

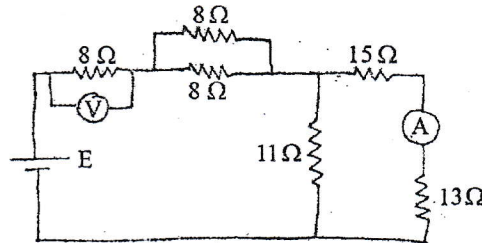
TRIBHUVAN UNIVERSITY  
INSTITUTE OF ENGINEERING  
**Examination Control Division**  
2077 Chaitra

Exam.	Regular		
Level	BE	Full Marks	80
Programme	BCE, BME, BGE	Pass Marks	32
Year / Part	I / II	Time	3 hrs.

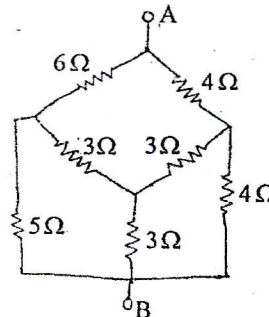
**Subject: - Basic Electrical Engineering (EE 451)**

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ Attempt All questions.
- ✓ The figures in the margin indicate Full Marks.
- ✓ Assume suitable data if necessary.

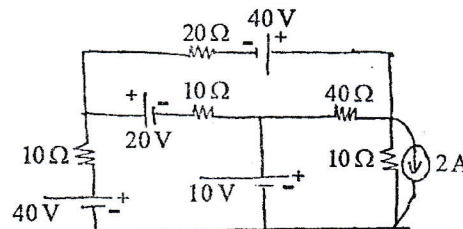
1. a) Explain constituent parts of an electric system with neat sketch. [5]
- b) A resistor coil has a resistance of 20 ohm when its mean temperature is 15°C and 24 ohm when its mean temperature is 65°C. Find its mean temperature rise when its resistance is 26 ohm and the surrounding temperature is 10°C. [5]
- c) A source of unknown emf is connected as shown in the figure. If the voltage drop across 8 ohm resistor measured by the voltmeter is 20V, what will be reading on the ammeter? Also what is the emf of the source? [6]



2. a) Find the equivalent resistance across A-B using Star/Delta Transformation. [8]

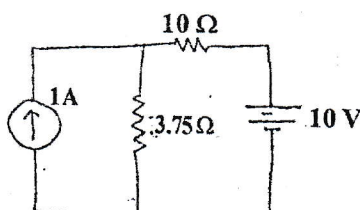


- b) Determine the power consumption of 20 ohm resistor of the given network using nodal method. [8]



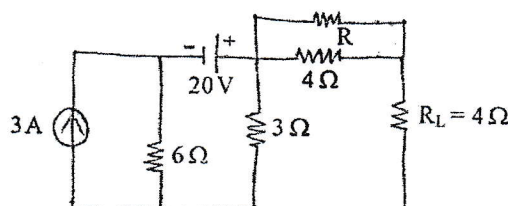
3. a) Find the voltage drop in  $3.75 \text{ ohm}$  resistor using Superposition Theorem for the following circuit.

[6]



- b) Find the value of resistance ' $R$ ' such that the load resistance ' $R_L$ ' which is equal to  $4 \text{ ohm}$  will deliver maximum power. Also find that maximum power for the given network below.

[6]



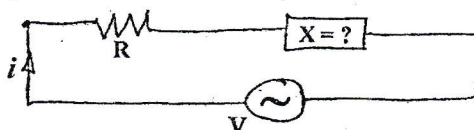
- c) State and explain Reciprocity theorem with suitable example.
4. a) Define Capacitance and derive the expression for equivalent capacitance when  $n$  Capacitors are connected in (i) Series (ii) Parallel
- b) A coil having resistance of  $7 \Omega$  and an inductance of  $31.8 \text{ mH}$  is connected to  $230 \text{ volts}$ ,  $50 \text{ Hz}$  supply. Calculate (i) the circuit current (ii) phase angle (iii) power factor (iv) power consumed.
- c) In A.C. series circuit, shown below the current and voltage are expressed as:  
 $i = 5 \sin(314t + 2\pi/3)$  and  $v = 15 \sin(314t + 5\pi/6)$ . Find:  
 (i) Net value of  $X$  and point out that it is  $X_L$  or  $X_C$ . Why?  
 (ii) Value of  $R$  and  $L$  or  $C$ .  
 (iii) P.F of whole circuit.  
 (iv) Draw phasor diagram.

[4]

[4]

[4]

[8]



5. a) Define power factor of a circuit. What are the disadvantages of poor power factor? Also explain in detail how poor power factor can be improved.
- b) Three,  $3\phi$  balanced loads are connected in parallel across a  $400\text{V}$ ,  $3\phi$ , 3 wire balanced supply system.  
 Load 1:  $12000\text{W}$ ,  $\Delta$ -connected P.F = 1.  
 Load 2:  $9000 \text{ VAR}$ , Y-connected P.F =  $0.866$  lagging  
 Load 3:  $6000 \text{ VAR}$ ,  $\Delta$ -connected P.F = 0  
 Find:  
 (i) total Power consumption  
 (ii) Whole P.F.  
 (iii) Total current drawn from the line.
- c) Explain power measurement in  $3\phi$  unbalanced load using 2-wattmeter method with neat sketch.

[4]

[8]

[4]

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