



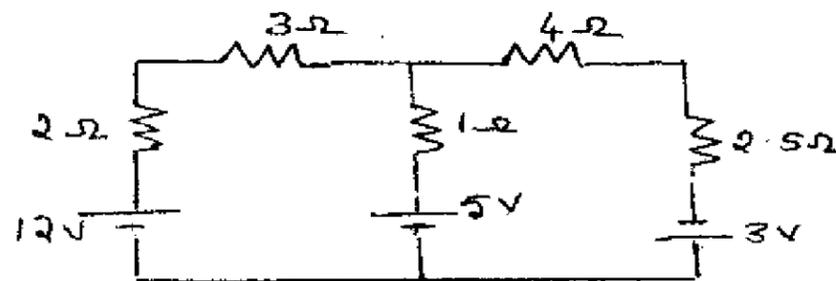
## B.Tech Degree I & II Semester Examination in Marine Engineering, May 2009

### MRE 107 FUNDAMENTALS OF ENGINEERING I (B) ELECTRICAL ENGINEERING

Time : 1 ½ Hours

Maximum Marks : 50

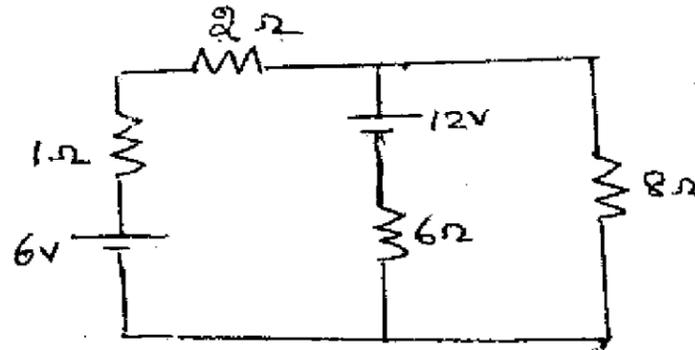
- I. (a) State and explain Kirchoff's laws. (8)  
 (b) Using Kirchoff's law determine  
 (i) Current in the  $2.5 \Omega$  resistor  
 (ii) Voltage across  $1 \Omega$  resistor



(10)

OR

- II. (a) State and explain superposition theorem. (8)  
 (b) Calculate the current in the  $8 \Omega$  resistor in the given circuit by using Thevenin's Theorem. (10)



- III. (a) State and explain Coulomb's law. (8)  
 (b) A mild steel ring of 30 cm mean circumference has a cross sectional area of  $6 \text{ cm}^2$  and has a winding of 500 turns on it. The ring is cut through at a point so as to provide an air gap of 1 mm in the magnetic circuit. It is found that a current of 4 A in the winding, produces a flux density of  $1 \text{ wb/m}^2$  in the air gap. Find  
 (i) relative permeability of the mild steel  
 (ii) inductance of the winding (8)

OR

- IV. (a) State and explain Faradays law of electromagnetic induction. (8)  
 (b) Define (i) Self inductance (4)  
 (ii) Mutual inductance (4)  
 (c) Derive an expression for the energy stored in a magnetic circuit. (4)

- V. (a) What is the r.m.s value of an ac quantity obtain an expression for the r.m.s value of a sinusoidal current? (8)  
 (b) An alternating current is given by  $i = 14.14 \sin 377t$   
 Calculate  
 (i) the r.m.s value of the current  
 (ii) the frequency  
 (iii) the instantaneous value of the current when  $t = 3 \text{ ms}$   
 (iv) the time taken for the current to reach 10A for the first time after passing through zero value. (8)

OR

- VI. (a) Draw a series RLC circuit and explain how resonance is achieved in such a circuit. (8)  
 (b) Show that the line to line voltage,  $V_L$ , in a  $3 \phi$  system is  $\sqrt{3}$  times the line to neutral voltage  $V_{ph}$ . Draw the phasor diagram for ABC sequence. (8)

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BT MRE – I&II – 09 – 08b

## ***B.Tech Degree I & II Semester Examination in Marine Engineering, May 2009***

### **MRE 108 FUNDAMENTALS OF ENGINEERING II (B) ELECTRONICS ENGINEERING**

Time : 1 ½ Hours

Maximum Marks : 50

- I. (a) Define the following terms :
- (i) Potential – energy barrier at the surface of a metal. (6)
  - (ii) Work function of a metal (6)
- (b) Draw the symbol of zener diode and explain the characteristics of zener diode with the help of band diagram. Mention its application. (6)
- (c) Define load line and Q point of a transistor amplifier. Explain graphically the operation of a transistor as an amplifier. (6)
- OR**
- II. (a) What is Schottky effect in connection with thermionic emission? How does it modify the emission current equation? (6)
- (b) What is a tunnel diode? Draw and explain the typical VI characteristics of a tunnel diode. Mention its application. (6)
- (c) Draw the input and output characteristics of BJT in CE configuration. Define ' $\beta$ ' from the graph. (6)
- III. (a) Draw the structure of an n-channel depletion type MOSFET. Explain how the depletion region is formed in the channel and differentiate depletion mode and enhancement mode. (8)
- (b) Draw the circuit of a series voltage regulator and explain its working. What is regulation factor? (8)
- OR**
- IV. (a) Draw the structure of a p-channel JFET. Explain its drain and transfer characteristics. Define the parameters of JFET. (8)
- (b) Draw and explain :
- (i) two transistor representation of SCR (8)
  - (ii) VI characteristics of UJT. (8)
- V. (a) State Barkhausen criterion and explain the working of wein bridge oscillator with the help of circuit diagram. (8)
- (b) Draw the circuit of Astable multivibrator. Explain its working and draw the base and collector waveforms. (8)
- OR**
- VI. (a) Draw the circuit and output waveforms of
- (i) double clipper (ii) Positive clamper at  $-2V$  (6)
  - (iii) Negative clipper at  $+3V$  (6)
- (b) Explain the working of Schmitt trigger with the help of circuit diagram. (6)
- (c) What is a sweep generator? What is its application? (4)