Exam.Code:0905
Sub. Code: 6659

1078
B.E. (Electrical and Electronics Engineering)
First Semester
EE-E101: Basic Electrical Engineering

Time allowed: 3 Hours | Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Part.

x-x-x

Q1. Explain briefly (10*1=10)

A) What are the conditions to be fulfilled before we convert practical voltage source to practical current source and vice-versa.
B) State the Norton's theorem with the help of suitable diagrams.
C) Define the peak factor and form factor of the periodic waveform.
D) Only draw the labeled circuit diagram for three phase power measurement for balanced delta connected load using two wattmeters.
E) Explain the dot convention used in magnetic coupled circuit with the help of suitable example.
F) Only draw the labeled phasor diagram of the practical transformer for lagging power factor load.
G) Characteristics of the ideal transformer.
H) Working principle of the DC Motor. Which Fleming's rule applied for motor operation?
I) Write the advantages of the single line diagram representation of large three phase power system.
J) Write two practical applications of the DC series motor.

Part A

Q2. A) State Thevenin's Theorem. Find Thevenin's equivalent circuit of the network shown in fig 1, across R_L. (05)

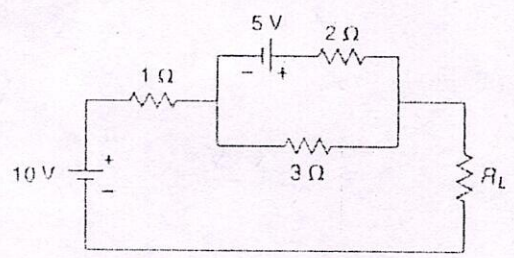

Fig.1

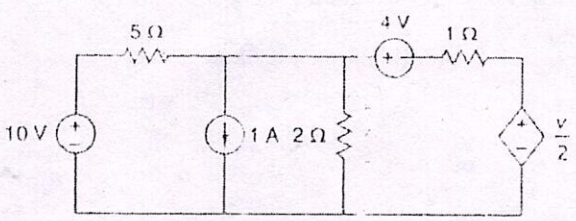

Fig.2.

B) Find V in the circuit shown in fig.2 using superposition theorem. (05)

Q3. A) Two impedances $Z_1 = 30\angle 45^\circ\ \Omega$ and $Z_2 = 45\angle 30^\circ\ \Omega$ are connected in parallel across single phase 230V, 50Hz supply. Calculate the (i) current drawn (ii) power factor and (iii) Power consumed by the circuit. (05)

B) Explain how emf is induced in the coil moving in the stationary field with the help of suitable diagrams? Also write the emf expression as a sine function. (05)

Q4. A) Derive the relationship between a line voltage and phase current and a line voltage and a phase voltage related to a star and delta connected load. (05)

B) A balanced delta connected load consists 7 ohms resistance in series with 4 Ω inductive reactance. Line to lone voltages are: $E_{ab} = 2360\angle 0^\circ V$, $E_{bc} = 2360\angle -120^\circ V$, $E_{ca} = 2360\angle +120^\circ V$.
Determine : (i) phase current I_{ab}, I_{bc}, I_{ca} (both magnetudes and phase), (ii) each line current and its associated phase angle, (iii) load power factor, (iv) Draw with the instruments, phasor diagram based on circuit diagram and clearly indiacate on both circuit diagram and phasor diagram line current, phase currents, line voltages, phase voltages, load phase angle. (05)

P.T.O.

Part B

Q5. A) A ring made up of steel has a rectangular cross sectional area. The outer diameter of the ring is 25 cm while the inner diameter is 20 cm, the thickness being 2 cm. the ring has a winding of 500 turns and when carrying a current of 3 A, produces a flux density of 1.2 T in air gap produced when the ring is cut to have an air gap of 1mm length as shown in fig 3. Find (i) the magnetic field intensity of the steel ring and in the air gap, (ii) relative permeability of the magnetic material, (iii) total reluctance of the magnetic circuit (iv) inductance of the coil and (v) e.m.f. induced in the coil when the coil carries a current of $i_{coil} = 5 \sin 314t$. (05)

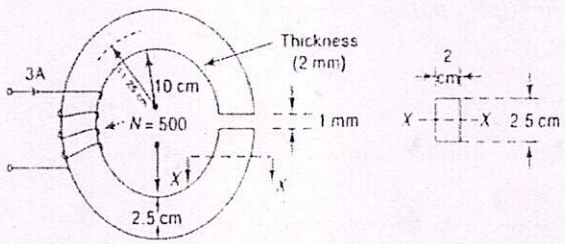

Fig.3

B) Why do magnetic circuits usually have air gaps? How the presence of air gaps does affect the magnetic circuit calculation which has higher reluctance an air gap or an iron path? And why? Prove $B = \mu H$. (05)

Q6. A) A 5KVA, 500/250V, 50Hz, single phase transformer gave the following readings,
O.C. test: 500V, 1A, 50W (L.V. side open circuited)
S.C. test: 25V, 10A, 60W (L.V. side short circuited)
Determine: (i) the efficiency on full load, 0.8 power factor lagging (ii) the efficiency on 60% of full load, 0.8 power factor leading (iii) Draw the equivalent circuit referred to primary and insert all the values in it. (05)

B) Explain how in a transformer, the primary current increases as secondary current increases. (05)

Q7. A) Define power system. Draw the labeled layout of the general power system showing primary, secondary transmission and distribution system. (05)

B) Explain the working principle of the asynchronous motor with suitable diagrams. (05)

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