B.E. ELECTRICAL ENGINEERING (PART TIME) EXAMINATION, 2018 (Old)
(1st Year 1st Semester)

SUBJECT : PRINCIPLES OF ELECTRICAL ENGINEERING

Time : Three hours

Full Marks -100
(50 marks for each part)

Use a separate Answer-Script for each part

No. of question	Part **Answer any three questions.** Two marks reserved for neatness and well organized answer.	Marks
1. a)	Briefly explain Hysteresis loss and eddy current loss. Also mention how these losses can be minimized.	8
b)	An iron ring of 500 cm mean circumference with a cross-section of 5 cm^2 is wound uniformly with 300 turns of wire. Find the current required to produce a flux of 0.5 mWb in iron. Consider relative permittivity of iron as 400.	8
2. a)	How an unbalanced system of three phase vectors can be resolved into three balanced systems of vectors? Highlight the properties of each of the resolved vectors with suitable diagrams.	10
b)	A Series R-L-C circuit consists of resistance of 10 Ω, inductance of 0.1 H and capacitance of 50 µF. Determine the frequency at which resonance will take place. If the applied voltage be 120V, 50Hz then determine the current and voltage drops across R, L and C. Also draw the phasor diagram at resonance condition.	6
3. a)	A balanced, 3-phase, star connected load of 15 kW draws a lagging current of 18A with a line voltage of 440V at 50Hz. Find the parameters of the load per phase. If the same impedances are connected in delta, by what percentage the line voltage needs to be changed to keep the line current unchanged?	10
b)	Explain how total power in a balanced three phase system can be measured with the help of two wattmeters.	6
4. a)	Explain the term inductance of a coil? Find the expression of energy stored in any conductor.	8
b)	Define magnetic field strength and magnetic flux density. Find the relationship between them.	8
5. a)	Write short notes on "Hysterisis Loop".	8
b)	Define Coulomb's Law for force between two point charges and hence give the definition of unit of charge. Define electric field intensity and potential.	8

[Turn over

B.E. ELECTRICAL ENGG. (PART TIME) 1ST YEAR 1ST SEMESTER EXAM.-2018 (Old)

Subject: PRINCIPLES OF ELECTRICAL ENGINEERING

Time: Three Hours   Full Marks: 100

Use separate Answer script for each part
PART-II (50 marks)
Answer any Three Questions
(Q. No. 1 carry 18 marks)

1. a) Show that an ideal current source and an ideal voltage source have infinite and zero internal resistance respectively.
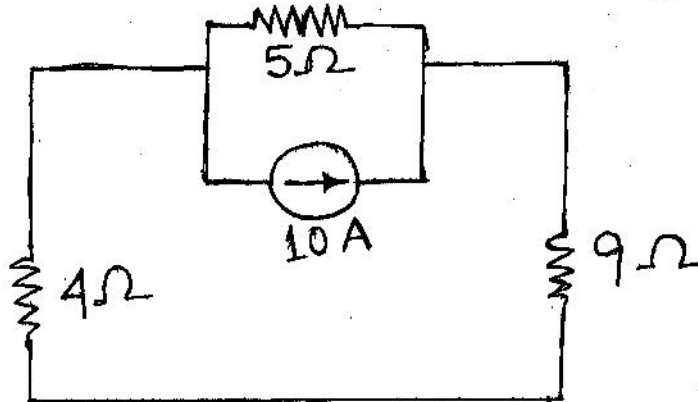
                                                                    3+3=6

   b) A circuit consists of resistance R, and inductive reactance of 27Ω connected in series. Determine the value of R for which the power factor of the circuit is 0.7. Also draw the phasor diagram.

                                                                    6

   c) Using Norton's theorem, calculate the current flowing through the 9Ω resistor.

