EEA01- BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

UNIT - 1

1.	What is the difference between a circuit and a network?
2.	Define active and passive elements
3.	List the active and passive elements of an electric circuit
4.	Define the dependent source of a circuit.
5.	What is node and principal node?
6.	Define the branch of a circuit.
7.	Define series and parallel connection.
8.	What is meant by open circuit and short circuit?
9.	Define Ohm's law.
10.	What are the limitations of Ohm's law?
11.	Define Kirchhoff's laws.
12.	Distinguish between mesh and loop of a circuit.
13.	What is mesh analysis?
14.	When is mesh analysis preferred to solve the currents?
15.	How is mesh analysis performed?
16.	What is node analysis?
17.	What is the fundamental principle behind nodal analysis, and how does it relate to Kirchhoff's Current Law (KCL)?
18.	Why is one node chosen as the reference (ground) node in nodal analysis, and how does this simplify calculations?
19.	How does nodal analysis handle dependent and independent current sources?

20.	In a DC circuit, how would you modify nodal analysis if a voltage source is connected between two non-reference nodes?
21.	What are the advantages of nodal analysis compared to mesh analysis for circuits with multiple nodes and current sources?
22.	Can nodal analysis be used for circuits containing only voltage sources? If so, how? If not, why?
23.	How does nodal analysis extend to AC circuits using phasors and complex impedances?
24.	When performing nodal analysis in an AC circuit with sinusoidal sources, why do we use impedance instead of resistance?
25.	How does nodal analysis handle circuits containing both series and parallel RLC elements in AC steady-state analysis?
26.	In an AC circuit with multiple frequency sources, can nodal analysis be applied directly? If not, what modifications are required?
27.	What is source transformation in electrical circuits?
28.	Why do we use source transformation in circuit analysis?
29.	What is the condition for two circuits to be equivalent in source transformation?
30.	How do you convert a voltage source into an equivalent current source?
31.	How do you convert a current source into an equivalent voltage source?
32.	What are the limitations of source transformation?
33.	Can you use source transformation in circuits with multiple sources? How?
34.	Is source transformation applicable in AC circuits? What changes in the transformation equations?
35.	If a voltage source has an internal resistance of zero, can it be transformed into a current source? Why or why not?
36.	Can source transformation be applied to dependent sources?
37.	What is Star-Delta transformation?
38.	Why is Star-Delta transformation needed in circuit analysis?
39.	What are the conditions under which a Star network can be converted into a Delta network?

40.	What is the difference between Star (Y) and Delta (Δ) networks?
41.	Can any three-terminal network be converted between Star and Delta configurations?
42.	What happens to the total resistance of a circuit when a Star is transformed into a Delta?
43.	How does Star-Delta transformation help in simplifying complex circuits?
44.	Can Star-Delta transformation be used for both AC and DC circuits?
45.	In which electrical applications is Star-Delta transformation commonly used?
46.	Why is the Star connection preferred for power distribution in transmission lines?
47.	Why is AC preferred for long-distance power transmission?
48.	What is resonance in an AC circuit?
49.	Explain the phase relationship between voltage and current in a capacitor.
50.	What are the three types of power in an AC circuit?
51.	What happens to inductive reactance if frequency increases?
52.	Define capacitive reactance and give its formula.
53.	What is reactance? How is it different from resistance?
54.	What happens to capacitive reactance if frequency increases?
55.	Give the formula for resonance frequency in an LC circuit.
56.	What is a transformer, and why is it used in AC circuits?
57.	State the Superposition Theorem and explain its significance in electrical circuits.
58.	What are the limitations of applying the Superposition Theorem in circuit analysis?
59.	Why does the Superposition Theorem only apply to linear circuits?
60.	In the Superposition Theorem, what happens to the other independent sources when analyzing the effect of a single source?
61.	Can the Superposition Theorem be used to analyze power in a circuit? Justify your answer.

62.	State the Maximum Power Transfer Theorem and its practical importance.
63.	What is the condition for maximum power transfer in DC circuits with resistive loads?
64.	In an AC circuit with a complex load impedance, how is the Maximum Power Transfer condition modified?
65.	How does the Maximum Power Transfer Theorem relate to real-world applications like communication systems and electrical power networks?
66.	What is the efficiency of power transfer when a load receives maximum power according to the Maximum Power Transfer Theorem?
61	State thevenin's theorem
62	Draw the equivalent circuit for thevenin's theorem.
63	Explain the procedure involved in finding the thevenin's resistance.
64	Explain the steps involved in finding the thevenin's voltage.
65	Tell the formula for finding the load current from thevenin's equivalent circuit.
66	State norton's theorem
67	Draw the equivalent circuit for norton's theorem
68	Explain the procedure involved in finding the norton's resistance.
69	Explain the steps involved in finding the norton's current.
70	Tell the formula for finding the load current from norton's equivalent circuit.

