C. U. SHAH UNIVERSITY
Winter Examination-2022

Subject Name: Electrical Machine – I

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

Semester: 3   **Date: 11/01/2023**   **Time: 02:30 To 05:30**   **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) Rotating part of DC motor is known as
   (a)Pole.
   (b)Armature.
   (c)Carbone brush.
   (d)Starter.
 b) The critical resistance of the d.c. generator is resistance of
   (a) Armature
   (b) Field
   (c) Load
   (d) brushes
 c) Commutator converts .... emf into.... emf.
   (a) AC, DC
   (b) DC, AC
   (c) Fixed AC, Variable AC
   (d) Fixed DC, Variable DC
 d) Effect of armature field on main field is known as...............
   (a) Magnetizing characteristic
   (b) Armature reaction
   (c) de-magnetizing characteristic
   (d) None of above
 e) In a dc machine 4 pole lap winding is used. The number of parallel paths is?
   (a) 2   (b) 4
   (c) 1   (d) 8
 f) Lamination of the transformer core is made up of
   (a)Aluminum
   (b)Iron
   (c)Steel
   (d)Silicon steel

g) Less current through the field of a shunt motor will cause a speed increase.
  (a)True
  (b)False

h) The noise produced by a transformer is termed as _____
  (a) zoom
  (b) hum
  (c) ringing
  (d) buzz

i) D.C. shunt motors are used for driving
  (a) trains
  (b)cranes
  (c)hoists
  (d)machine tools

j) Power transformers are designed to have maximum efficiency at
  (a) nearly full load
  (b) 70% full load
  (c) 50% full load
  (d) no load

k) At stand still condition the value of slip is
  (a)1
  (b)0
  (c)infinite value
  (d)finite value

l) Explain the function of yoke.

m) Explain the function of commutator.

n) How may the direction of rotation of a d.c. motor be reversed?

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

Q-2		**Attempt all questions**	**(14)**
	A	Explain the Speed control of D.C. Series Motor.	**07**
	B	Explain different types of D.C. generator.	**07**
Q-3		**Attempt all questions**	**(14)**
	A	Explain in detail armature reaction in dc machines.	**07**
	B	Derive emf equation of single phase transformer.	**07**
Q-4		**Attempt all questions**	**(14)**
	A	Explain open circuit and short circuit test on transformer with suitable diagram.	**07**
	B	A long shunt compound generator delivers a load current of 50A at 500V and has armature, series field and shunt field resistances of 0.05 ohm, 0.03 ohm, 250 ohm respectively. Calculate the generated voltage and armature current. Assume brush drop of 2 V.	**07**
Q-5		**Attempt all questions**	**(14)**
	A	Explain construction and working of three phase induction motor.	**07**
	B	Explain Swinburne's test to find the efficiency of a d. c. motor.	**07**

Q-6		**Attempt all questions**	**(14)**
	A	Define "All day efficiency" of transformer. Explain the construction and working principle of auto transformer.	07
	B	Explain the construction and working of three point starter.	07
Q-7		**Attempt all questions**	**(14)**
	A	Explain the operation of transformer on load and no load with vector diagram.	07
	B	A 30kVA, 2400/120 V, 50 Hz transformer has a high voltage winding resistance of 0.1 Ω and a leakage reactance of 0.22Ω. The low voltage winding resistance is 0.035Ω and the leakage reactance is 0.012Ω. Find the equivalent winding resistance, reactance and impedance referred to the (i) high voltage side and (ii) the low voltage side.	07
Q-8		**Attempt all questions**	**(14)**
	A	Derive the expression for the torque developed in d.c. motor	07
	B	Define the term "slip" of induction motor. Draw and explain the torque-slip characteristics of a three phase induction motor.	07