

**2 0 1 6**

( 1st Semester )

**ELECTRONICS**

Paper No : EL-101

**( Electronic Measuring Instruments and  
Circuit Analysis )***Full Marks : 55**Time : 2½ hours*

( PART : B—DESCRIPTIVE )

( Marks : 35 )

*The figures in the margin indicate full marks  
for the questions*

1. (a) Compare among air core, iron core and ferrite core of an inductor. Two coils each having an inductance of 250 H have coefficient of coupling  $k = 0.1$ . Calculate their mutual inductance. 3+2=5
- (b) Two carbon-composition resistors of yellow, green, black and brown, red, brown are connected in series. Calculate the combined resistance. 2

*Or*

- (c) Discuss the principle of working of varactor. 3
- (d) Discuss the factors that control the capacitance of a capacitor. Why is ceramic capacitor preferred over mica or paper capacitor? 2+2=4

2. What is multimeter? Explain, with circuit diagram, the working of multimeter as voltmeter and ammeter. 1+3+3=7

*Or*

- (a) Define deflection sensitivity of cathode-ray tube (CRT). 2
- (b) Describe the construction, working principle and any two applications of a thermocouple. 5

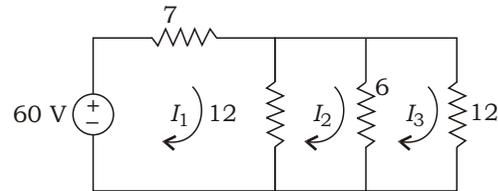
3. (a) Derive the expression for impedance in an a.c. circuit containing  $L$  and  $C$ . 3
- (b) What is  $j$  operator? Discuss the significance of  $j$  operator. 4

*Or*

- (c) Discuss how high-pass filter works. 3
- (d) Discuss the phase relation between voltage and current waves in a pure capacitor. 4

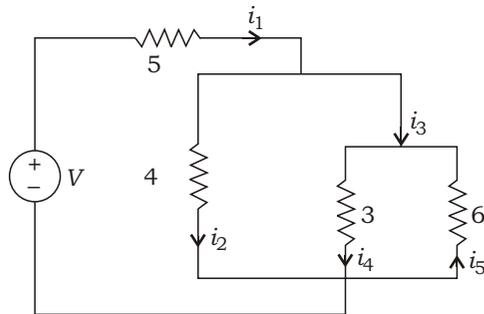
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4. (a) Discuss the current and voltage division law. 4
- (b) Find the current supplied by 60 V source using mesh analysis : 3



Or

- (c) What are Kirchhoff's current and voltage laws? How will you convert a current source into a voltage source? 2+2=4
- (d) For the given circuit, assuming  $i_1 = 5$  A, determine  $i_2, i_3, i_4$  and  $i_5$  : 3



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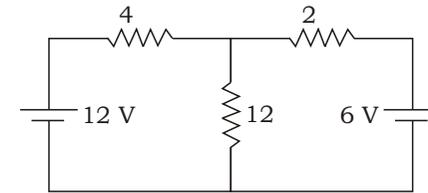
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I/ELEC (i)

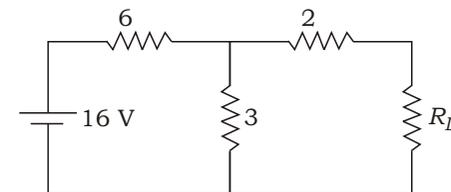
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5. (a) State and illustrate Norton's theorem. 4
- (b) Apply Thevenin's theorem to find current through the 12 Ω resistor of the circuit shown in the figure below : 3



Or

- (c) State and prove maximum power transfer theorem. 4
- (d) In the following circuit, what should be the value of load resistance  $R_L$  to obtain maximum power from 16 V battery? What is the value of this maximum power? 3



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Subject Code : **I**/ELEC (i)

Booklet No. **A**

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Date Stamp .....