EEA01- BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

UNIT - 2

DC Machines and AC machines

1.	What is the main difference between AC and DC machines?
2.	Why do we use a commutator in a DC machine?
3.	What are the different types of DC generators and their applications?
4.	What is the function of slip rings in an AC machine?
5.	How does a three-phase induction motor start?
6.	What is meant by armature reaction in DC machines?
7.	What are the losses in an electrical machine? How can they be minimized?
8.	Why is the field winding of a synchronous machine excited by DC instead of AC?
9.	What happens when a DC motor is connected to an AC supply?
10.	What is meant by back EMF in a DC motor?
11.	Why is a capacitor used in a single-phase induction motor?
12.	What is meant by the slip of an induction motor?
13.	Why is a starter required for a DC motor?
14.	What are the advantages of a three-phase induction motor over a single-phase induction motor

EEA01- BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

UNIT – 3

1.	What is a mechanical translational system?
2.	What is a transfer function?
3.	What is the role of damping in a mechanical translational system?
4.	How is the equation of motion derived for a mechanical translational system?
5.	Can you derive the transfer function for a mass-spring-damper system?
6.	What is the standard form of a transfer function for a simple mass-spring-damper system?
7.	What is the effect of varying the spring constant in the system?
8.	How is the equation of motion derived for a rotational system?
9.	What is the role of torsional damping in a mechanical rotational system?
10.	What is the significance of the natural frequency in a rotational system?

EEA01- BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

UNIT – 4

1.	What are the main types of batteries, and how do they differ in terms of chemistry and application?
2.	Explain the working principle of a lithium-ion battery. How does it differ from a lead-acid battery?
3.	What are the advantages and disadvantages of nickel-cadmium (Ni-Cd) and nickel-metal hydride (Ni-MH) batteries?
4.	What factors affect the lifespan of a battery, and how can battery life be extended?
5.	How does the charging and discharging process affect battery performance?
6.	What is power factor, and why is it important in electrical systems?
7.	Explain the difference between active, reactive, and apparent power in relation to power factor
8.	What methods can be used to improve power factor in industrial and commercial setups?
9.	What are the key factors to consider when designing a battery backup system?
10.	How do UPS (Uninterruptible Power Supply) and inverters differ in terms of battery backup applications?

EEA01- BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

UNIT - 5

1.	What is the Discrete Fourier Transform (DFT) and how is it different from the Continuous Fourier Transform (CFT)?
2.	explain the mathematical formulation of the DFT?
3.	What are the applications of DFT in real-world scenarios?
4.	How does the Fast Fourier Transform (FFT) improve the efficiency of computing the DFT?
5.	Explain the Cooley-Tukey algorithm used in the FFT.
6.	What is the significance of zero-padding in DFT computations?
7.	How is the DFT used in digital signal processing?
8.	What are the common pitfalls or limitations of the DFT?
9.	How does windowing affect the results of a DFT?
10.	Can you explain the concept of spectral leakage in DFT and how it can be mitigated?
11.	What are the key characteristics of a **Butterworth filter**?
12.	What is an **IIR filter**, and how does it differ from an FIR filter?
13.	What is the effect of increasing the **order** of a Butterworth filter?

14.	Why do we prefer **Butterworth filters** for audio processing applications?
15.	Why is the Butterworth filter called a **maximally flat** filter?
16.	What is the general form of a **Butterworth filter transfer function**?
17.	What is the role of **pre-warping** in the bilinear transformation method?
18.	What is the significance of the **cutoff frequency** in filter design?
19.	How do you convert an **analog Butterworth filter** to a digital filter?
20.	What is the **bilinear transformation** method in IIR filter design?
21.	What is a Finite Impulse Response (FIR) filter?
22.	What are the advantages of using FIR filters over IIR filters?
23.	What is the Fourier series representation of an FIR filter?
24.	How causality is brought-in in the Fourier series method of filter design?
25.	What are the disadvantages of Fourier series method?
26.	What are the steps involved in designing an FIR filter using the fourier series method?
27.	What is the basis for Fourier series method of design? Why truncation is necessary?
28.	What are the two concepts that lead to the Fourier series or window method of designing FIR filters?
29.	List the three well known design techniques for linear phase FIR filters.
30.	Explain the concept of frequency sampling in FIR filter design?

31.	What is the multiplication of the window function w(n) with h(n) is equivalent ?
32.	$h(n)=1-\frac{2\left\|n-\frac{M-1}{2}\right\|}{M-1}$? Which window has a time domain sequence
33.	What happens to the width of each side lobes with an increase in M.
34.	What happens to the height of each side of the lobe with increase in the value of M.
35.	Which window includes a ripple factor
36.	Mention a windowing method with a main-lobe width twice that of a rectangular window
37.	A technique that involves defining a portion of data to solve problems involving arrays or strings is called ?
38.	Which is a windowing method with a main-lobe width that is twice that of a rectangular window
39.	What are the uses of windowing ?
40.	Explain different types of windowing techniques ?