2nd Semester Back Examination: 2023-24
SUBJECT: Basic Electrical Engineering
BRANCH(S): AE,AEIE,CIVIL,CSE,CSEAI, CSEAIME,CSEDS,CST,ECE,EEE,
ELECTRICAL,ELECTRICAL & C.E,ETC,IT,MECH,MINING,MME
Time: 3 Hour
Max Marks: 100
Q.Code : P372
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 **Answer the following questions:** (2 x 10)

a) State the steps to solve the circuit using super position theorem.

b) Mention the functions of no-load current in a transformer.

c) Mention the limitations of Norton's theorem.

d) State Faraday's Laws of Electromagnetic Induction.

e) Draw circuit, waveforms and Phasor Diagram for pure Series R-L Circuit. Write equation of Power.

f) Define form factor and crest factor. What is the significance of form factor?

g) An 1100/400 V, 50 Hz single phase transformer has 100 turns on the secondary winding. Calculate the number of turns on its primary.

h) Give the relation between flux, magneto motive force, and reluctance.

i) If voltage across an impedance of Z = 5 + j7 is $110\angle30^0$. Find the current in polar form.

j) What do you mean by power factor and apparent power?

Part-II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** (6 × 8)

a) A three single phase balanced load connected in three phase three wires star form, with the help of phasor diagram, obtain the relationship between line and phase quantities of voltage and current.

b) Find the Norton's equivalent for the circuit shown below.
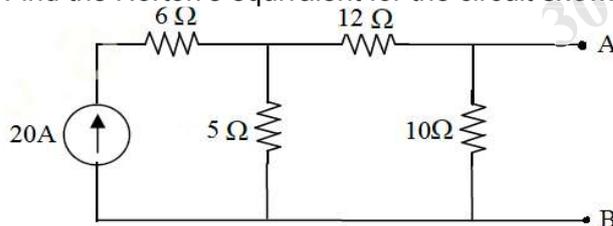
c) Find the equivalent resistance between AB for the circuit shown bellow.
R1 = 4Ω, R2 = 2Ω, R3 = 8Ω, R4 = 1Ω, R5 = 12Ω, R6 = 3Ω, R7 = 10Ω, & R8 = 5Ω
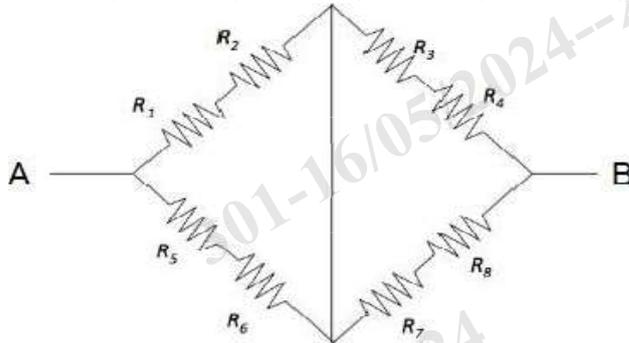
d) Draw the no-load phasor diagram and give brief explanation.

e) Define Instantaneous Value, Amplitude, RMS value and Average Value of an A.C. Quantity.

f) Derive the emf equation for DC generator from the first principle.

g) Two circuits, the impedances of which are given by $Z_1 = 10 + j15$ Ω and $Z_2 = 6 - j8$ Ω, are connected in parallel. If the total current supplied is 15 A, what is the power taken by each branch.

h) With the help of neat diagram, explain the constructional details of three phase induction motor.

i) A pure inductor excited by sinusoidally varying AC voltage. Show that the average power consumed by inductor is zero.

j) Derive the voltage and current relations in three phase balanced circuits for delta connection.

k) What are the different types of D.C. motors. Explain in detail.

l) Mention the Procedure for conducting O.C. test on a single-phase transformer. Explain with neat diagram.

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

Q3 An iron ring of a mean diameter 15cm and 10m^2 cross section is wound with 200 turns of wire. There is an air gap of 2mm cut in the ring for a flux density of 1 Web/m^2, and relative permeability of 500. Find the exciting current, the inductance and the stored energy. **(16)**

Q4 A 5KVA, 500/250V, 50Hz, single - phase transformer gave the following results: **(16)**
From O.C. Test: 500V, 1A, 50W (H.V. Side is opened)
From S.C. Test: 25V, 10A, 60W (L.V Side is shorted)
Determine: (i) The Efficiency on Full-load, 0.8 lagging P.F. (ii) The Voltage Regulation on Full-load, 0.8 lagging P.F. (iii) The Efficiency on 60% of Full-load, 0.8 lagging P.F. (iv) The Voltage Regulation on Full-load, 0.6 leading P.F.

Q5 With detail schematics list the various types of D.C. Generators and Explain in detail. **(16)**

Q6 Draw the equivalent circuit diagram of the 3-phase induction motor with proper explanation. **(16)**