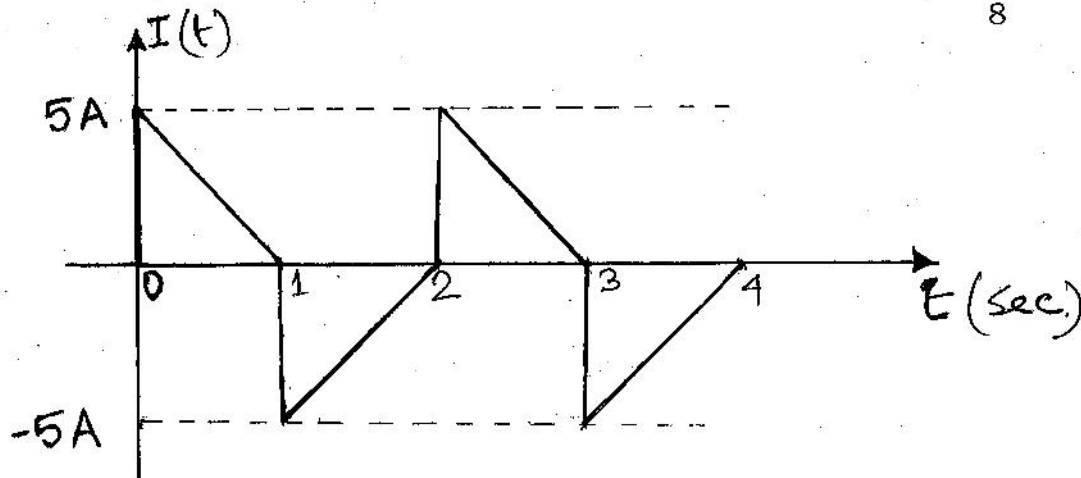   6

2. a) State and explain the Reciprocity theorem. Find the dimensions of Electric Field Intensity (E) and Magnetic Flux Density (B) in MKS unit system.

                                                                    4+4=8

   b) Find the r.m.s. and average value of current wave as shown below-

                                                                    8

B.E. ELECTRICAL ENGG. (PART TIME) 1ST YEAR 1ST SEMESTER EXAM.-2018 (Old)

Subject: PRINCIPLES OF ELECTRICAL ENGINEERING

Time: Three Hours   Full Marks: 100

3. a) Prove that an ideal inductance does not consume any power over the full cycle of applied sinusoidal voltage.
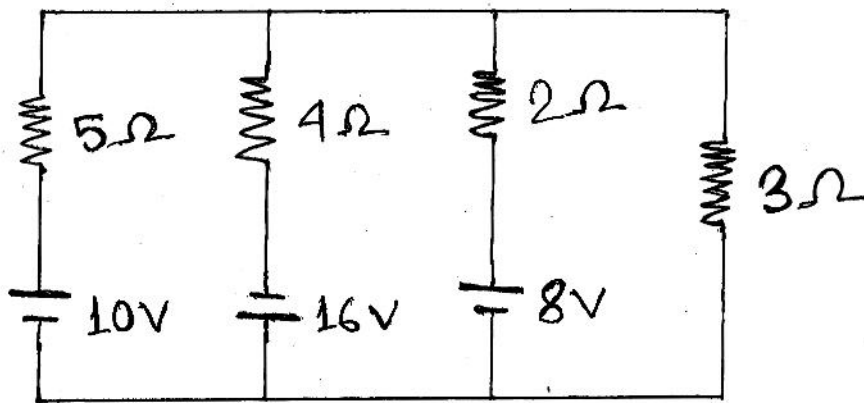
4

b) In a series R-L-C circuit prove that the voltage across the capacitor is Q times the applied voltage under resonance condition, where Q is the quality factor of the circuit.

5

c) Determine the current through and voltage across the 3Ω resistor of the given network using Millman's theorem.

7

4. a) Deduce the condition at which an RLC series circuit draws maximum current.

4

b) A coil of resistance 10Ω and inductance 0.12H is connected in parallel with a series combination of 40Ω resistance and 60μF capacitance. Calculate the total current, when the parallel combination is connected across 230V, 50Hz supply. Also draw the phasor diagram.

8

c) What are the various methods used for the power factor correction.

4

5. a) Show that the maximum power transfer occurs for a resistive load when the load voltage and current are one-half their maximum possible values.

4

b) A series circuit consists of a resistance of 23Ω, a capacitance of 250μF and an inductance of 0.12H. A supply of 230V, 50Hz is connected across it. Calculate i) the current in the circuit, ii) the potential differences across each element and iii) the frequency at which the current would have unity power factor.

8

c) For a R-L-C series circuit, discuss the nature of power factor for i) $X_L > X_C$ ii) $X_L < X_C$ with suitable phasor diagram.

4