Sr. No..002904.

August/September 2022

B.Tech - II SEMESTER

Basic Electrical Technology (ESC-101-A)

Time: 3 Hours | Max. Marks:75

Instructions:
1. *It is compulsory to answer all the questions (1.5 marks each) of Part -A in short.*
2. *Answer any four questions from Part -B in detail.*
3. *Different sub-parts of a question are to be attempted adjacent to each other.*
4. *Any other specific instructions*

PART -A

Q1 (a) Enumerate various limitations of ohms law. (1.5)[CO1]

(b) Convert 4A source with its parallel resistance of 15Ω into its equivalent voltage source. (1.5)[CO1]

(c) Differentiate between active and passive components. (1.5)[CO1]

(d) Define dynamic impedance. Also write its unit. (1.5)[CO2]

(e) Explain why a series resonance is called voltage resonance. (1.5)[CO2]

(f) List various applications of autotransformer. (1.5)[CO3]

(g) In case of power measurement by two-wattmeter method for 3-phase balanced load, under what conditions: the one wattmeter will give zero reading and whole of the power will be measured by the other wattmeter. (1.5)[CO2]

(h) List various methods of starting a single-phase Induction motor. (1.5)[CO3]

(i) What is the function of commutator in dc machines? (1.5)[CO3]

(j) Why earthing is provided? (1.5)[CO4]

PART -B

Q2 (a) Determine i_1, i_2 and i_3 using Nodal analysis for a given circuit shown in Fig.1. (8)[CO1]

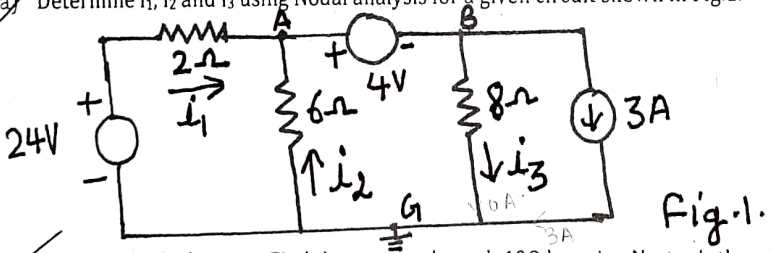

Fig.1.

(b) State Norton's theorem. Find the current through 10Ω by using Norton's theorem for a given circuit shown in Fig.2. (7)[CO1]

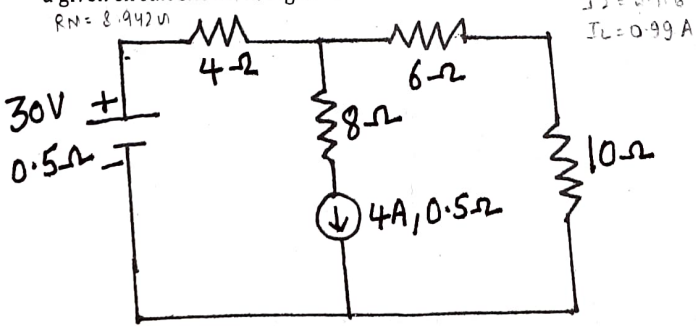

Fig.2

Q3 (a) Find the average and effective values of voltage for sinusoidal waveform shown in Fig.3. (5)[CO2]

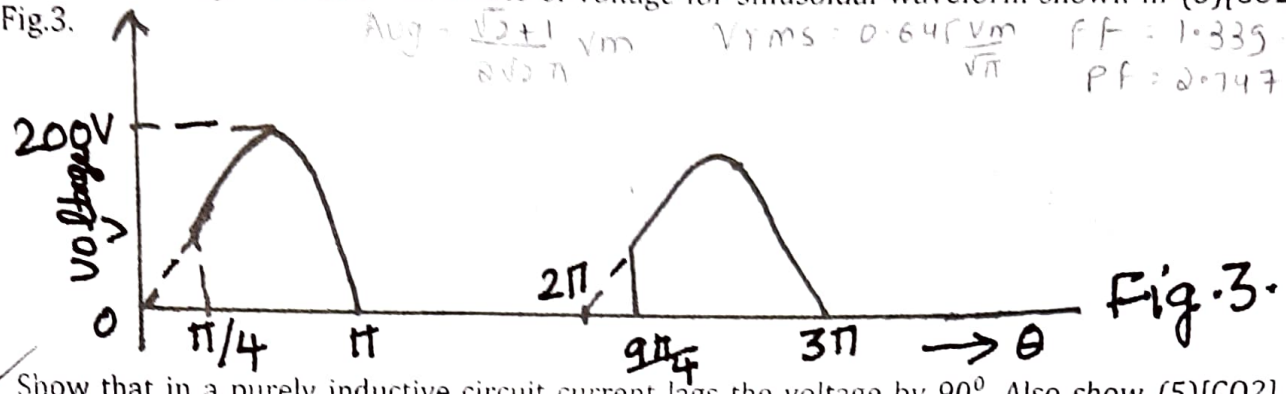

Fig.3.

(b) Show that in a purely inductive circuit current lags the voltage by 90^0. Also show that the average power consumed by it is always zero. (5)[CO2]

(c) Draw resonance curve. Also define selectivity and Quality factor. (5)[CO2]

Q4 (a) Discuss two-wattmeter method for power measurement in three-phase system feeding balanced load. Derive the expression for the power delivered and power factor. (8)[CO2]

(b) A balanced three-phase star load impedance of (5-j10) ohms per phase and is supplied from a balanced three-phase 400V, 50Hz ac supply. Calculate the values for (i) line voltages (ii) phase voltages (iii) line currents (iv) phase currents (v) total power consumption and power factor. (7)[CO2]

Q5 (a) Explain that "The main flux in a transformer remains practically invariable under all conditions of load". (5)[CO3]

(b) Define (i) Voltage regulation (ii) Efficiency and (iii) Eddy current and Hysteresis losses in case of transformer. (5)[CO3]

(c) Explain the working principle of dc motor. (5)[CO3]

Q6 (a) Explain why single-phase Induction Machine is not self-starting using the concept of double field revolving theory. (8)[CO3]

(b) Explain with neat diagram the construction details of three-phase Synchronous Machine. (7)[CO3]

Q7 Write short notes on the followings

(a) Earthing (5)[CO4]

(b) Earth-Leakage Circuit Breaker (ELCB) (5)[CO4]

(c) Power factor improvement methods (5)[CO4]

****