Total Number of Pages: 02 5 th Semester Regular Examination 2017-18 ENERGY CONVERSION TECHNIQUES BRANCH: MECH Time: 3 Hours Max Marks: 100 Q.CODE:B491 Answer Part-A which is compulsory and any four from Part-B. The figures in the right hand margin indicate marks. Part – A (Answer all the questions) Q1 Answer the following questions: a) The no load terminal voltage of a dc shunt generator is 220V. If the direction of rotation is reversed the voltage to which it build up is: (A) 220 V (B) -220 V (C) 0 V (D) 22 V b) The slip of an induction motor normally does not depend on (A) rotor speed (B) synchronous speed (C) shaft torque (D) core-loss component c) A 4 point starter is used to start and control the speed of a (A) dc shunt motor with field weakening control (B) dc shunt motor with armature resistance control (B) dc shunt motor with armature resistance control (C) dc series motor (D) dc compound motor (C) d series motor (D) dc compound motor (C) dr series motor (D) dc compound motor (D) a field excitation of 20 A in a certain alternator results in an armature current of 400 A in short circuit and a terminal voltage or ywithin the machine at aload current of 200 A is (A) 1 V (B) 10 V (C) 100 V (D) 1000 V (E) The maximum power developed in the synchronous motor will depend on (A) rotor excitation only (B) maximum value of coupling angle (C) supply voltage only (D) Rotor excitation supply voltage and maximum value of coupling angle. (f) The type of machine having highest no load current is (A) Transformer (B) DC shunt motor (C) 3 phase Synchronous motor (D) 3 phase Induction motor (D) 4 single phase transformer has a maximum efficiency of 90% at full loadand unity power factor. Efficiency at half load at the same power factor is (A) 86.7% (B) 88.26% (C) 88.9% (D) 87.8% (A) 1500rpm (D) 3000 rpm (D	Registration No:															
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W1: 250 V, 10 A, Low Power Factor W2: 250 V, 5 A, Low Power Factor					ow F	Power	r Fact	or	W2:	250 \	/, 5 A	, Low	Pow	er Factor		

210		The Wattmeters used in open circuit test and short circuit test of the transformer will respectively be	21
		(A) W1 and W2 (B) W2 and W4 (C) W1 and W4 (D) W2 and W3	
	j)	The direction of rotation of a 3-phase induction motor is clockwise when itis supplied with 3-phase sinusoidal voltage having phase sequence A-B-C.For counter clockwise rotation of the motor, the phase sequence of the powersupply should be	
210		(A) B-C-A (B) C-A-B(C) A-C-B (D) B-C-A or C-A-B	21
Q2	Ans	swer the following questions: How does a dc motor adjust itself to match the mechanical load?	(2 x 10)
	b)	A single phase transformer has a hysteresis and eddy current loss of 150W and 100W respectively when supplied from 250V, 50Hz. What will be the corresponding losses when supplied from 250V, 30Hz?	
210	c)	Four terminals of a dc shunt machine are available, but these are unmarked. How would you identify field and armature terminals?	21
		Why the air gap length in a synchronous machine is higher compared to an induction machine?	
	e) f)	What is the condition for maximum efficiency in a DC Motor? Why are the transformer rated in kVA and not in kW?	
	g)	Explain why an induction motor at no load operates at a very low power	
210	h)	factor? 210 210 210 210 210 210 210	21
	i)	Differentiate between a single 3-phase transformer and a transformer	
	j)	bank. What is the load angle for which a synchronous machine delivers maximum power?	
210		Part – B (Answer any four questions)	21
Q3	a)	A 250V, 20Kw shunt motor running at 1500 rpm has a maximum efficiency of 85%, when delivering 80% of its rated output. The shunt field resistance is 125Ω . Determine efficiency and speed when it draws	(10)
	b)	100A from mains. Derive the EMF equation of DC generator by BLV concept.	(5)
Q4 210	a)	Explain the speed vs. Torque and Speed vs. Armature Current characteristics of a Dc shunt and series Motor.	(10)
	b)	Explain the working of a 3-point starter with a neat diagram.	(5)
Q5	a)	A 10 KVA, 2500/250 V,single-phase,transformer gave the following test results:	(10)
		Open-circuit test: 250 V, 0.8 A, 50 W Short-circuit test: 60 V, 3 A, 45 W	
210		 (i) Calculate the efficiency at ¼ of full load at 0.8 power factor. (ii) Calculate the load (KVA output) at which maximum efficiency 	21
	b)	occurs and the value of maximum efficiency at upf? A 600kVA, single phase transformer has an efficiency of 92% both at full load and half load at unity power factor. Determine its efficiency at	(5)

 $\emph{W}3$: 150 V, 10 A, High Power Factor $\emph{W}4$: 150 V, 5 A, High Power Factor

Q6 a) 210 b)	Explain different induction motor? A 3-phase induction from 240V, 50H are 0.12 Ω and 0 and full load slip maximum torquoccurs.	o 210 ction motor hav Z supply .The D.85 Ω per pha D is 4%. Calculi	ving a 6pole, s rotor resistance se .The ratio of ate the develop	tar connected se and standstill stator to rotor to ed torque at fu	stator runs reactance urns is 1.8 Il load and	(10) (5)	210		
Q7 a)	Explain full d synchronization. Derive the poalternator? Also	wer angle (l	P-δ) equation	·	nethod of	(10) (5)	210		
Q8 a) ₂₁₀ b)									
Q9 Wr a) b) ²¹⁰ c) d)	rite short notes of Voltage buildup O.C. and S.C. to Double field revolution of Speed control of	of DC shunt ge est of single-pholying theory.	ase transforme	210	210	(5X3)	210		
210	210	210	210	210	210	2	210		
210	210	210	210	210	210	2	210		
210	210	210	210	210	210	2	210		