

NATIONAL INSTITUTE OF TECHNOLOGY JAMSHEDPUR

Department of Electrical Engineering
Mid-Semester Examination of Spring Semester 2023-2024

Course Code EE-1201

Course Name Electrical Eng. and Measurement

Program B.Tech. II Sem

Department ME, MME, PIE, & ECM

Instructor Dr. M. K. Sarkar, Dr. S. K. Samal &
Dr. A. K. Prajapati

Duration 2.00 Hrs.

Date/Shift 21/03/2024 (B)

Max. Mark 30

Note: Attempt all the questions. Assume appropriate values whenever is required.

1. For the circuit of Figure 1, find the values of V_1 and V_2 . Also, find the power input/output of the current and voltage sources. **6M**

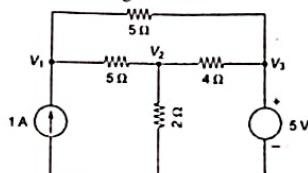


Figure 1

2. State Thevenin's theorem and find the Norton equivalent of the circuit of Figure 2, at terminals ab. **6M**

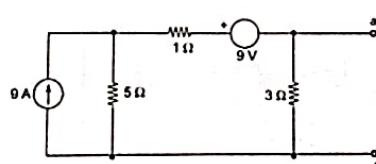


Figure 2

3. Two circuits with impedances of $Z_1 = 10 + j15\Omega$ and $Z_2 = 6 - j8\Omega$ respectively are connected in parallel as shown in Figure 3. If the total current supplied is 15A (RMS); find each branch current and their phase angle w.r.t. the total current. What is the voltage across the combination and its phase angle? **6M**

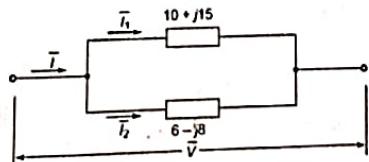


Figure 3

4. Find the average power fed to the circuit of Figure 4 by the current source of 10A (RMS) and the power factor. **6M**

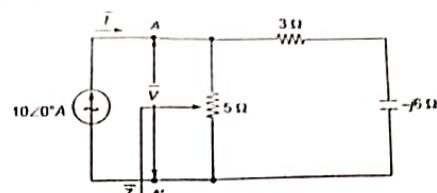


Figure 4

5. Write short note on:
 a) Power Triangle
 b) Impedance diagram
 c) Nodal Analysis **3x2=6M**

NATIONAL INSTITUTE OF TECHNOLOGY JAMSHEDPUR

Department of Electrical Engineering

B.Tech (ME, MME, PIE and ECM), 2023-Batch, End Semester Examination

Subject: Electrical Engineering and Measurement

Subject Code: EE1201

Course Instructors: (Dr.S.K. Samal, Dr.A K. Prajapati and Dr.M.K. Sarkar)

Full marks: 50

Date of Examination: 09/05/2024

Time: 04:00PM to 07:00PM

Attempt All Questions. Assume appropriate values whenever is required.

1. a) By superposition theorem, find the current flowing through the resistance R. [4]

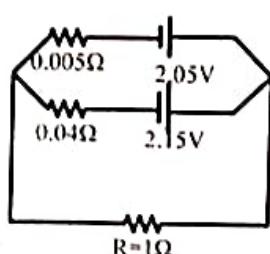


Fig.1.

- b) Find the load impedance (Z_L) in Fig.2, for maximum power transfer to the load, and find the maximum power. [6]

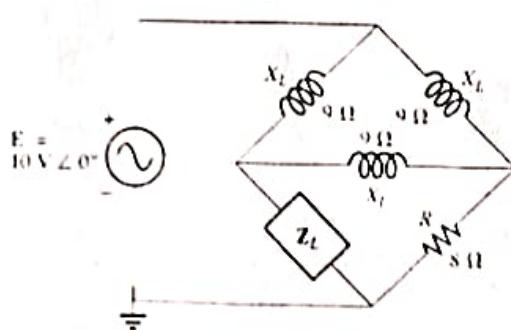


Fig.2.

[4]

2. a) Calculate the various power for the given circuit [Fig.3].

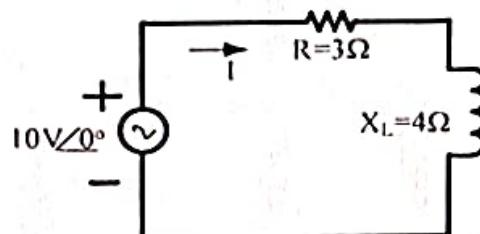


Fig.3.

- b) Three identical coils, each of resistance 10Ω and inductance 42 mH are connected (i) in star and (ii) in delta to a $415V$, 50Hz , 3-phase supply. Determine the total power dissipated and current (phase and line) in each case. [6]

3. a). Write short note on:

- (i) Losses in Transformer (ii) Transformer on-load phasor diagram [2+2=4]

- b) A $3300/250\text{ V}$, 50Hz , single phase transformer is built on a core having an effective cross sectional area of 125cm^2 and 70 turns on the low-voltage winding.

Calculate (i) the value of the maximum flux density (ii) the number of turns on the high voltage winding. [6]

4. a) Write short note on:

- (i) Commutator (ii) No-load Characteristic of DC-Shunt generator [4]

- b) A separately-excited generator develops a no-load e.m.f. of 150V at an armature speed of 20rev/s and a flux per pole of 0.10Wb . Determine the generated e.m.f. when (i) the speed increases to 25 rev/s and the pole flux remains unchanged, (ii) the speed remains at 20 rev/s and the pole flux is decreased to 0.08 Wb , and (iii) the speed increases to 24 rev/s and the pole flux is decreased to 0.07 Wb . [6]

5. a) Write short note on:

- (i) Systematic Error and (ii) Gross Error [2+2=4]

- b) The four arms of a Wheatstone bridge are as follows:

$$AB = 100\Omega; BC = 10\Omega; CD = 4\Omega; DA = 50\Omega$$

The Galvanometer has a resistance of 20Ω and is connected across B and D. A source of 10V d.c. is connected across A and C. Find the current through the Galvanometer. What should be the resistance in the arm DC for 10mA current through the Galvanometer? [6]