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(An Autonomous Institution Affiliated to Anna University, Chennai)											
		K	legulation	- 2015							
	<b>B.E/B.TECH DEGREE END SEMESTER EXAMINATIONS – NOV/DEC 2018</b>										
	FIFTH SEMESTER										
	ELECI	<b>FRICAL AND</b>	ELECT	RONIC	CS EN	GINE	EERIN	NG			
	15U.	EE504 – ELE	CTRICA	L MAC	CHINI	E DES	SIGN				
Du	iration: 3 Hours						N	Aaxin	num:	100 N	<b>Aarks</b>
		PART	A (10 x	1 = 10	Mark	s)					
		(Ans	swer all Q	uestion	ns)						
1	The average flux de	nsity of ac dc r	nachine. i	f the m	ax flux	x dens	sity is	0.72 a	and fie	eld for	m
	factor is 0.66 is						[C	- 00	Unde	erstan	ding]
	a)0.47 b) 0.8	c) 1 (	d)0.4	toic			<u> </u>	<u>101 -</u>	Undo	reton	ding
2	Gap contraction factor with slots and no ducts is $[COI - Understanding a)Kg=0$ b) Kg=1 c) Kg= Kgs d)Kg=2						ungj				
	a)Kg= 0 b) Kg=	= 1 c) Kg= Kg	s d)Kg=	2							
3	a)Kg= 0 b) Kg= Real flux density is	= 1 c) Kg= Kg 2.2 T and perm	s d)Kg= neability is	2 s 31.4 x	10 -6	5 H/m.	the m	nagnet	tic fiel	d inte	nsity
3	a)Kg= 0b) Kg=Real flux density isa)70.063 ATb) 70	= 1 c) Kg= Kg 2.2 T and perm 0.063 AT/ m2	s d)Kg= neability is c) 70.063	2 s 31.4 x AT /m	(10-6 d) 7	5 H/m. 0.063	the m AT /n	nagnet 13	tic fiel	d inte	nsity
3	a)Kg= 0 b) Kg= Real flux density is a)70.063 AT b) 70	= 1 c) Kg= Kg 2.2 T and perm 0.063 AT/ m2 3100 AT and N	eability is reability is c) 70.063	2 s 31.4 x AT /m	(10-6) d) 7(	5 H/m. 0.063	the m AT /m	nagnet n3 [( //E for	tic fiel CO2 -	d inte	ensity [ying]
3	a)Kg= 0 b) Kg= Real flux density is a)70.063 AT b) 70 MMF for air gap is a) 3100 AT b) 500	= 1 c) Kg= Kg 2.2 T and perm 0.063 AT/ m2 3100 AT and M 00 AT c) 800 A	s d)Kg= neability is c) 70.063 MMF for f	2 s 31.4 x AT /m ield is 3 00AT	(10-6) d) 7( 3900 A	5 H/m. 0.063 AT. Th	the m AT /n ne MN	nagnet n3 [9 /IF for	tic fiel CO2 - r iron CO2 -	d inte Appl is Appl	ensity [ying] ving]
3	a)Kg= 0 b) Kg= Real flux density is a)70.063 AT b) 70 MMF for air gap is a) 3100 AT b) 500 Power transformers	<ul> <li>1 c) Kg= Kg</li> <li>2.2 T and perm</li> <li>0.063 AT/ m2</li> <li>3100 AT and M</li> <li>00 AT c) 800 A</li> <li>should be desi</li> </ul>	s d)Kg= neability is c) 70.063 MMF for f AT d) 10 gned to ha	2 s 31.4 x AT /m ield is 3 00AT ave max	(10 -6 d) 7 (3900 A (ximum	5 H/m. 0.063 AT. Th	the m AT /n ne MN	nagnet n3 [9 /IF for [0 [0	tic fiel CO2 - c iron CO2 - CO3 -	d inte Appl is Appl Appl	ensity lying] lying] ying]
3 4 5	<ul> <li>a)Kg= 0 b) Kg=</li> <li>Real flux density is</li> <li>a)70.063 AT b) 70</li> <li>MMF for air gap is</li> <li>a) 3100 AT b) 500</li> <li>Power transformers</li> <li>a)at one-fourth load</li> </ul>	<ul> <li>1 c) Kg= Kg</li> <li>2.2 T and perm</li> <li>2.063 AT/ m2</li> <li>3100 AT and M</li> <li>00 AT c) 800 A</li> <li>should be desi</li> <li>(b)at one-half</li> </ul>	s d)Kg= neability is c) 70.063 MMF for f AT d) 10 gned to ha load (c) a	2 AT/m ield is 3 00AT ave may	( 10 -6 d) 7( 3900 <i>A</i> ximum r full 1	5 H/m. 0.063 AT. Th n effic load	the m AT /n ne MM iency (d)any	nagnet n3 IF for [( y of th	tic fiel CO2 - r iron CO2 - CO3 - ne abo	d inte Appl is Appl Appl ve	ensity lying] lying] ying]
3 4 5 6	<ul> <li>a)Kg= 0</li> <li>b) Kg=</li> <li>Real flux density is</li> <li>a)70.063 AT</li> <li>b) 70</li> <li>MMF for air gap is</li> <li>a) 3100 AT</li> <li>b) 500</li> <li>Power transformers</li> <li>a) at one-fourth load</li> <li>Yokes with rectange</li> </ul>	= 1 c) Kg = Kg 2.2 T and perm 0.063 AT/ m2 3100 AT and M 00 AT c) 800 A should be desi (b)at one-half ular cross-section	as d)Kg= neability is c) 70.063 MMF for f AT d) 10 gned to ha load (c) a on are use	2 s 31.4 x AT /m ield is 3 00AT ave may t or nea	(10-6) d) 7( 3900 <i>f</i> ximum r full 1	5 H/m. 0.063 AT. Th n effic load	the m AT /n ne MM iency (d)any [C	nagnet n3 [( //F for [( ( y of th ( CO3 -	tic fiel CO2 - r iron CO2 - CO3 - ne abo Unde	d inte Appl is Appl Appl ve rstan	ensity lying] lying] ying] ding]
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		<b>PART B</b> (5 x $2 = 10$ Marks)				
		(Answer all Questions)				
11.	11. Show how the specific magnetic and specific electric loadings are interdependent.					
