Basavarajeswari Group of Institutions

BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT

(Autonomous Institute under Visvesvaraya Technological University, Belagavi)

USN										Course Code	2	2	E	S	C	2	4	2

Second Semester B.E. Degree Examinations, Sept/Oct 2023

INTRODUCTION TO ELECTRICAL ENGINEERING

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

Q. No		Question	Marks	(RBTL:CO: PI)
		MODULE – 1		
1.	a	State and explain Kirchhoff's law.	06	(2 :1: 1.3.1)
	b	A closed iron ring of mean diameter 12cm is made from round iron bar of diameter 2cm. It has a uniform winding of 1000 turns. Calculate the self inductance and the current required to produce a flux density of 1.5 T, given that relative permeability is 1250.	07	(3 :1: 2.1.2)
	c	Using Kirchhoff's laws determine the magnitude and direction of current in 100Ω resistor as shown in fig.Q1(c).	07	(3 :1: 2.1.2)

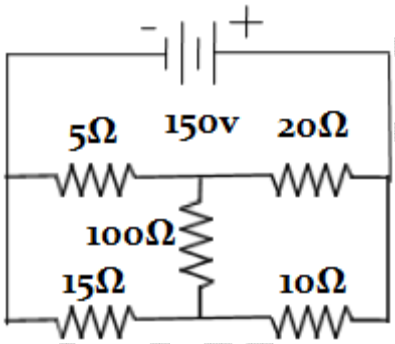


Fig.Q1(c)

OR

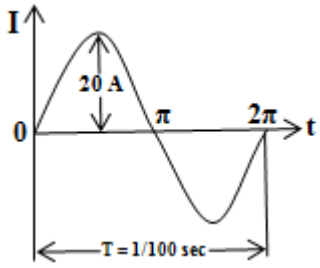
2.	a	State and explain Faraday's Laws of Electromagnetic Induction.	06	(2 :1: 1.3.1)
	b	A current of 10A flows through two ammeters A and B connected in series. The voltage across A and B are 0.2V and 0.3V respectively. Solve how the same current will divide in A and B when they are connected in parallel? Also find the energy dissipated in both the ammeters for 36min.	07	(3 :1: 2.1.2)
	C	The self-inductance of a coil of 600 turns is 0.3H. If 60% of the flux is linked with the second coil of 12,000 turns. Calculate i) mutual inductance and ii) e.m.f induced in the second coil, when the current in the first coil changes at the rate of 120 A/S.	07	(3 :1: 2.1.2)
		MODULE – 2		
3.	a	Show that the numerical value of $V_{rms} = 0.707V_m$ in 1-Ø AC system.	06	(3 :2: 1.3.1)
	b	Three alternating currents $i_1=141Sin(\omega t+\pi/4)$, $i_2=30Sin(\omega t+\pi/2)$ & $i_3=20Sin(\omega t-\pi/6)$ are fed into a common conductor. Find the equation for the resultant current, its rms value, form factor & peak factor.	07	(3 :2: 2.1.2)
	c	Two circuits A and B are connected in parallel across 200V, 50Hz supply. Circuit A consists of 10Ω resistance and 0.12H inductance in series while circuit B consists of 20Ω resistance in series with 40 μ F capacitance. Calculate i) current in each branch ii) supply current iii) power dissipated in each branch	07	(3 :2: 2.1.2)

OR

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

4.	**a**	Using power triangle, define and explain the different types of power in 1-Ø AC system.	06	**(3 :2: 1.3.1)**
	b	With necessary circuit diagram, vector diagram and wave forms prove that the power drawn by the pure capacitor in ac circuit is zero.	07	**(3 :2: 2.1.2)**
	c	For the current wave shown in Fig. Q4 (c). Determine i) Peak current ii) Average value ii) RMS value iv) Frequency v) Instantaneous value at t=3mS.	07	**(3 :2: 2.1.2)**

Fig. Q4 (c).



MODULE – 3

5.	**a**	With neat sketch explain the constructional details of core and shell type 1-Ø transformer.	06	**(2 :3: 1.3.1)**
	b	A 10 kVA, 400/200 V, 50Hz, 1-Ø transformer has a full load copper loss of 200 W & has a full load efficiency of 96% at 0.8 pf lag. Determine the iron loss. What would be the efficiency at half the full load at UPF?	07	**(3 :3: 2.1.2)**
	c	Define Slip of a 3-Ø Induction motor. Show that rotor frequency, f '=Sf.	07	**(3 :3: 1.3.1)**

OR

6.	**a**	In detail illustrate the concept of rotating magnetic field of a 3-Ø Induction motor.	07	**(2 :3: 1.3.1)**
	b	With necessary notations derive an expression for emf of a 1-Ø transformer.	06	**(3 :3: 1.3.1)**
	c	3-Ø Induction motor with 4 poles is supplied from an alternator having 6 poles & running at 1000rpm. Calculate (i) Synchronous speed of the I.M, (ii) its speed when slip is 0.04, (iii) frequency of the rotor EMF when the speed is 600rpm.	07	**(3 :3: 2.1.2)**

MODULE – 4

7.	**a**	With a neat sketch explain the salient and non-salient type rotor construction details of a 3-Ø synchronous generator.	06	**(2 :4: 1.3.1)**
	b	With neat block diagram explain the concept of producing electric power by solar energy.	07	**(2 :4: 1.3.1)**
	c	Find the number of armature conductors of a 3-Ø, 50Hz, 10 pole alternator having 90 slots. The winding is star connected & short pitched with 2 slots to give a line voltage of 11 kV where the flux/pole is 160 mWb.	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 producing electric power in a hydel power plant.	07	**(2 :4: 1.3.1)**
	c	Derive the expression for the EMF equation of a 3-Ø synchronous generator.	07	**(3 :4: 2.1.2)**

MODULE – 5

9.	**a**	Illustrate with necessary conditions, how a single lamp is controlled from three different places?	06	**(3 :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)**

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

	c	Explain the working principle of a electrical fuse and write some advantage and disadvantage of it.	07	**(2 :5: 1.3.1)**
		OR		
10.	**a**	Explain the working principle of a electrical miniature circuit breaker (MCB) and write some advantage and disadvantage of it.	07	**(2 :5: 1.3.1)**
	b	Define earthing and explain the plate type of earthing in detail.	06	**(2 :5: 1.3.1)**
	d	The domestic power load in a house comprises 8 lamps of 100w each, 3 fans of 80w each, 1 refrigerator of ½ HP and one electric heater of 1kw. Calculate (i) Current drawn from 230V supply, ii) Energy consumed in a day, if on an average only a quarter of the load is present all the time.	07	**(3 :5: 2.1.2)**

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