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**NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA**  
(An Autonomous Institute Affiliated to AKTU, Lucknow)

**B.Tech**

**SEM: I - THEORY EXAMINATION (2025- 2026)**

**Subject: Principles of Electrical Engineering**

**Time: 2 Hours**

**Max. Marks: 50**

**General Instructions:**

**IMP:** Verify that you have received the question paper with the correct course, code, branch etc.

1. This Question paper comprises of **three Sections -A, B, & C**. It consists of Multiple Choice Questions (MCQ's) & Subjective type questions.

2. Maximum marks for each question are indicated on right -hand side of each question.

3. Illustrate your answers with neat sketches wherever necessary.

4. Assume suitable data if necessary.

5. Preferably, write the answers in sequential order.

6. No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.

**SECTION-A**

15

1. Attempt all parts:-

- 1-a. Source Transformation is \_\_\_\_\_(CO1, K1) 1
- (a) Unilateral
- (b) Unique
- (c) Bilateral
- (d) Complicated
- 1-b. The superposition theorem is applicable to \_\_\_\_\_(CO2, K1) 1
- (a) Linear, nonlinear and time variant responses
- (b) Linear and nonlinear resistors only
- (c) Linear responses only
- (d) None of the above
- 1-c. The rms value of sinusoidal varying voltage is \_\_\_\_\_ than its average. (CO3, K1) 1
- (a) More than
- (b) Less than
- (c) Same as
- (d) none
- 1-d. In which direction does the electric field point around a negative point charge? 1
- (CO4, K1)
- (a) Away from the charge.
- (b) Toward the charge.
- (c) Radially outward in all directions.
- (d) Radially inward in all directions.

- 1-e. An ideal voltmeter has \_\_\_\_\_ equivalent resistance and ideal ammeter has \_\_\_\_\_ equivalent resistance. (CO5, K1) 1
- (a) Unity, Unity  
 (b) Zero, infinite  
 (c) Infinite, Zero  
 (d) Zero, Zero

2. Attempt all parts:-

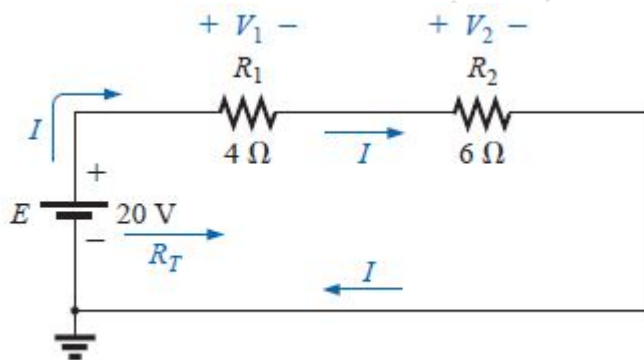
- 2.a. What is the difference between electromotive force and potential difference ? (CO1, K1) 2
- 2.b. State the maximum power transfer theorem and explain its importance.(CO2, K1) 2
- 2.c. In a single phase ac circuit, if  $Z=5+j10$  and current flowing through it is 5A total power consumed will be... (CO3, K2) 2
- 2.d. What is permittivity in the context of dielectrics?(CO4, K1) 2
- 2.e. Define: Calibration.(CO5, K1) 2

