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	USN								_	14ELE15	
			First	Seme	ster I	B.E.	De	gr	– ee Examination. Dec.2014/.	lan.2015	
	Basic Electrical Engineering										
	Time: 3 hrs May Marke: 100										
	Note: Answer FIVE full auestions. selecting										
						at l	easi	t 0	NE full question from each part		
	1	PART —11a. Find the values of currents in all the branches of the network shown in Fig. Ql4(06 Marks)									
Ų									M 80A ST A		
Q.							\mathbf{O}^{\parallel}	x	0.2 0.2 601		
a	ste Jo-1-2										
								×	0.3 CK 60A		
								f ^r 0	c all and a second		
,,,					0 4 M				FIV FigQ I (a)		
6		b.	A curr	ent of 2	0 A flo V ond	ows th	rouş sec B	gh 1 2 ic	two ammeters A and Bin series. The	potential difference	
U			across	A IS 0.2 hen the	v and v are i	n nara	allel.	0 15	0.5 V. Find now the same current wi	(06 Marks)	
00		c.	Coils A	and B i	n a ma	gneti	c cir	cui	it have 600 and-500 turns respectivel	y. A current of 8 A in	
	coil A produces a flux of 0.04 Wb. If co-efficient of coupling is 0.2, calculate										
			i) Self	inducta:	nce of	coil A	wit	th I	B open circuited.		
			iii) Flux	linking average	with i	ne co duce	ПВ. d in	coi	il 13'when the flux with it changes fro	m zero to full value	
			in (.02 seco	nd.	luuce		coi			
₿ g .			iv) Mut	ıal indu	ctance	•			ON	(08 Marks)	
0	2	a.	A circuit consists of two parallel resistors having_ resistances of 20 n and 30 El respectively,								
-() CI crs		connected in series with a 15 c2 resistor. If the current through 30 SI resistor is 1.2 A, find									
З ы	\mathbf{X}	(i) Currents in 20 11 and 15 CI resistors. (ii) The voltage across the whole circuit.									
.7c1			(m) Vol	tage acr	oss 15	II re	siste	or a	and 20 fl resistor.(iv) 1 otal power con	Sumed in the circuit. (08 Marks)	
с о		b.	Obtain	the rel	ation	betw	een	se	lf inductances, mutual inductanc	e and co-efficient of	
E. ' ¹ '			coupling	g.		Ú				(06 Marks)	
8 ^{c°}		c.	A coil c	onsists (of 600	turns	and	d a	current of 10 A in the coil gives rise	to a magnetic flux of	
3 t)			1 M. Wo	ent is re	alcula	$\frac{\mathbf{te}(\mathbf{l})}{\mathbf{l} \text{ in } 0}$	seir 01 si	1N(eco	auctance (II) Induced emi and (III)	Energy stored when (06 Marks)	
8			the curr		, erset	i III V.	UI S		$\mathbf{PART} = 2$	(00 1/14113)	
⁹ , 0	3	a.	Derive t	he expr	ession	for ar	mat	ure	e torque developed in a d.c. motor.	(06 Marks)	
0		b.	Explain	with a	neat d	iagra	m, tl	he o	constructional features and operation	n of an induction type	
•		G	single p	hase ene	rgy m	eter.	aon	ore	ator has armature and field resistan	(06 Marks)	
2		C.	100 ohr	n respec	tively.		ulate	e th	ne total power developed by the arma	ture when it delivers -	
			full outp	out powe	er.					(08 Marks)	
0	4	a.	Derive t	he emf o	equatio	on for	a do	c ge	enerator.	(06 Marks)	
v		b.	With a	neat dia	gram (explai	n th	e c	onstruction and working of dynamor	neter type wattmeter.	
		c.	A 200 V	lan wo	սոժ ժգ	shun	tmo	ntor	r has 800 conductors on its armature	(06 Marks) The resistance of the	
ca.			armatu	re windi	ng is (5.5 cl	and	l th	hat of field winding is 200 a The mot	tor takes a current of	
			21 A, th	e flux p	er pole	e is 30	mw	b.]	Find the speed and torque developed	in the motor.	
			-	-	-				_ • •	(08 Marks)	

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(06 Marks)

<u>PART-3</u>

- 5 a. Obtain expression for the current through the pure inductor, if the voltage across it is v = v. sin wt . (06 Marks)
 - b. A voltage v = 100 sin 314t is applied to a circuit consisting of a 25 ohm resistor and an 80 p.F capacitor in series. Determine (i) peak value of current (ii) power factor (iii) Total power consumed by the circuit. (08 Marks)
 - c. Write a short note on:

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- (i) Necessity of earthing.
- (ii) Precautions to be taken to prevent electric shock.

A voltage of 200 V is applied to a series circuit consisting of a resistor, an inductor and a capacitor. The respective voltages across these components are 170 V, 150 V and 100 V and the current is 4 A. Find (i) the power factor (ii) Resistance (iii) Impedance (iv) Inductive reactance,,and capacitive reactance. (08 Marks)

- b. Explainifienecessity and the operation of earth leakage circuit breaker. (06 Marks)
- c. Two impedances $z_1 = (6 j8)$ ohms and $z_2 = (16 + j12)$ ohms are connected in parallel. If the total current'of the combination is (20 + j10) amperes, find
 - (i) Voltake_across the combination.
 - (ii) Currents in the two branches.

<u>PART _ 4</u>

- 7 a. Obtain the relationship between line and phase, voltages and currents in a three phase balanced star connected systein.. (06 Marks)
 - b. A 3-phase delta connected balarice.d -load consumes a power of 60 k.w. taking a lagging current of 200 A at a line voltage oT400X, 50 Hz. Find the parameters of each phase.
 - c. A 12 pole 500 rpm star connected 'alternator has 48 slots with 15 conductors per slot. The flux per pole is 0.02 webers. The winding actor is 0.97 and pitch factor is 0.98. Calculate the phase emf and line emf. _ ' ' (08 Marks)
 - a. Define phase sequence and list out the advantages of three phase system as compared to single phase system. (06 Marks)
 - A 4-pole 1500 rpm star connected alternator has 9 slots / pole and 8 conductors per slot. Determine the flux per pole to give a terminal voltage of 3300 V. Take winding factor and pitch factor as:unity.
 - c. The input _power to a 3-phase induction motor running on 400 V, 50 Hz supply was measured by two wattmeter method and readings were 3000 W and -1000 W. Calculate (i) Total power input (ii) Power factor (iii) Line current. (06 Marks)

<u>PART _ 5</u>

_ Derive emf equation of a transformer.

- In a 25 KVÅ, 2000/200 V single phase transformer, the iron and full load copper losses are 350 watts and 400 watts respectively. Calculate the efficiency at unity power factor on (i) full load (ii) half full load.
- c. An 8-pole alternator runs at 750 rpm and supplies power to a 6-pole induction motor which runs at 970 rpm. What is the slip of the induction motor? (06 Marks)
- 10 a. A 600 KVA transformer has an efficiency of 92% at full load, unity p.f: and half full load, 0.9 p.f. Determine its efficiency at 75% of full load, 0.9 p.f. (08 Marks)
 - b. An 8-pole alternator runs at 750 rpm and supplies power to a 4-pole induction motor. The frequency of rotor current is 1.5 Hz. Determine the speed of the motor. (06 Marks)
 - c. Derive the condition for which the efficiency of a transformer is maximum. (06 Marks)

% t (06 Marks)

(06 Marks)