**PVP 23**

Code: 23EE3301

**II B.Tech - I Semester – Regular / Supplementary Examinations**
**NOVEMBER 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.

BL – Blooms Level CO – Course Outcome

# PART – A

| | | BL | CO |
|---|---|---|---|
| 1.a) | How do you find the average and RMS values of a non-sinusoidal periodic waveform using Fourier coefficients? | L2 | CO1 |
| b) | What is the relationship between the trigonometric and exponential forms of a Fourier series? | L2 | CO1 |
| c) | Express the relationship between Z and Hybrid (h) parameters. | L2 | CO2 |
| d) | Why h-parameters are called as 'hybrid' parameters? | L2 | CO2 |
| e) | Distinguish between the natural response and the forced response of a circuit. | L2 | CO3 |
| f) | What is the condition for a series RLC circuit to be underdamped, overdamped and critically damped? | L2 | CO3 |
| g) | List the advantages of a three-phase system over a single-phase system. | L2 | CO4 |
| h) | How can the power factor of a balanced three-phase load be determined from the readings of two watt meters? | L2 | CO4 |
| i) | Define the cut-off frequency for a filter. | L1 | CO5 |

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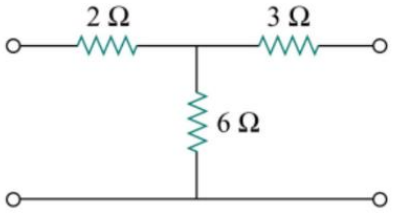
| j) | Draw the equivalent circuit of a typical band-pass filter. | L3 | CO5 |

## PART – B

| | | | BL | CO | Max. Marks |
|---|---|---|---|---|---|
| **UNIT-I** | | | | | |
| 2 | | Solve the Laplace transform of the following functions: a) $f(t)=e^{-at}\sin(\omega t)$ b) $f(t)=t^2u(t-1)$ | L3 | CO1 | 10 M |
| **OR** | | | | | |
| 3 | | Determine the Laplace transform of the periodic sawtooth waveform. | L3 | CO1 | 10 M |
| **UNIT-II** | | | | | |
| 4 | | Find the z-parameters of the two-port network shown in the figure.   | L3 | CO2 | 10 M |
| **OR** | | | | | |
| 5 | a) | Derive the expressions for converting Y-parameters into ABCD (transmission) parameters. | L3 | CO2 | 5 M |
| | b) | Determine the transmission parameters for a two-port network, Given Z-parameters are $Z=\begin{bmatrix}10 & 5\\ 3 & 8\end{bmatrix}$. | L3 | CO2 | 5 M |
| **UNIT-III** | | | | | |
| 6 | | A series RLC circuit with R=5 Ω, L=1 H and C=0.25 μF is excited by a 100 V DC source at t=0. Obtain the expression for the current i(t) using the Laplace transform approach. | L4 | CO3 | 10 M |

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|---|---|---|---|---|---|
| **OR** | | | | | |
| 7 | a) | Develop an expression for the step response of a series R-C circuit. | L4 | CO3 | 5 M |
| | b) | Derive the general expression for the current response of a series R-L circuit excited by a sinusoidal voltage source, $V = V_m \sin(\omega t + \theta)$. | L4 | CO3 | 5 M |
| **UNIT-IV** | | | | | |
| 8 | a) | Derive the relationship between line currents and phase currents in a star -connected three-phase balanced system. | L3 | CO4 | 5 M |
| | b) | The two-wattmeter method produces readings of 1500 W and 750 W when connected to a delta-connected load. Calculate the total active power, total reactive power and the power factor of the load. | L3 | CO4 | 5 M |
| **OR** | | | | | |
| 9 | | A balanced star-connected load with an impedance of (12 + j15) Ω per phase is connected to a three-phase, 400 V, 50 Hz supply. Determine the line currents, power factor and total active power consumed by the load. | L4 | CO4 | 10 M |
| **UNIT-V** | | | | | |
| 10 | a) | Design a constant-k high-pass T-section and π-section filter with a cut-off frequency of 3000 Hz and a nominal characteristic impedance of 500 Ω. | L4 | CO5 | 5 M |
| | b) | Explain the characteristics of a Constant-K high-pass filter with a neat diagram. | L3 | CO5 | 5 M |
| **OR** | | | | | |
| 11 | | Design a constant-k low pass filter having cut-off frequency of 4000 Hz and a nominal characteristic impedance of 500 Ω. | L4 | CO5 | 10 M |