**SECTION-B** 15

3. Attempt all parts:-

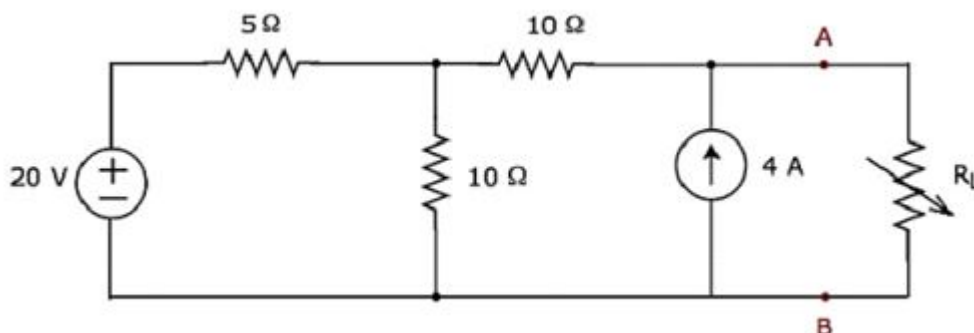
3.a. Answer any one of the following:-

- 3.a.(i) Three resistors are connected in series across a 12 V battery. The first resistance has a value of  $2\ \Omega$ , second has a voltage drop of 4 V and third has a power dissipation of 12W. Calculate the value of the circuit current. (CO1, K2) 3
- 3.a.(ii) Determine the current I, voltages  $V_1$  and  $V_2$  for the circuit shown in Fig. (CO1, K2) 3



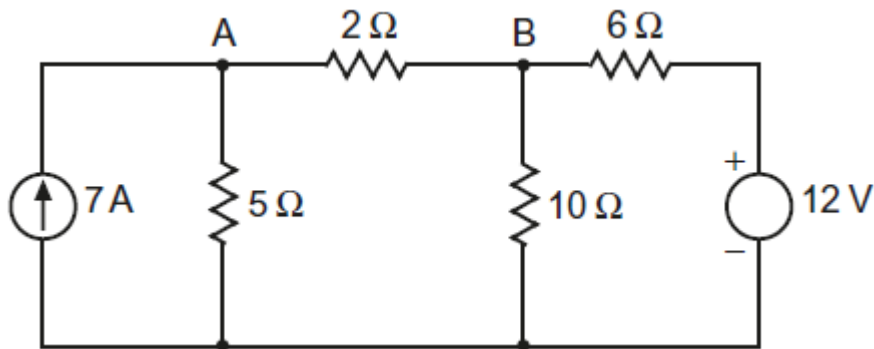
3.b. Answer any one of the following:-

- 3.b.(i) For the network of Fig., determine the value of R for maximum power to R, and calculate the power delivered under these conditions. (CO2, K5) 3



- 3.b.(ii) Using Thevenin's theorem, determine current in  $2\text{-}\Omega$  resistor in the circuit shown in 3

Figure. (CO2, K2)



3.c. Answer any one of the following:-

3.c.(i) Two impedances  $Z_1=10+j5\Omega$  and  $Z_2= 8+j6\Omega$  are connected in parallel across a voltage of  $V= (200+j0)$  V. Calculate circuit current, power factor and reactive power. (CO3, K4) 3

3.c.(ii) Find the relationships between line current and phase current in a delta connected system. (CO3, K3) 3

3.d. Answer any one of the following:-

3.d.(i) Can the permittivity of a material change with temperature or other factors?(CO4, K2) 3

3.d.(ii) Explain charging and discharging of capacitors.(CO4, K2) 3

3.e. Answer any one of the following:-

3.e.(i) Discuss the different thermocouple laws for the measurement of temperature? (CO5, K2) 3

