SV - 4

Total No. of Pages : 3

Seat No.	

F.E. (All Branches) (Semester - I&II) (Revised) Examination, May - 2018
BASIC ELECTRICAL ENGINEERING
Sub. Code: 59178

Day and Date : Thursday, 03 - 05 - 2018 **Total Marks : 100**

Time : 10.00 a.m. to 1.00 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Draw neat labeled diagrams as a part of explanation.**
4) **In case of missing data, assume suitable value. State it clearly.**

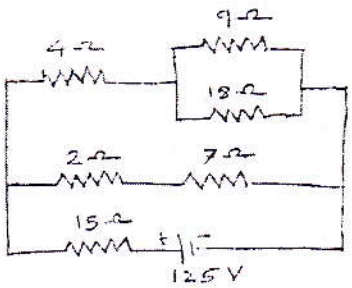
Q1) Answer any Two: **[2 × 9 = 18]**

a) By mesh analysis or nodal analysis, for the given network, find:

i) Current in 15 ohm resistor.

ii) Voltage across 18 ohm.

iii) Power dissipated in 7 ohm resistor.



b) Explain magnetic leakage and fringing in a magnetic circuit? State how they are minimized.

c) A water heater immersed in 1Kg water has heating element of 250 ohm & supply voltage is 230V. Calculate rise in temperature of water in 5 minutes. Assume Specific Heat = 4186 J/Kg. Deg K. Assume 70% efficiency.

P.T.O.

Q2) Answer any two: **[2 × 9 = 18]**

a) Prove that average power consumed by ac circuit is V I cos Φ when connected ot sinusoidal AC voltage V_m sin wt and conducting current I_m sin (wt-Φ).

b) Two impedances $Z_1 = 2 + j\,4$ and $Z_2 = 3 + j\,5$ are connected in parallel across 100 ∟0V, AC supply.

Calculate :

i) Total current

ii) Total Impedance

iii) Power factor

c) A resistance of 100 ohm, inductance 1 Henry and capacitor 5 micro farad are connected in series across voltage V = 141.41 sin 314.14 t. Calculate Impedance, rms value of voltage, rms value of current, power factor, Active power, Reactive power.

Q3) Answer any two: **[2 × 7 = 14]**

a) Draw and explain operating principle of LED lamp. Why LED lamps are now a days replacing conventional lamps?

b) Compare rewirable Fuse and MCB. Why MCB is preferred over Fuse?

c) State the methods of earthing used in electrical system. What is risk involved without proper earthing, explain with the help of neat diagram.

Q4) Answer any two: **[2 × 7 =14]**

a) Prove that line voltage is $\sqrt{3}$ times the phase voltage in a balanced delta connected circuit.

b) Prove that line current and total I^2R power loss in transmission lines is less in 3 phase system than single phase system. (Assume same line voltage, same power delivered to load with same power factor).

c) Define and explain:

i) Balanced 3 phase supply

ii) Phase sequence

iii) Balanced 3 phase load

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Q5) Answer any two: **[2 × 9 = 18]**

a) Compare construction of projecting pole rotor and smooth cylindrical rotor of alternator. Which rotor is suitable if the prime mover is a water turbine?

b) Describe the core and windings of

i) Shell type transformer

ii) Core type transformer

c) Find the emf induced per turn in a transformer operating on 200V, 50 Hz ac supply. Peak value of magnetic flux in the core is 2mWb. If it is a step down transformer with turns ratio ½. Find the secondary winding turns.

Q6) Answer any two: **[2 × 9 = 18]**

a) Explain the operating principle of universal motor on dc supply. Explain the role of commutator. Draw suitable diagrams.

b) List the criteria to obtain rotating magnetic field in split phase induction motor. Explain the terms:

i) Cage type rotor

ii) Slip

c) Draw circuit diagrams (symbolic diagrams) of all types of split phase induction motor. Out of these, name the motor famous for

i) best power factor during running

ii) very small starting torque

iii) Good starting torque as well as good power factor

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