equal to [K₁]
 a) Source impedance b) Half the source impedance
 c) Zero d) Twice the source impedance
4. The reciprocity theorem is applicable to [K₂]
 i) Linear Networks ii) Bilateral Networks iii) Non linear networks

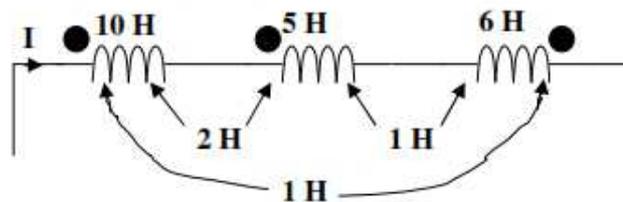
16. The inductance matrix for the circuit of three series connected coupled coils is given below. Find the [K₃]

inductances and draw the circuit indicating the dots for the coil. $L = \begin{bmatrix} 4 & -4 & 1 \\ -4 & 2 & -3 \\ 1 & -3 & 6 \end{bmatrix}$

17. Find the current in the 2 Ω resistor in middle branch using superposition theorem [K₃]



18. Find the equivalent inductance of the following circuit. [K₃]



19. The Phase voltage of a symmetrical star connected system $V_{RN} = 230 \angle 0^\circ$. Calculate the line voltages [K₂]
 V_{RY}, V_{YB}, V_{BR} with their phase angles.

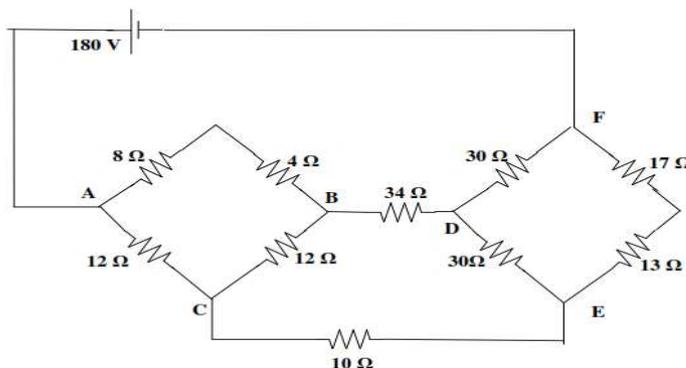
20. Distinguish between power factor and Vector power factor. [K₂]

Answer any FIVE Questions:-
PART C (5 x 14 = 70 Marks)
(Answer not more than 300 words)

Q.No. 21 is Compulsory

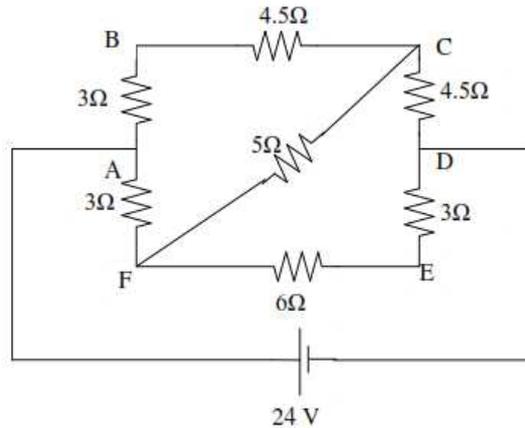
21. An unbalanced four wire, star connected load has a balanced voltage of 400 V. The loads are [K₃]
 $Z_1 = (4 + j8) \Omega$; $Z_2 = (3 + j4) \Omega$; $Z_3 = (15 + j20) \Omega$; Calculate the (i) Line currents (ii) Current in the neutral wire (iii) the total power.

22. Calculate the current flowing in the 10 Ω resistor. [K₂]



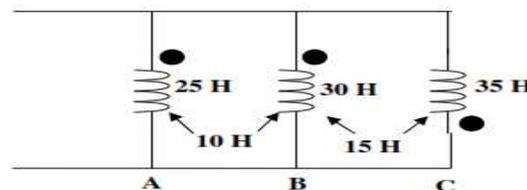
23. A series RLC circuit with a resistance of $10\ \Omega$, Inductance of 0.2H and a capacitance of $40\ \mu\text{F}$ is supplied with a $100\ \text{V}$ supply at variable frequency. Find the following (i) Frequency at resonance (ii) Current at resonance (iii) Power (iv) power factor (v) Voltage across R,L,C at resonance (vi) Quality factor (vii) half power points (viii) Phasor diagram [K₃]

24. Calculate using Thevenin's Theorem the current through the branch FC [K₃]



25. (i) Calculate the MMF required to produce a flux of $5\ \text{mWb}$ across an air gap of $2.5\ \text{mm}$ of length having an effective area of $100\ \text{cm}^2$ of cast steel ring of mean iron path of $0.5\ \text{m}$ and cross sectional area of $150\ \text{cm}^2$. Relative permeability of cast steel = 800 . Neglect leakage flux. (10) [K₂]

- (ii) Find the equivalent inductance for the following circuit (4) [K₂]



26. A three phase, balanced delta connected load of $(4+j8)\ \Omega$ is connected across a $400\ \text{V}$, 3 phase balanced supply. Determine the phase currents and line currents. Assume the phase sequence to be RYB. Also calculate the power drawn by the load. [K₂]
