

**NATIONAL INSTITUTE OF TECHNOLOGY JAMSHIEDPUR**

**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

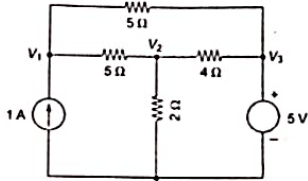
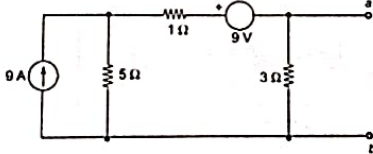
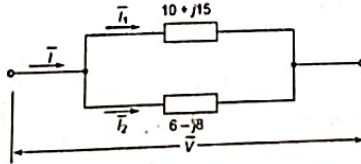
Instructor Dr. M. K. Sarkar, Dr. S. K. Samal & Dr. A. K. Prajapati

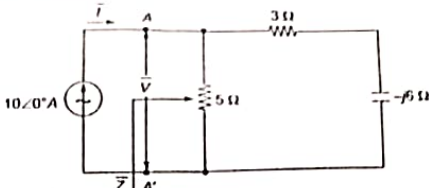
Duration 2.00 Hrs.

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
 <p align="center">Figure 1</p>		
2.	State Thevenin's theorem and find the Norton equivalent of the circuit of Figure 2, at terminals ab.	6M
 <p align="center">Figure 2</p>		
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
 <p align="center">Figure 3</p>		

4.	Find the average power fed to the circuit of Figure 4 by the current source of 10A (RMS) and the power factor.	6M
 <p align="center">Figure 4</p>		
5.	Write short note on: a) Power Triangle b) Impedance diagram c) Nodal Analysis	3x2=6M
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# 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]

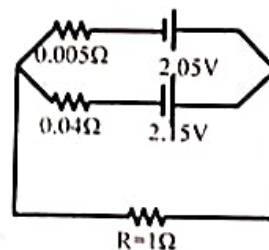


Fig.1.

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

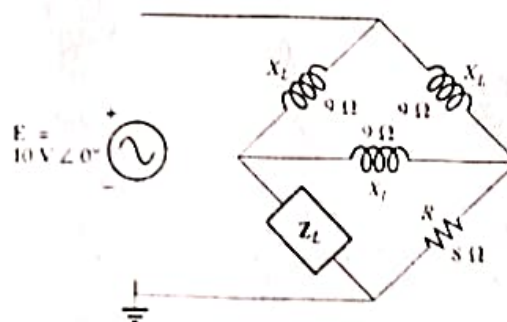


Fig.2.

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

[4]

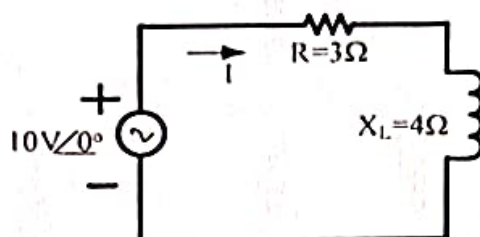


Fig.3.

- b) Three identical coils, each of resistance  $10\ \Omega$  and inductance  $42\ \text{mH}$  are connected (i) in star and (ii) in delta to a  $415\text{V}$ ,  $50\text{Hz}$ , 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  $3300/250\ \text{V}$ ,  $50\text{Hz}$ , single phase transformer is built on a core having an effective cross sectional area of  $125\text{cm}^2$  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  $150\text{V}$  at an armature speed of  $20\text{rev/s}$  and a flux per pole of  $0.10\text{Wb}$ . Determine the generated e.m.f. when (i) the speed increases to  $25\text{ rev/s}$  and the pole flux remains unchanged, (ii) the speed remains at  $20\text{ rev/s}$  and the pole flux is decreased to  $0.08\text{ Wb}$ , and (iii) the speed increases to  $24\text{ rev/s}$  and the pole flux is decreased to  $0.07\text{ Wb}$ . [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  $20\Omega$  and is connected across B and D. A source of  $10\text{V d.c.}$  is connected across A and C. Find the current through the Galvanometer. What should be the resistance in the arm DC for  $10\text{mA}$  current through the Galvanometer? [6]