C.U.SHAH UNIVERSITY
Winter Examination-2015

Subject Name : Electrical Machines and Electronics

Subject Code :4TE03EMN1   **Branch : B.Tech (Mech,Auto)**

Semester :3   **Date :3/12/2015**   **Time :2:30 To 5:30**   **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) State the function of Commutator in D.C. Generator.
  b) State the classification of D.C.motor.
  c) Transformer cores are laminated to reduce(1) Copper loss (2) Hysterisis loss (3) Eddy current loss (4) size
  d) The rotor of an induction motor rotates (1) to maintain the stator flux (2) to reduce the stator voltage (3) To increase the rotor current(4) To reduce the relative motion between stator and rotor
  e) The transistor operation in semiconductor is possible if (1) two diodes are connected back to back(2) two diodes are connected as neck to back(3) Base width is reduced (4) Doping of all the semiconductor layers is increased.
  f) Sketch the two types of single phase transformer.
  g) Load Factor is the ratio of _____.
  h) If the power factor of an equipment is low (1) The system will not operate (2) It will draw more current from the supply (3) It will draw more voltage from the supply (4) It will produce the humming sound.
  i) The ideal gain of an operation amplifier is _____ and slew rate is _____.
  j) State the name of different methods of power factor improvement.
  k) State the various level of transmission voltages in India.
  l) State any two applications of d.c. generator.
  m) Draw the speed torque characteristics of d.c. series motor.
  n) Name the various methods of speed control of d.c. motor.

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

Q-2   **Attempt all questions**   **(14)**
  (a)   State and Explain the function of   each part of D.C. Generator.   (5)
  (b)   Derive the EMF equation of a D.C.Generator   (5)
  (c)   Classify the D.C. Generators with neat circuit diagram and equation.   (4)

Q-3	**Attempt all questions**	**(14)**
(a)	What is back emf? State the function of back emf in D.C. Motor.	(3)
(b)	Derive the torque equation of D.C. Shunt Motor.	(4)
(c)	State and explain 3 point starter for D.C. Motor. State the necessity of starter in d.c. motor. Also state its limitations.	(7)

Q-4	**Attempt all questions**	**(14)**
(a)	Derive an emf equation of single phase transformer.	(4)
(b)	Describe the S.C. and O.C. test for single phase transformer.	(5)
(c)	A transformer is having 200 volt on primary side and supply frequency of 50 Hz. If the number of turns on the primary winding is 50. Find(i)the flux in the limb of a transformer.(ii) Calculate the voltage on the secondary side if the no. of turns on the secondary side is 150.	(5)

Q-5	**Attempt all questions**	**(14)**
(a)	Explain the function of differential amplifier with neat sketch.	(4)
(b)	Draw the pin diagram of OPAMP 741c and explain the function of each pin.	(5)
(c)	Explain the AND, OR and NOT gate with its truth table and symbol.	(5)

Q-6	**Attempt all questions**	**(14)**
(a)	A particular load is driven by induction motor at about 1500 RPM of ideal speed. What should be the no of poles for a three phase induction motor when (i) f= 50 Hz. (ii) Calculate the actual speed if the rated slip is 4%	(4)
(b)	Define Power Factor. State the disadvantage of low power factor.	(5)
(c)	Explain D'Morgan's Law for the Boolean Algebra.	(5)

Q-7	**Attempt all questions**	**(14)**
(a)	Describe the constructional features of an alternator.	(4)
(b)	List the various equipments used in the substation. Explain the function of any four.	(6)
(c)	A D.C. Motor is operating on a supply voltage of 200 volt DC has armature resistance of 0.5 ohm. Its armature current is 20 ampere. Calculate the back emf.	(4)

Q-8	**Attempt all questions**	**(14)**
(a)	An input voltage to an OPAMP is 1.8 volt D.C. The value of input resistance R1 is 10 kohm and feedback resistance Rf is 20 kohm. Calculate the output voltage if the (i) OPAMP is connected in the inverting mode. (ii) If the input signal is applied at non-inverting terminal.	(4)
(b)	A 4 pole D.C. Shunt Generator has a lap wound armature with 728 conductors . The flux per pole is 25 mWb . The generator supplies two hundred 110 volt , 75 watt lamps. Determine speed of the generator. Armature and Field Winding Resistances are 0.075 ohm and 110 ohm respectively.	(5)
(c)	Explain NAND gate and NOR gate with its truth table and Symbol.	(5)