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# INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Four Year B.Tech I Semester End Examinations(Regular) - December, 2019  
Regulation: IARE – R18

## FUNDAMENTAL OF ELECTRICAL ENGINEERING

Time: 3 Hours

(Common to CSE | IT)

Max Marks: 70

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the question must be answered in one place only

### UNIT – I

1. (a) State and explain the Ohm's law and Kirchhoff's laws. Explain voltage division rule and current division rule. [7M]
- (b) Determine voltage across the 10 ohm resistor and also the current passing through it for the circuit shown in Figure 1. [7M]

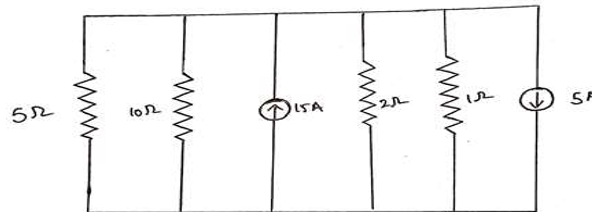


Figure 1

2. (a) Explain in detail about resistance, inductance & capacitance and also write the expression for energy stored in inductor and capacitor. [7M]
- (b) Consider a coil allowing a current of  $i(t) = 4t^2$ . Calculate voltage induced, power absorbed and energy stored by inductor, if its inductance is 5H. [7M]

### UNIT – II

3. (a) Obtain the expressions of star to delta and delta to star transformation. [7M]
- (b) Using star-delta technique find out the resistance between A and B, and also find the total current for the circuit shown in Figure 2. [7M]

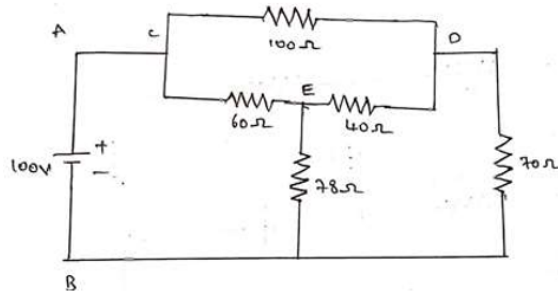


Figure 2

4. (a) Determine the step by step method of finding voltage across each node for a given circuit using nodal analysis [7M]
- (b) Determine the current in the 5 ohms resistor using node voltage analysis for the circuit shown in Figure 3. [7M]

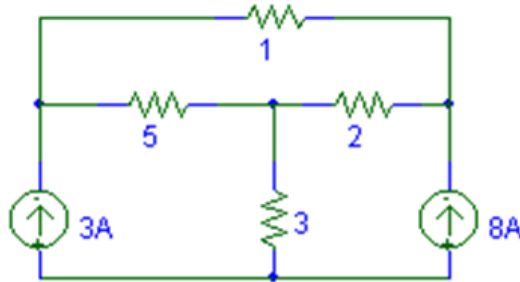


Figure 3

### UNIT – III

5. (a) Define the terms peak, peak to peak, average, RMS values, peak factor and form factor of sine wave. [7M]
- (b) A non-alternating periodic waveform is shown in Figure 4. Determine its form factor. [7M]

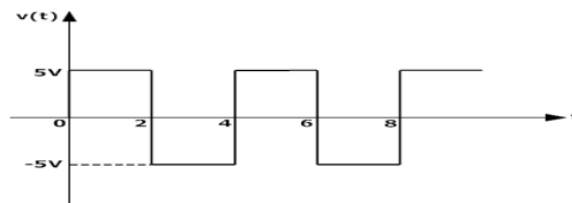


Figure 4

6. (a) Write the expression for the impedance offered by pure resistor and inductor and also draw the corresponding waveforms. [7M]
- (b) A generator supplies a 30 V, 100 Hz signal to a series circuit shown in Figure 5, find the impedance, the line current and the phase angle for the circuit. [7M]

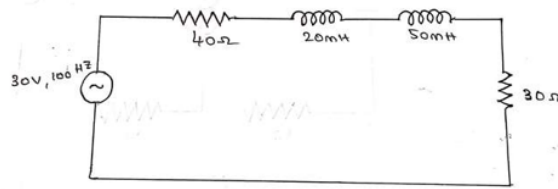


Figure 5

### UNIT – IV

7. (a) Explain the active & reactive power for series RL and RC circuits. [7M]  
 (b) A two element series circuit consumes 700W and has power factor of 0.707 leading. If the applied voltage is  $V = 141 \sin(314t + 30^\circ)$ , find the circuit constants. [7M]
8. (a) Define the power factor of the circuit and give its importance. How do you convert KW to KVA? [7M]  
 (b) Three impedances  $(4 - j6) \Omega$ ,  $(6 + j8) \Omega$  &  $(5 - j3) \Omega$  are connected in series. Calculate the total current if the total supply voltage is 200 V. [7M]

### UNIT – V

9. (a) Define the following terms  
 i) Graph  
 ii) Tree  
 iii) Co-tree  
 iv) Link  
 v) Twig [7M]
- (b) Obtain the Tie-set matrix for the oriented graph shown in Figure 6. [7M]

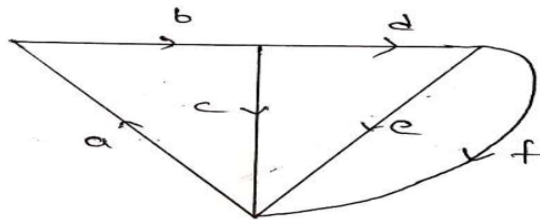


Figure 6

10. (a) Explain the concept of duality with necessary example. [7M]  
(b) Draw the dual network for the circuit shown below in Figure 7 using the graphical method. [7M]

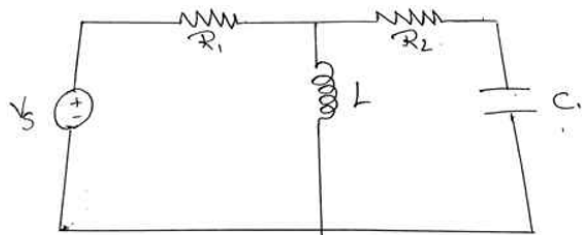


Figure 7