

Code: 23EE3301

**II B.Tech - I Semester – Supplementary Examinations - MAY 2025****ELECTRICAL CIRCUIT ANALYSIS - II  
(ELECTRICAL & ELECTRONICS ENGINEERING)**

Duration: 3 hours

Max. Marks: 70

Note: 1. This question paper contains two Parts A and B.

2. Part-A contains 10 short answer questions. Each Question carries 2 Marks.

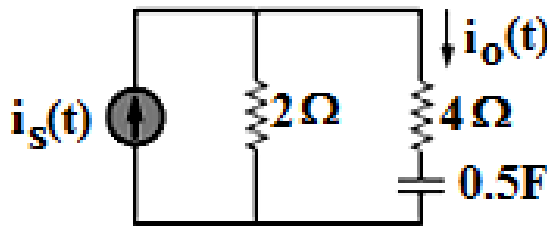
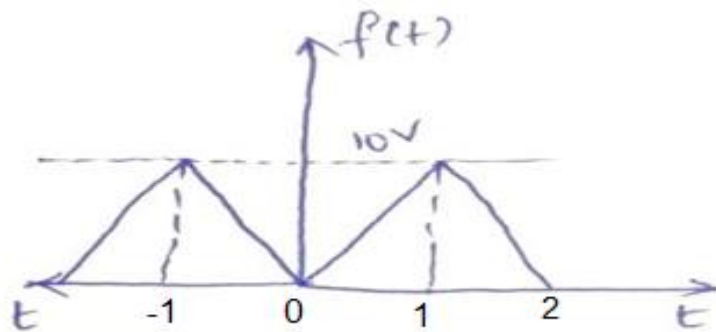
3. Part-B contains 5 essay questions with an internal choice from each unit. Each Question carries 10 marks.

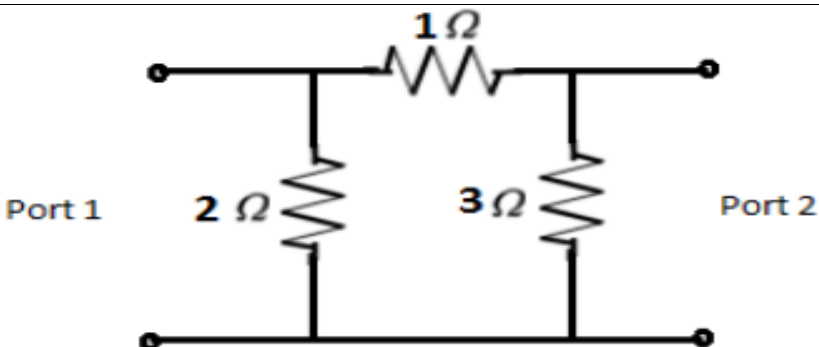
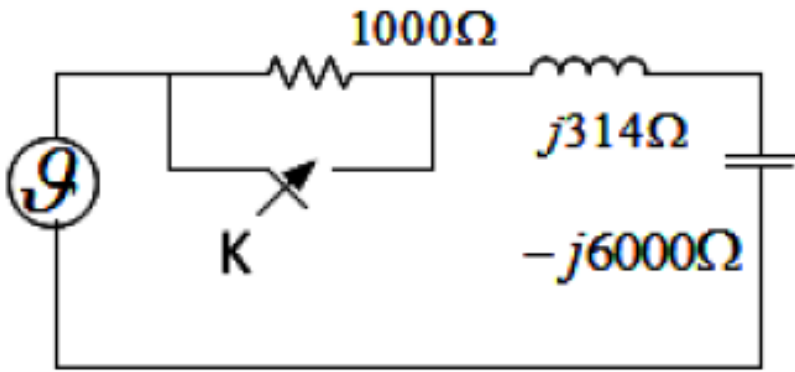
4. All parts of Question paper must be answered in one place.

**PART – A**

|      |                                                                                                                  |
|------|------------------------------------------------------------------------------------------------------------------|
|      |                                                                                                                  |
| 1.a) | State any two applications of Shifting theorem.                                                                  |
| 1.b) | Express the average value of non sinusoidal periodic wave form.                                                  |
| 1.c) | A two-port network is described by $V_1 = I_1 + 2V_2$ , $I_2 = -2I_1 + 0.4V_2$ write the impedance matrix.       |
| 1.d) | What are Z and H-parameters?                                                                                     |
| 1.e) | List the properties of RL impedance function.                                                                    |
| 1.f) | Define Time Constant of RC Circuit.                                                                              |
| 1.g) | State the relationships between line and phase currents and line and phase voltages for a star-connected system. |
| 1.h) | How will you measure the power in three phase unbalanced system?                                                 |
| 1.i) | Classify the filters.                                                                                            |
| 1.j) | What are the applications of filters?                                                                            |

