

Uva Wellassa University, Sri Lanka  
Faculty of Science and Technology  
Science and Technology Degree Programme  
1<sup>st</sup> Semester Examination – March/April 2013



SCT 253-1 Applied Electricity

Instructions to candidates

Number of questions: Three (03)

Answer all questions

Time allocation: One (01) hour

Total marks allocated: 100

1.

a. Consider the waveform in Fig Q1. Determine the following.

i. average value

(03 marks)

ii. rms value

(03 marks)

iii. form factor

(03 marks)

iv. peak factor

(03 marks)

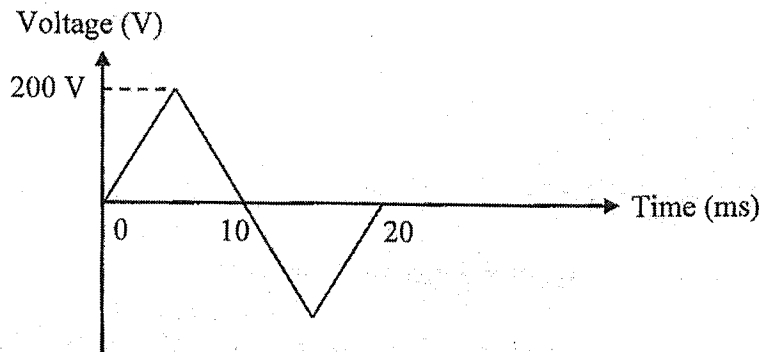


Fig. Q1

b. The current in an AC circuit at any time  $t$  (s) is given by  $i = 120 \sin(100\pi t + 0.36)$  V.

Determine the following.

i. Amplitude

(02 marks)

ii. rms value

(03 marks)

- iii. periodic time (02 marks)
- iv. phase angle in degrees relative to  $120 \sin(100\pi t)$  (03 marks)
- v. time when the current becomes maximum for the first time (03 marks)

2.

- a.
  - i. What are "inductive" and "capacitive" circuits related to AC supply RLC circuits? (02 marks)
  - ii. Draw the impedance ( $Z$ ) and phase angle ( $\phi$ ) of RLC circuits with respect to frequency. (02 marks)

b. A coil of inductance 318.3 mH and negligible resistance is connected in series with a  $200 \Omega$  resistor to a 240 V, 50 Hz supply.

Determine the following.

- i. inductive reactance of the coil (03 marks)
- ii. impedance of the circuit (03 marks)
- iii. current in the circuit (03 marks)
- iv. potential difference across each component (03 marks)
- v. circuit phase angle (03 marks)
- vi. true power and dissipated power of the circuit (03 marks)
- vii. Draw the phasor diagram (03 marks)

c. A circuit consisting of a resistor in series with an inductance takes 210 W at a power factor of 0.6 from 50 V, 100 Hz supply.

Determine the following.

- i. current (03 marks)
- ii. circuit phase angle (03 marks)



- iii. resistance (03 marks)
- iv. impedance (03 marks)
- v. inductance (03 marks)
- 3.
- a. A mild steel ring has a radius of 50 mm and a cross sectional area of 400 mm<sup>2</sup>. A current of 0.5 A flows in a coil wound uniformly around the ring and the flux produced is 0.1 mWb. If the relative permeability at this value of current is 200 determine the following.
- i. reluctance of the mild steel (03 marks)
- ii. magneto motive force (mmf) produced within the coil (03 marks)
- iii. number of turns of the coil (03 marks)
- b. Three (03) 24  $\mu$ F capacitors are connected in star across 400 V, 50 Hz, three phase supply.
- i. calculate the voltage across each capacitor (04 marks)
- ii. calculate the phase current (04 marks)
- iii. calculate the line current (04 marks)
- iv. What value of capacitance must be connected in delta in order to take the same line current? (05 marks)
- c. A 20  $\Omega$  resistance is connected across the secondary winding of a single - phase ideal power transformer. The secondary voltage is 150 V. If the load resistance dissipate 500 W, determine the following.
- i. primary side voltage (05 marks)
- ii. turns ratio (04 marks)