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**To be filled in by the Candidate**

DEGREE 1st Semester  
(Arts / Science / Commerce /  
..... ) Exam., **2016**

Subject .....

Paper .....

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**To be filled in by the Candidate**

DEGREE 1st Semester  
(Arts / Science / Commerce /  
..... ) Exam., **2016**

Roll No. ....

Regn. No. ....

Subject .....

Paper .....

Descriptive Type

Booklet No. B .....

**INSTRUCTIONS TO CANDIDATES**

- 1. The Booklet No. of this script should be quoted in the answer script meant for descriptive type questions and vice versa.**
- 2. This paper should be ANSWERED FIRST and submitted within 45 minutes of the commencement of the Examination.**
- 3. While answering the questions of this booklet, any cutting, erasing, overwriting or furnishing more than one answer is prohibited. Any rough work, if required, should be done only on the main Answer Book. Instructions given in each question should be followed for answering that question only.**

Signature of  
Scrutiniser(s)

Signature of  
Examiner(s)

Signature of  
Invigilator(s)

**I/ ELEC (i)**

**2 0 1 6**

( 1st Semester )

**ELECTRONICS**

Paper No : EL-101

**( Electronic Measuring Instruments and Circuit Analysis )**

( PART : A—OBJECTIVE )

( Marks : 20 )

SECTION—I

( Marks : 5 )

*Each question carries 1 mark*

Tick ( ✓ ) the correct answer in the brackets provided :

**1.** The fifth band of a resistor indicates

(a) tolerance ( )

(b) resistance value ( )

(c) reliability ( )

(d) decimal multiplier ( )

**/27**

( 2 )

2. In the relation,  $Z = R + jX$ ,  $X$  stands for

(a) reactance ( )

(b) conductance ( )

(c) impedance ( )

(d) resistance ( )

3. For display of signal pattern, the voltage applied to the horizontal plates of a CRO is

(a) sinusoidal wave ( )

(b) sawtooth wave ( )

(c) cosine wave ( )

(d) triangular wave ( )

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( 3 )

4. To get the Norton's current, you have to

(a) short the load resistor ( )

(b) open the load resistor ( )

(c) short the voltage source ( )

(d) open the voltage source ( )

5. If the input impedance is  $Z_{in}$  and the source of e.m.f. is  $E_0$ , then the feeder current is

(a)  $I = \frac{Z_{in}}{E_0}$  ( )

(b)  $I = \frac{E_0}{Z_{in}}$  ( )

(c)  $I = \frac{Z_{in}}{E_0}$  ( )

(d)  $I = \frac{E_0}{Z_{in}}$  ( )

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( 4 )

SECTION—II

( Marks : 15 )

Answer *any five* questions

*Each question carries 3 marks*

1. Define self-inductance and mutual inductance of a coil. How is coefficient of coupling related to mutual and self-inductance of two coils?

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( 5 )

2. What is variable resistor? Describe the working of potentiometer used in a tone control circuit.

( 6 )

3. A power transformer has 200 primary and 800 secondary turns. If the primary voltage is 230 V and full-load primary current is 20 A, then find the secondary voltage and current.

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4. What is phasor? Write down the polar form of a phasor.

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( 8 )

5. Derive the expression for sharpness of resonance.

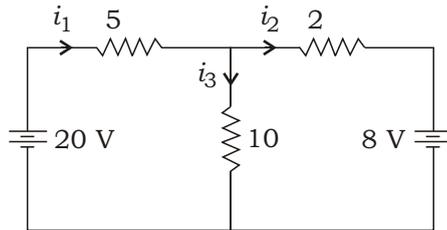
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( 9 )

6. Explain ideal and practical voltage sources.

( 10 )

7. For the given circuit, find  $i_1$ ,  $i_2$  and  $i_3$  using node voltage analysis :



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( 11 )

8. State and prove superposition theorem.

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