## PART – B

|                                                                                                                 |                                                                                                                              |                                                                |  |  |               |
|-----------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|--|--|---------------|
|                                                                                                                 |                                                                                                                              |                                                                |  |  | Max.<br>Marks |
| UNIT-I                                                                                                          |                                                                                                                              |                                                                |  |  |               |
| 2                                                                                                               | Using the Fourier transform method, find $i_o(t)$ , when $i_s(t) = 10 \sin 2t$ A (Figure 1)                                  |                                                                |  |  | 10 M          |
| <div></div> <p>Figure (1)</p> |                                                                                                                              |                                                                |  |  |               |
| OR                                                                                                              |                                                                                                                              |                                                                |  |  |               |
| 3                                                                                                               | a)                                                                                                                           | Mention the properties of Fourier Transform.                   |  |  | 5 M           |
|                                                                                                                 | b)                                                                                                                           | Find the trigonometric form of fourier series for given signal |  |  | 5 M           |
| <div></div>                 |                                                                                                                              |                                                                |  |  |               |
| UNIT-II                                                                                                         |                                                                                                                              |                                                                |  |  |               |
| 4                                                                                                               | For the network shown in the figure, determine hybrid parameters and using these parameters calculate admittance parameters. |                                                                |  |  | 10 M          |

|                                                                                      |                                                                                                                                                                                                                                               |                                                                                                                                          |      |
|--------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|------|
|                                                                                      |                                                                                                                                                             |                                                                                                                                          |      |
| OR                                                                                   |                                                                                                                                                                                                                                               |                                                                                                                                          |      |
| 5                                                                                    | a)                                                                                                                                                                                                                                            | Derive the condition for Reciprocity and symmetry in a two port Z - parameter representation.                                            | 5 M  |
|                                                                                      | b)                                                                                                                                                                                                                                            | The Z-parameters of a circuit are given by $Z_{11} = 4$ ; $Z_{12} = 1$ ; $Z_{21} = 3$ ; $Z_{22} = 3$ Obtain the transmission parameters. | 5 M  |
| UNIT-III                                                                             |                                                                                                                                                                                                                                               |                                                                                                                                          |      |
| 6                                                                                    | Obtain the expression for $i(t)$ for a series RL circuit when excited by a source of $V(t)=V_m \sin (wt+\theta)$ using Laplace transform.                                                                                                     |                                                                                                                                          | 10 M |
| OR                                                                                   |                                                                                                                                                                                                                                               |                                                                                                                                          |      |
| 7                                                                                    | With the switch open steady state is reached with $V =100 \sin 314 t$ volts. The switch is closed at $t=0$ . The circuit is allowed to come to steady state again. Determine steady state current and complete solution of transient current. |                                                                                                                                          | 10 M |
|  |                                                                                                                                                                                                                                               |                                                                                                                                          |      |

| <b>UNIT-IV</b> |                                                                                                                                                                                                                                                                                                                                                                                                       |      |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 8              | Show that the total power in a 3-phase, 3-wire system using the two-wattmeter method of measurement is given by the sum of the wattmeter readings. Draw a connection diagram. Draw a phasor diagram for the two-wattmeter method for a balanced load. Use the phasor diagram to derive a formula from which the power factor of a 3-phase system may be determined using only the wattmeter readings. | 10 M |
| <b>OR</b>      |                                                                                                                                                                                                                                                                                                                                                                                                       |      |
| 9              | Three impedances of $(7+j4) \Omega$ , $(3+j2) \Omega$ and $(9+j2) \Omega$ are connected between neutral and the R, Y and B phases. The line voltage is 440V, Calculate <ol style="list-style-type: none"> <li>The line currents</li> <li>The current in the neutral wire.</li> <li>Find the power consumed in each phase and the total power drawn by the circuit.</li> </ol>                         | 10 M |
| <b>UNIT-V</b>  |                                                                                                                                                                                                                                                                                                                                                                                                       |      |
| 10             | Explain the technical concept of Low pass and High pass filters.                                                                                                                                                                                                                                                                                                                                      | 10 M |
| <b>OR</b>      |                                                                                                                                                                                                                                                                                                                                                                                                       |      |
| 11             | Design a constant-k high-pass T and $\Pi$ sections filters having a cut-off frequency of 1000 Hz and infinite frequency characteristic impedance of $200 \Omega$ .                                                                                                                                                                                                                                    | 10 M |