

B. Information Technology 1<sup>st</sup> Yr. 1<sup>st</sup> Sem. Supplementary Examination- 2017

Sub: Electrical Circuit

Time: Three hours

Full Marks: 100

Part-I (70 Marks)

(Use separate answer script for each part)

No. Of Questions	Part-I Answer Q1 and any two from rest	Marks
Q1.	a) Find the effective value of a resultant current in a wire which carries simultaneously a direct current of 10A and alternating current given by,	10
	$i = 12 \sin \omega t + 6 \sin (3\omega t - \pi/6) + 4 \sin(5\omega t + \pi/3).$	
	b) Calculate the Average value, RMS value, Form factor and Peak factor of a periodic current having following values for equal time intervals changing suddenly from one value to next as 0, 2, 4, 6, 8, 10, 8, 6, 4, 2, 0, -2, -4, -6, -8, -10, -8, .....	10
Q2.	a) What is electrical resonance?	5
	b) A 50Hz sinusoidal current has peak factor 1.4 and form factor 1.1. Its average value is 20A. The instantaneous value of current is 15A at $t = 0$ sec. Write the equation of current and draw its waveform.	10
	c) A resistance $R$ , an inductance $L = 0.5H$ and a capacitance $C$ are connected in series. When a voltage $v = 350\cos(3000t - 20^\circ)$ V is applied to this series combination, the current flowing is $15\cos(3000t - 60^\circ)$ A. Find the values of $R$ and $C$ .	10
Q3.	a) State the advantages of using two wattmeters for power measurement of 3-phase circuit.	5
	b) The parallel circuit comprises respectively (i) A coil of resistance 20 ohm in series with inductance of 0.07H and (ii) A condenser of capacitance $60\mu F$ in series with a resistance of 50 ohm. Calculate the current drawn from mains and power factor of the arrangement when connected across a 230V, 50Hz supply. Draw the phasor diagram showing branch current and total current.	10
	c) Two wattmeters connected to measure 3-phase power for star connected read 5.185kW and 10.37kW. The line current is 10A. Calculate the i) Line and phase voltages ii) Resistance and reactance per phase.	10
Q4.	a) Derive the expression for equivalent delta connected resistive circuit from the star connected resistive circuit.	5
	b) Derive the phasor expression for current, voltage, impedance and power for R-L -C series circuit. Also draw the waveforms of voltage, current and power along with phasor diagram of the circuit.	10
	c) A voltage $v = 200\sin(100\omega t)$ is applied to a load having $R = 200\text{ohm}$ in series with $L = 638\text{mH}$ . Estimate i) Expression for current in $i = I_m \sin(\omega t \pm \Phi)$ form ii) Power consumed by the load iii) Reactive power of the load iv) Voltage across $R$ and $L$ .	10

BACHELOR OF INFORMATION TECHNOLOGY ENGG. EXAMINATION 1<sup>st</sup> year 1<sup>st</sup> semester, 2016-17

Electrical Circuit

Time: Three hours.

Full marks: 30

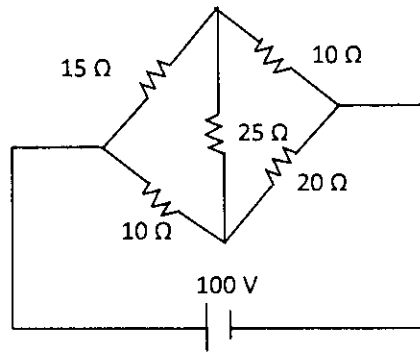
Use separate Answer-script for each part

Part- II

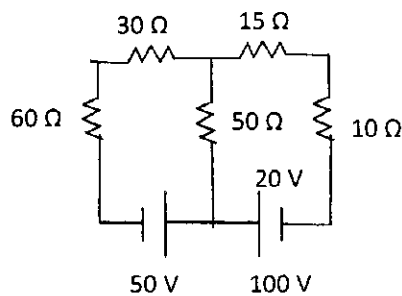
Attempt any two from the 1-4

2\*15=30

1. (a) State & explain Thevenin's theorem. 5
- (b) Using Thevenin's theorem determine the current flow through 25 Ω resistor. 10



2. (a) Define Superposition theorem. State the essential circuit properties for applying Superposition theorem. 5
- (b) Using Superposition theorem find the current through 15 Ω resistor. 10

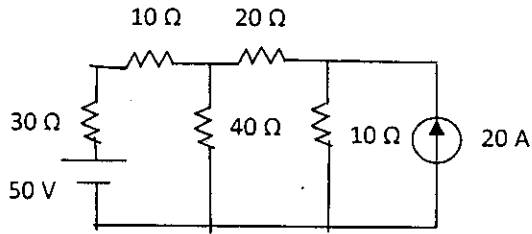


3. (a) State KCL & KVL.

5

(b) Find current flow through  $40\ \Omega$  resistor using mesh analysis/nodal analysis.

10



4. (a) Why Laplace Transform is required for solving differential equations of electrical systems?

5

(b) Calculate Laplace Transform of the following functions:

10

(i)  $f(t) = \frac{\sin(2t)}{t}$

(ii)  $f(t) = (1 + 2e^{-4t} - 4te^{-4t})u(t)$