Total No. of Printed Pages:02

F.E (Sem-I)(Revised Course 2016-17)
EXAMINATION NOV/DEC 2019
Fundamental of Electrical Engineering

[Time: Three Hours] **[Max.Marks: 100]**

Instructions:
1. Answer any two Questions from Part – A.
2. Answer any two Questions from Part – B.
3. Answer any one Question from Part – C.
4. Assume suitable additional data if necessary.

Part - A

Q.1

a. State and explain the following laws related to magnetism: **(6)**
   i. Faraday's laws
   ii. Lenz's law

b. Draw the typical layout of a Nuclear power plant and explain how it generates electrical energy. **(7)**

c. For the network show in fig. (1c), determine : (i) the voltage drop in each resistor, (ii) the current in each resistor. **(7)**

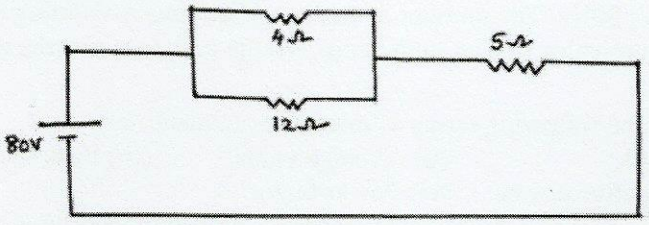

Fig. (1c)

Q.2

a. State the similarities and differences between Electrical and Magnetic circuits. **(7)**

b. A mild steel ring is having a mean circumference of 400mm and cross-sectional area of $500mm^2$. It is uniformly wound with a coil of 100 turns around it. The relative permeability is 380. Calculate : (i) reluctance of the ring. (ii) the current required to produce a flux of 800μwb in the ring. **(6)**

c. Determine the current in 20Ω resistance of the network shown in fig.(2c) by Thevenin's theorem. **(7)**

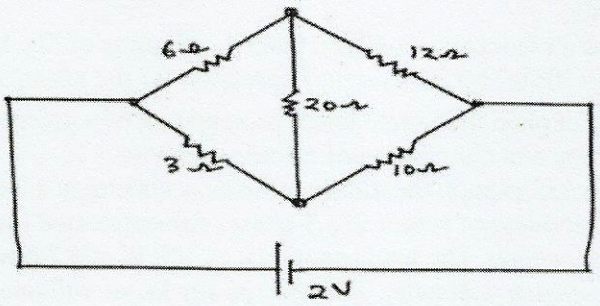

Fig. (2c)

Q.3	a.	Explain the Solar Photovoltaic technology for conversion of solar energy to Electrical energy.	(7)
	b.	State Maximum Power transfer theorem. Derive the condition for maximum power to be transferred.	(7)
	c.	When two identical coils are connected in series, the inductance of the combination is found to be 80mH. When the connection to one of the coil is reversed, a similar measurement indicates 20mH. Find the coupling coefficient between the two coils.	(6)

Part - B

Q.4	a.	Explain the concept of phasors. Show how phasor additions and subtractions are performed.	(6)
	b.	In a Delta connected, three phase system, derive the relationship between line voltage and phase voltage, line current and phase current and the expression for total power consumed.	(8)
	c.	Three coils reach of resistance 4Ω and inductive reactance 3Ω are connected in delta across 400V, 50Hz supply. Find current in each coil, line current, active power and reactive power.	(6)
Q.5	a.	Derive the expression for instantaneous current and instantaneous power in an AC circuit containing Resistance only. Draw neat and labeled waveforms and phasor diagram.	(8)
	b.	Graphically show the representation of a three phase system and explain the concept of phase sequence.	(6)
	c.	The no load current of a single phase transformer is 5A at 0.25 power factor when supplied at 230V, 50Hz. The number of turns on the primary winding is 200. Calculate : (i) the maximum value of flux in the core, (ii) the core loss (iii) the magnetising component of current.	(6)
Q.6	a.	Define the following terms as related to ac quantities: (i) Cycle (ii) Average value (iii) Peak factor (iv) Frequency (v) Reactive power (vi) Power factor	(6)
	b.	With the help of a neat phasor diagram, explain the working of a single phase ideal transformer on no-load.	(6)
	c.	A series R-L circuit having a resistance of 7Ω and an inductance of 31.8mH is connected to 230V, 50Hz supply. Calculate: (i) the circuit current, (ii) Phase angle, (iii) Power factor, (iv) Power consumed.	(8)

Part - C

Q.7	a.	Explain the magnetic circuit concept. Discuss the different types of magnetic circuits.	(8)
	b.	Compare the Resistance, Inductance and Capacitance from their Circuit and Energy viewpoints.	(6)
	c.	A coil has an inductance of 20mH and a resistance of 5Ω. It is connected across a supply voltage v=50Sin314t. Obtain the expression for the instantaneous Current.	(6)
Q.8	a.	Draw and explain the Single line representation of a power system indicating generation, transmission and distribution of electrical power.	(8)
	b.	List down and explain the different losses occurring in a Transformer.	(6)
	c.	The measurement of power in a 3-phase, star-connected load was done using two-wattmeter method. The load supplied was 30KW at 0.7 power factor lagging. Find the readings of each wattmeter. For what power factor will one of the wattmeters read zero.	(6)

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