Derive the expression for parallel resonance frequency and also draw the resonance curve for the same. 8

(b) Draw and explain the working of ELCB. 7

6. (a) A three-phase star connected load consists of three identical inductive coils of resistance 20Ω and inductance 0.5H. The supply voltage is 400V, 50 Hz. Calculate : 8

(i) phase current

(ii) line current

(iii) power factor

(iv) total power consumed.

(b) Discuss the different method of power factor improvements. 7

7. Discuss the working of transformer and draw the phasor diagram of transformer for inductive load. Also draw and explain the equivalent circuit of single-phase transformer. 15

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013102

December 2024

B. Tech. (First Semester)

Basic Electrical Technology (ESC-101A)

Time : 3 Hours] [*Maximum Marks : 75*

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

Part A

1. (a) Differentiate the dependent and independent sources. 1.5

(b) Distinguish between a current source and voltage source. 1.5

(c) Define Apparent power and Power factor. 1.5

(d) Define Phase and Phase difference. 1.5

(e) Define Earthing. 1.5

(f) What is the main purpose of commutator in a DC machine ? 1.5

(g) List the advantage of three phase system over a single-phase system. **1.5**

(h) Write the current and voltage relations for delta connected three phase system. **1.5**

(i) List the five house hold application of single-phase induction motor. **1.5**

(j) List the components of a switchgear system. **1.5**

Part B

2. (a) In the figure 1 given below V = 10V, $R_1 = 10\Omega$, $R_2 = 10\Omega$, $R_3 = 15\Omega$, $R_4 = 20\Omega$ and $R_5 = 5\Omega$. The internal resistance of voltage source is 1Ω. Fing the current following through R_5 using Thevenin theorem. **9**

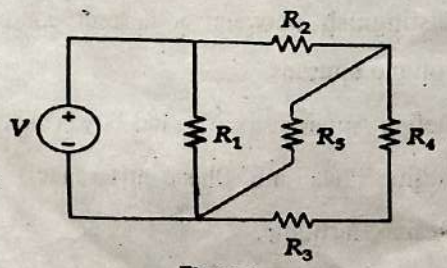

Figure1

(b) State and prove the Maximum power transfer theorem with suitable example. **6**

3. (a) Describe the construction of an induction motor with neat diagrams. **7.5**

(b) Draw and explain the two-wattmeter method of power measurement in a three-phase circuit. **7.5**

4. (a) An a. c. series circuit consisting of a pure resistance of 250, inductance of 0.15H and capacitance of 80μF is supplied from a 230V, 50Hz. Find : **8**

(i) impedance of the circuit,

(ii) the current,

(iii) power drawn by the circuit and

(iv) the power factor.

(b) With a neat circuit diagram Explain the construction and principle of operation of DC Motor. **7**

5. (a) Define the term resonance. What the conditions for parallel resonance occurrence ?