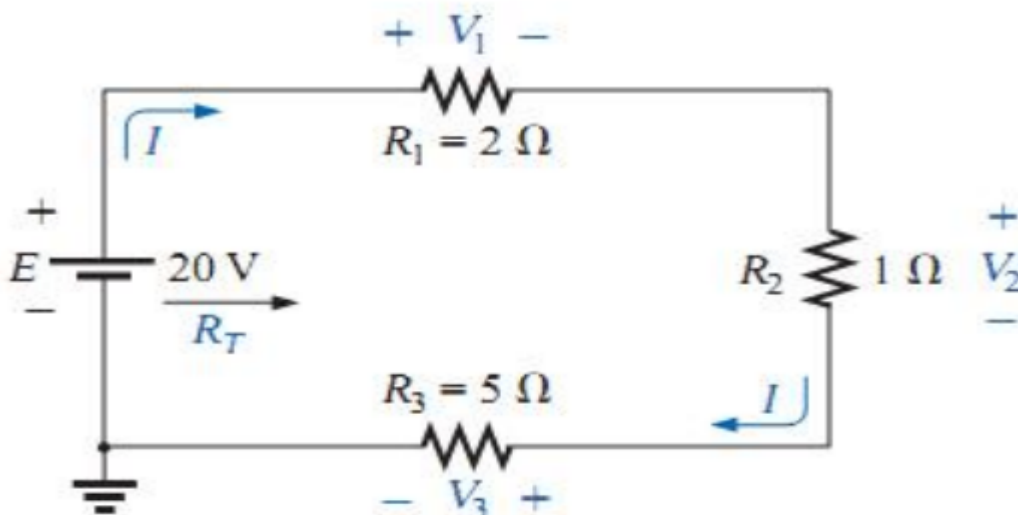
3.e.(ii) What are the different methods of earthing? Explain briefly. (CO5, K2) 3

**SECTION-C** 20

4. Answer any one of the following:-

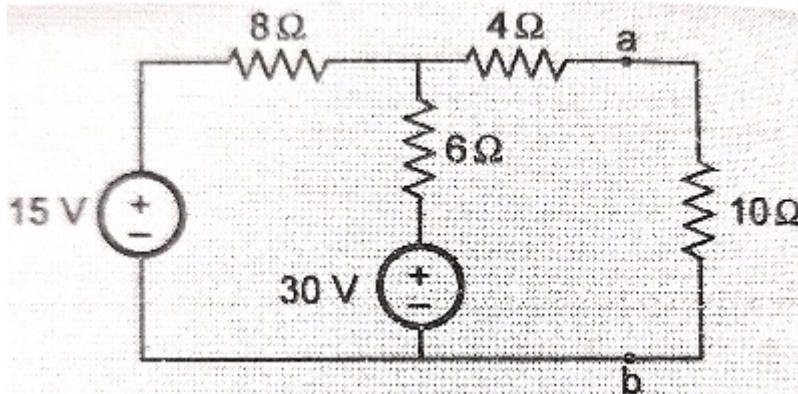
4-a. What is DC Current source? Differentiate between ideal and non-ideal current sources.(CO1, K1) 4

4-b. (a) Find the total resistance for the series circuit of Fig. (b) Calculate the source current  $I_s$ . (c) Determine the voltages  $V_1$ ,  $V_2$ , and  $V_3$ . (d) Calculate the power dissipated by  $R_1$ ,  $R_2$ , and  $R_3$ . (CO1, K2) 4



5. Answer any one of the following:-

- 5-a. Determine current in  $10\ \Omega$  resistance using Nortons theorem in the following network. (CO2, K2) 4



- 5-b. State Thevenins theorem. Explain the duality between Thevenins and Nortons equivalent circuit. (CO2, K2) 4

6. Answer any one of the following:-

- 6-a. If the bandwidth of a resonant circuit is 10 kHz and lower half power frequency is 120 kHz. Find upper half power frequency and quality factor of resonant circuit. (CO3, K2) 4

- 6-b. A 100V, 80W lamp is to operate on 230V, 50Hz ac. Calculate the resistance and inductance to be connected in series with lamp so that lamp is not over run. Lamp is taken as pure resistance (CO3, K3) 4

7. Answer any one of the following:-

- 7-a. What is the electrostatic field, and how does it differ from the electric field? (CO4, K1) 4

- 7-b. Calculate equivalent capacitance if three capacitors are in series with capacitance of 2pF.(CO4, K2) 4

8. Answer any one of the following:-

- 8-a. Explain the working principle of Piezoelectric transducer. How it can be used for force measurement? (CO5, K2) 4

- 8-b. With the help of neat diagram explain the construction and principle of operation of dynamometer type wattmeter. (CO5, K2) 4