Basavarajeswari Group of Institutions

2022 SCHEME

BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT

(Autonomous Institute under Visvesvaraya Technological University, Belagavi)

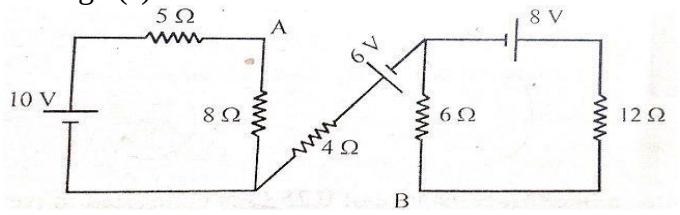
USN										Course Code	2	2	E	E	E	13	/	23

First/Second Semester B.E. Degree Summer Semester Examinations, September/October 2025

ELEMENTS OF ELECTRICAL ENGINEERING

Duration: 3 hrs **Max. Marks: 100**

Note: ***1. Answer any* FIVE *full questions, choosing* ONE *full question from each module.***
2. Missing data, if any, may be suitably assumed.

Q. No		***Question***	***Marks***	*(RBTL:CO:PI)*
		Module-1		
1.	**a.**	State and explain Kirchhoff's laws.	**06**	**(2:1:1.3.1)**
	b.	A current of 10 A flows through two ammeters A and B connected in series. The potential differences across A and B are 0.2 V and 0.3 V respectively. Find how the same current will divide between A and B when they are connected in parallel.	**07**	**(2:1:1.3.1)**
	c.	Find the potential difference between the points A and B in the network shown in Fig.1(c).  **Fig.1(c)**	**07**	**(3:1:2.1.2)**
		(OR)		
2.	**a.**	State and explain Faraday's laws of electromagnetic induction.	**06**	**(2:1:1.3.1)**
	b.	Define coefficient of coupling and derive an expression for it.	**07**	**(2:1:1.3.1)**
	c.	Two identical coils of 1200 turns each are placed side by side such that 60 % of the flux produced by one coil links the other. A current of 10 A in the first coil sets up a flux of 0.12 mWb. If the current in the first coil changes from +10 A to -10 A in 20 mS. Find (i) the self-inductances of the coils (ii) the e.m.f induced in both the coils.	**07**	**(3:1:2.1.2)**
		Module-2		
3.	**a.**	Define average value of sinusoidal varying current and derive an expression for its maximum value.	**06**	**(2:2:1.3.1)**
	b.	With necessary circuit diagram and wave forms prove that the power drawn by the pure inductance in ac circuit is zero.	**07**	**(2:2:1.3.1)**
	c.	Three alternating voltages v_1=141 Sin ($\omega t+\pi/4$), v_2=30 Sin ($\omega t+\pi/2$) & v_3=20 Sin ($\omega t - \pi/6$) are fed into a common conductor. Find the equation for the resultant voltage, its rms value, form factor & peak factor.	**07**	**(3:2:2.1.2)**
		(OR)		
4.	**a.**	Using power triangle, define and explain the different types of power in 1-Ø AC system.	**06**	**(2:2:1.3.1)**
	b.	An inductive coil takes a current of 33.24 A from 230 V, 50 Hz supply. If the resistance of the coil is 6 Ω. Calculate the inductance of the coil and power taken by the coil.	**07**	**(2:2:1.3.1)**

Note: (**RBTL - Revised Bloom's Taxonomy Level: CO - Course Outcome: PI - Performance Indicator)**

	c.	Two impedances (150 – j 157) Ω and (100 + j 110) Ω are connected in parallel across 200 V, 50 Hz supply. Find the branch currents, total current and total power consumed in the circuit	**07**	**(3:2:2.1.2)**

Module-3

5.	**a.**	What are the advantages of 3-Ø system over 1-Ø system?	**06**	**(2:3:1.3.1)**
	b.	Find the relation between the phase and line quantities of voltage and current for a 3-Ø star connection and deduce the power equation from the same.	**07**	**(2:3:1.3.1)**
	c.	A delta connected load consists of a resistance of 10 Ω and a capacitance of 100 μF in each phase. A supply of 410 V at 50 Hz is applied to the load. Find the line current, power factor and power consumed by the load.	**07**	**(3:3:2.1.2)**

(OR)

6.	**a.**	Briefly explain block diagram and functionality of Trivector meter.	**06**	**(2:3:1.3.1)**
	b.	Find the relation between the phase and line quantities of voltage and current for a 3-Ø delta connection and deduce the power equation from the same.	**07**	**(2:3:1.3.1)**
	c.	Three coils each having a resistance of 10 Ω and an inductance of 0.02 H are connected in star across 440V, 50 Hz, three phase supply. Calculate the line current and power consumed by the circuit.	**07**	**(3:3:2.1.2)**

Module-4

7.	**a.**	With a neat circuit diagram explain the working of Whetstone bridge and derive its equation for balanced condition.	**06**	**(2:4:1.3.1)**
	b.	Write a short note on Megger.	**07**	**(2:4:1.3.1)**
	c.	Mention the various types of domestic wiring and with a neat diagram explain casing and capping type of wiring.	**07**	**(2:4:1.3.1)**

(OR)

8.	**a.**	With a neat diagram and switching table, explain two way control of lamp.	**06**	**(2:4:1.3.1)**
	b.	With a neat circuit diagram explain the working of Schering bridge and derive its equation for balanced condition.	**07**	**(2:4:1.3.1)**
	c.	Write a short note on (i) Current transformer and (ii) Potential transformer.	**07**	**(2:4:1.3.1)**

Module-5

9.	**a.**	Write a short note on (i) MCB (ii) Fuse	**06**	**(2:5:1.3.1)**
	b.	Define a UNIT. Explain the concept of two part tariff.	**07**	**(2:5:1.3.1)**
	c.	What is the necessity of earthing? Explain the method of pipe earthing with a neat diagram.	**07**	**(2:5:1.3.1)**

(OR)

10.	**a.**	Write a short note on (i) RCCB (ii) ELCB	**06**	**(2:5:1.3.1)**
	b.	What are the safety precautions to be taken while working with electricity to avoid shocks?	**07**	**(2:5:1.3.1)**
	c.	The domestic power load in a house comprises 8 lamps of 100 W each, 3 fans of 80 W each, 1 refrigerator of ½ HP and one electric heater of 1kW. Calculate (i) Current drawn from 230 V supply (ii) Energy consumed in a day, if on an average only a quarter of the load is present all the time.	**07**	**(2:5:1.3.1)**

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Note: (**RBTL - Revised Bloom's Taxonomy Level: CO - Course Outcome: PI - Performance Indicator)**