Basavarajeswari Group of Institutions

2022 SCHEME

BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT

(Autonomous Institute under Visvesvaraya Technological University, Belagavi)

USN | | | | | | | | | | | **Course Code** | 2 | 2 | E | S | C | 1 | 4 | 2 | / | 2 | 4 | 2 |

First/ Second Semester B.E. Degree Examinations, February 2025

INTRODUCTION TO ELECTRICAL ENGINEERING

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

Note: *1. Answer any* **FIVE** *full questions, choosing* **ONE** *full question from each module.*
2. Use of Electrical Engineering Formula Handbook is permitted
3. Missing data, if any, may be suitably assumed.

Q. No		Question	Marks	(RBTL:CO:PI)
		Module-1		
1.	**a.**	Define the law used to relate voltage, current and resistance of the electric circuit under room temperature and also write some limitations of it.	**06**	**(2 :1 : 1.3.1)**
	b.	With example, explain the two basic laws used to solve complex circuits for their unknown currents or voltages.	**06**	**(2 :1 : 1.3.1)**
	c.	For the series parallel circuit shown in the Fig Q1.c, find (i) voltage drop across 24 Ω resistor and (ii) the supply voltage 'V'.	**08**	**(3 :1 : 2.1.2)**

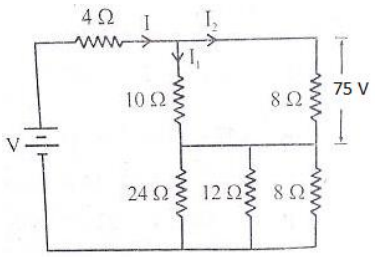

Fig.Q1(c)

(OR)

2.	**a.**	Define the following terms and write their formula with unit: (i) Self-inductance (ii) Maximum flux density (iii) Mutual inductance.	**06**	**(2 :1 : 1.3.1)**
	b.	Explain in brief about statically and dynamically induced EMF.	**06**	**(2 :1 : 1.3.1)**
	c.	The self-inductance of a coil of 800 turns is 0.4 H. if 80 % of the flux is linked with the second coil of 12000 turns, calculate (i) Mutual inductance and (ii) EMF induced in the second coil, when the current in the first coil changes at the rate of 150 A/S.	**08**	**(3 :1 : 2.1.2)**
		Module-2		
3.	**a.**	Define the following terms for AC quantities: (i) Phase difference (ii) Peak factor (iii) Form factor.	**06**	**(2 :2 : 1.3.1)**
	b.	Define R.M.S value of ac quantity. Show that in case of 1-Ø AC system the numerical value of $V_{rms} = 0.707V_m$	**06**	**(2 :2 : 1.3.1)**
	c.	The equation for a sinusoidally varying voltage is v=200sin(396.8t-30°) V. Find the maximum value, RMS value, the frequency, phase angle, form factor and peak factor of the voltage.	**08**	**(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.	With necessary circuit diagram, vector diagram and wave forms prove that the power drawn by the pure inductor in ac circuit is zero.	**06**	**(2 :2 : 1.3.1)**

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

	c.	A circuit consists of a resistance of 25 Ω, and capacitance of 100 μF connected in series across a supply of 200 V, 50 Hz. Find the current, power factor and power consumed by the circuit. Also draw the vector diagram.	**08**	**(3 :2 : 2.1.2)**

Module-3

5.	**a.**	Describe the different types of 1-Ø transformer based on their construction.	**06**	**(2 :3 : 1.3.1)**
	b.	With usual notations deduce an equation to find the efficiency of a 1-Ø transformer for any load and power factor.	**07**	**(2 :3 : 1.3.1)**
	c.	The primary winding of a 25 kVA transformer has 200 turns and is connected to 230 V, 50 Hz supply, being secondary turns of 50, calculate (i) secondary emf (ii) primary and secondary full load currents (iii) Maximum flux density if cross section of the core is 60 cm^2.	**07**	**(3 :3 : 2.1.2)**
		(OR)		
6.	**a.**	Explain with neat sketch the types of 3-ϕ induction motor.	**06**	**(2 :3 : 1.3.1)**
	b.	In detail, illustrate the concept of rotating magnetic field of a 3-Ø Induction motor.	**07**	**(2 :3 : 1.3.1)**
	c.	A 3-Ø Induction motor with 4 poles has stator emf frequency of 50 Hz and that of rotor is 1.5 Hz. Calculate slip and at what speed the motor is running?	**07**	**(3 :3 : 2.1.2)**

Module-4

7.	**a.**	With a neat sketch, explain the construction of 3-Ø salient and non-salient synchronous generator.	**06**	**(2 :4 : 1.3.1)**
	b.	Derive the expression for the EMF equation of a 3-Ø synchronous generator.	**07**	**(2 :4 : 1.3.1)**
	c.	A 3-Ø, 50 Hz, 6 pole alternator having 12 slots/pole and 4 conductors/slot. The winding is $5/6^{th}$ full pitched with flux of 25 mWb per pole. Determine the line EMF if the alternator is star connected.	**07**	**(3 :4 : 2.1.2)**
		(OR)		
8.	**a.**	Illustrate the single line diagram approach of an electric power system.	**06**	**(2 :4 : 1.3.1)**
	b.	With neat block diagram explain the concept of electric power generation in a hydel power plant.	**07**	**(2 :4 : 1.3.1)**
	c.	With neat block diagram explain the concept of electric power generation by solar energy.	**07**	**(3 :4 : 2.1.2)**

Module-5

9.	**a.**	Explain the working principle of an electrical Miniature Circuit Breaker (MCB) and write some advantage and disadvantage of it.	**06**	**(2 :5 : 1.3.1)**
	b.	Define earthing and explain any one type of earthing in detail.	**07**	**(2 :5 : 1.3.1)**
	c.	Explain the working principle of an electrical fuse and write some advantage and disadvantage of it.	**07**	**(2 :5 : 1.3.1)**
		(OR)		
10.	**a.**	Illustrate with necessary conditions, how a single lamp is controlled from three different places?	**06**	**(2 :5 : 1.3.1)**
	b.	Define a UNIT w.r.t electrical energy and explain about two-part electrical tariff.	**07**	**(2 :5 : 1.3.1)**
	c.	The domestic house comprises a load of 5 LED lamps of 20 W each, 3 fans of 60 w each, 1 refrigerator of 400 W and one water pump of ½ HP. Calculate (i) Current drawn from 230V supply (ii) Total bill for February month of the year 2024 if the cost per unit is Rs. 5.90.	**07**	**(2 :5 : 1.3.1)**

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