Enrollment No: _____ Exam Seat No:_____

C.U.SHAH UNIVERSITY

Summer Examination-2017

Subject Name: Electrical Machine-I

Subject Code: 4TE03EMC1 **Branch:** B.Tech (Electrical)

Semester: 3 **Date: 31/03/2017** **Time: 10:30 To 01:30** **Marks: 70**

Instructions:

(1) Use of Programmable calculator & any other electronic instrument is prohibited.
(2) Instructions written on main answer book are strictly to be obeyed.
(3) Draw neat diagrams and figures (if necessary) at right places.
(4) Assume suitable data if needed.

Q-1 **Attempt the following questions:** **(14)**

a) The critical resistance of the d.c.generator is resistance of (1)
(A) Armature
(B) Field
(C) Load
(D) brushes

b) Buchholz relay is used in (1)
(A) motor protection
(B) line protection
(C) transformer protection
(D) none of the above

c) A shunt d.c. motor works on a.c. mains (1)
(A) unsatisfactory
(B) satisfactory
(C) not at all
(D) none of the above

d) The field coils of D.C. generator are usually made of (1)
(A) mica
(B) copper
(C) cast iron
(D) carbon

e) Lap winding is suitable for ……. Current ,…….voltage d.c.generators. (1)
(A) High, low
(B) Low, high
(C) Low, low
(D) High, high

f) If B is the flux density, I the length of conductor and v the velocity of conductor, then induced e.m.f. is given by (1)

(A) Blv
(B) Blv^2
(C) Bl^2v
(D) BI^2V^2.

g) The efficiecny of transformer will be maximum when (1)
(A) copper losses = hysteresis losses
(B) hysteresis losees = eddy current losses
(C) eddy current losses = copper losses
(D) iron losses = copper losses

h) Hopkinson's test on D.C. machines is conducted at (1)
to determine
(A) full-load
(B) part load
(C) no-load
(D) overload

i) Power transformers are designed to have maximum efficiency at (1)
(A) nearly full load
(B) 70% full load
(C) 50% full load
(D) no load

j) Which of following is not a part of transformer installation (1)
(A) conservator
(B) breather
(C) Buchholz relay
(D) exciter

k) Slip rings are usually made of (1)
(A) copper
(B) carbon
(C) phospor bronze
(D) aluminium

l) In a 3-phase induction motor, the rotor field rotates at synchronous speed with respect to (1)
(A) stator
(B) rotor
(C) stator flux
(D) none of the above

m) The frame of an induction motor is made of (1)
(A) carbon
(B) closed grained cast iron
(C) aluminium
(D) stainless steel

n) A transformer transforms (1)
(A) Frequency
(B) Voltage
(C) Current
(D) Voltage and current

Attempt any four questions from Q-2 to Q-8

Q-2		**Attempt all questions**	**(14)**
	a)	Explain the Construction Parts of D.C. Generator (1) Yoke (2) Pole Cores and Pole shoes (3) Commutator (4) Armature core (5) Brushes and bearing.	**(5)**
	b)	Explain the Swinburne test of D.C .Motor.	**(5)**
	c)	Explain transformer at no load Condition with phasor diagram.	**(4)**
Q-3		**Attempt all questions**	**(14)**
	a)	Derive the EMF equation for single phase transformer with help of sketch.	**(5)**
	b)	Explain the speed control of dc shunt motor.	**(5)**
	c)	Explain the classification of DC machines.	**(4)**
Q-4		**Attempt all questions**	**(14)**
	a)	Explain conversion of 2 Winding transformer into Auto Transformer.	**(5)**
	b)	Explain the E.M.F. equation for Simplex lap and wave wound generator.	**(5)**
	c)	Explain the Brake test of D.C .Motor.	**(4)**
Q-5		**Attempt all questions**	**(14)**
	a)	Derive the Condition for Maximum Efficiency of Transformer. What is all - day efficiency?	**(7)**
	b)	Define the term "slip" of induction motor. Draw and Explain the torque-slip characteristics of a three phase induction motor.	**(7)**
Q-6		**Attempt all questions**	**(14)**
	a)	Explain open and short circuit test for single phase transformer. While making short circuit test, low voltage winding is always short circuited. Why?	**(7)**
	b)	Explain in detail armature reaction in dc machines.	**(7)**
Q-7		**Attempt all questions**	**(14)**
	a)	What is Necessity of Starter? Explain the 3 Point Starter for D.C Shunt Motor with neat diagram.	**(7)**
	b)	In a long – shunt compound generator, the terminal voltage is 230 V when generator delivers 150 A. Determine (i) induced e.m.f. (ii) totol power generated and (iii) distribution of this power. Given that shunt field, series field, divertor and armature resistance are 92 Ω, 0.015 Ω, 0.03 Ω and 0.032 Ω respectively.	**(7)**
Q-8		**Attempt all questions**	**(14)**
	a)	Explain the Production of Rotating field of 3 Phase Supply for Induction Motor.	**(7)**
	b)	A 100-kVA lighting transformers each has a full load loss of 2KW. The losses being equally divided between iron and copper. During a day, the transformer operates on full-load for 3 hours, one half load for 4 hours, and the output being negligible for the remainder of the day. Calculate the all-day efficiency.	**(7)**