1st Semester Back Examination 2018-19
BASIC ELECTRICAL ENGINEERING
BRANCH : AEIE, AERO, AUTO, BIOMED, BIOTECH, CHEM, CIVIL, CSE, ECE, EEE, EIE,
ELECTRICAL, ENV, ETC, FASHION, FAT, IEE, IT, ITE, MANUFAC, MANUTECH, MARINE,
MECH, METTA, METTAMIN, MINERAL, MINING, MME, PE, PLASTIC, TEXTILE
Time : 3 Hours
Max Marks : 100
Q.CODE : E950
Answer Question No.1 (Part-1) which is compulsory, any EIGHT from Part-II and any TWO
from Part-III.
The figures in the right hand margin indicate marks.

Part- I

Q1	**Short Answer Type Questions (Answer All-10)**	**(2 x 10)**
a)	The radio receiver draws 0.9A at 110 Volts. If the set is used 3 hour/day, how much energy does it consume in 7-days?	
b)	A 250 kVA, 11 000 V/400 V, 50 Hz single-phase transformer has 80 turns on the secondary. Calculate: the approximate values of the primary and secondary currents.	
c)	Which type of DC motor would be suitable for drives requiring high starting torque and why?	
d)	A 3- phase, 4-pole, 50 Hz induction motor runs at a speed of 1440 rpm. What is frequency of the rotor current ?	
e)	What is Biot-SavartLaw? What are the applications of Boit-SavartLaws?	
f)	Why the core of the transformer is made of at highest permeability? Does it reduces the cost of the transformer, Explain?	
g)	The torque required to drive a d.c. generator at 15 r/s is 2 KN m. The core, friction and windage losses in the machine are 8.0 KW. Calculate the power generated in the armature winding.	
h)	What do mean by time constant of a R-C circuit excited by DC source? How the transient response will be affected by time constant?	
i)	Define the RMS and Average values of sinusoidal wave form.	
j)	Write down the different method of excitations seen in DC machines with circuit.	

Part- II

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Q2	**Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)**	**(6 x 8)**
a)	Minimization of hysteresis and eddy current losses is required in transformer. Justify.	
b)	Prove the rotation of a rotor in a three phase induction motor is in same direction with rotating flux.	
c)	Derive the exponential current growth in an R-L series circuit for step input excitation.	
d)	KVL and KCL satisfies the law of conservation of energy and charge respectively. Justify it.	
e)	Starting of DC series motor with loading condition. Justify the statement.	
f)	Justify that the quality of a R-L-C series is reciprocal to its bandwidth.	
g)	Show the line voltage is 1.732 times phase voltage of a star connected power supply.	
h)	Induced EMF generated across a coil is alternating for a complete rotation of it inside the magnetic field. Derive it.	
i)	Draw and explain the speed-torque characteristics of DC shunt, series and compound motor.	
j)	The magnetizing component is obtained from open circuit test of single phase transformer. Justify this.	
k)	Bring out the differentiation and similarities of series and parallel magnetic circuit.	
l)	Draw the equivalent circuit of the three phase induction motor showing the rotor, stator copper loss and mechanical power.	

Part-III
Long Answer Type Questions (Answer Any Two out of Four)

Q3 **a)** Why theorems are required even though KCL and KVL exists. Write down the different theorems used in DC circuit analysis. State and explain Thevenin's Theorem. What are the advantages and dis-advantages of this theorem ? **(8)**

b) The four arms of a Wheatstone bridge have thefollowing resistances : **(8)**
AB = 100 ohm, BC = 10 ohm, CD = 4 ohm, DA = 50 ohm. A galvanometer of 20 ohmresistance is connected across BD. Use Thevenin's theorem to compute the current through the galvanometer when a p.d. of 10 V is maintained across AC.
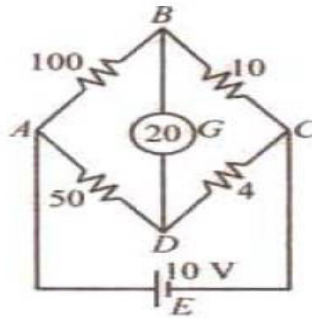
Q4 **a)** What do you mean by an ideal voltage source and practical voltage source? Draw the connection of a practical voltage source with a practical voltmeter. **(8)**

b) Define ideal current source and practical current source and the connection of a practical current source with practical ammeter. **(8)**
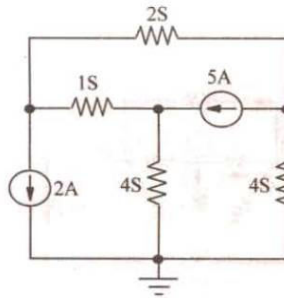
Using nodal analysis find the different branch currents in the circuit. All branch conductances are in siemens (i.e. mho).

Q5 **a)** Derive the torque developed in armature of DC motor. Draw and explain the torque-speed characteristics of a DC motor in constant power and constant torque region. What are the different methods of speed control of DC motor. **(8)**

b) A DC motor takes an armature current of 110 A at 480 V. The resistance of the armature circuit is 0.2 Ω. The machine has six poles and the armature is lap-connected with 864 conductors. The flux per pole is 0.05 Wb. Calculate **(8)**
(a) the speed,
(b) the gross torque developed by the armature.

Q6 **a)** Define power factor, form factor, peak factor of an alternating sinusoidal wave form. What is quality factor of a coil. Derive quality factor for a coil. **(8)**

b) A current of 5A flows through a non-inductive resistance in series with a choking coil when supplied at 250V, 50Hz. If the voltage across the resistance is 125V and across the coil is 200V, Calculate (i) the impedance, reactance and resistance of the coil (ii) the power absorbed by the coil and (iii) the total power. (iv) Draw the phasor diagram. **(8)**