		[CO1 - Understan	ding]			
12.	Ι	dentify the guiding factors for the choice of number of poles in a DC machine.				
		[CO2 - Appl	ying]			
13.	D	efine window space factor [CO3 - Remember	ing]			
14.	ŀ	How the induction motor can be designed for best power factor? [CO4 - Remembering				
15.	D	Define run away speed in synchronous machines [CO5 - Remember]				
		<b>PART B</b> ( 5 x 16 = 80 Marks)				
	1	(Answer all Questions)				
16.	(a)	Illustrate the choice of specific magnetic and electric loading. [CO1 - Understanding]	16			
	I	OR				
	(b)	Explain about various duties and ratings of rotating machines and give their respective temperature time curves. [CO1 - Understanding]	16			
	1					
17	(a)	i) Derive the output equation of a d.c machine. [CO2 - Understanding]	8			
	ii) Explain the various factors that are affected by the selection of number of					
		poles in d.c machines. [CO2 - Understanding]	0			
		OR				
	(b)	A design is required for a 50 KW, 4 pole, 600 rpm, dc shunt generator, the full load terminal voltage being 220V. If the maximum gap density is 0.83Wb/m <sup>2</sup> and the armature ampere conductors per metre are 30000. Calculate suitable dimensions of armature core to give a square pole face. Assume that the full load armature voltage drop is 3 percent of the rated terminal voltage, and that the field current is 1 percent of rated full load current. Ratio of pole arc to pole pitch is 0.67. <b>[CO2 - Applying]</b>	16			
18.	(a)	i) Derive the output equation of a three phase transformer [CO3-Understanding]	8			
		ii) Calculate the core and window area required for a 1000kVA, 6600/400V, 50Hz, single phase core type transformer. Assume a maximum flux density of 1.25 Wb/m <sup>2</sup> and a current density of 2.5 A/mm <sup>2</sup> , voltage per turn =30V. window space factor 0.32 [CO3 - Applying]	8			

		OR		
	(b)	A 250kVA, 6600/400V, 3 phase core type transformer has a total loss of 4800W at full load. The transformer tank is 1.25m in height and 1m x 0.5m in plan. Design a suitable scheme for tubes if the average temperature rise is to be limited to 35°C. The diameter of tubes is 50mm and is spaced 75mm from each other. The average height of tubes is 1.05m. Specific heat dissipation due to radiation and convection is respectively 6 and 6.5 W/m <sup>2</sup> -°C. Assume that convection is improved by 35 percent due to provision of tubes. [CO3 - Applying]	16	
19.	(0)	(i) Derive the output equation of a three phase induction motor [CO4 - Understanding]	8	
	(a)	(ii) Write short notes on design of rotor bars, slots and end rings [CO4 - Understanding]	8	
	1	OR		
		A 90kW. 500V, 50Hz, three phase, 8 pole induction motor has a star connected		
		stator winding accommodated in 63 slots with 6 conductors per slot. The slip ring		
		voltage on open circuit should be 400 volts approximately. Design a suitable rotor		
	(b)	winding and state (i) number of slots in rotor, (ii) number of conductors per slot,	16	
		(iii) coil span, (iv) slip ring voltage on open circuit, (v) full load current per phase		
		rotor. Assume efficiency of 90 percent and power factor of 0.86.		
		[CO4 – Applying]		
		SERVICE		
20.	(a)	Derive the output equation of synchronous machine. [CO5 - Understanding]	8	
		Explain the design of turbo alternator. [CO5 - Understanding]	8	
	1	OR		
		Find main dimensions of 100MVA, 11KV, 50Hz, 150rpm, three phase water whe		
	(b)	generator. The average gap density = $0.65$ Wb/m and ampere conductors per met		
		40000. The peripheral speed should not exceed 65 m/s at normal running speed		
		order to limit runaway peripheral speed. [CO5 - Applying]		