Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech S1 (S,FE) S2 (S,FE) Degree Examination December 2025 (2019 Scheme)

Course Code: EST130

Course Name: BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING (2019 -Scheme)

- *Use separate answer sheets for Part 1 and Part 2*
- *No separate minimum marks are required to pass.*

PART I: BASIC ELECTRICAL ENGINEERING

Max. Marks: 100 Duration: 3 Hrs.

PART A

Answer all questions, each carries 4 marks Marks

1 State and explain Kirchhoff's law. (4)

2 A 200Ω resistor, 150mH inductor and a 2μF are in series. Find the total impedance in polar form at 400Hz. Draw the impedance triangle. (4)

3 A sinusoidal current has an amplitude of 3A and a radian frequency of 90rad/s. Find the rms value of the current and the instantaneous current at 20ms. (4)

4 Compare electric and magnetic circuits. (4)

5 Derive the relation between line current and phase current for a balanced 3 phase delta connected load. (4)

PART B

Answer one full question from each module, each question carries 10 marks.

MODULE 1

6 Find the current I by using nodal voltage analysis for the circuit shown in the Figure 1. (10)

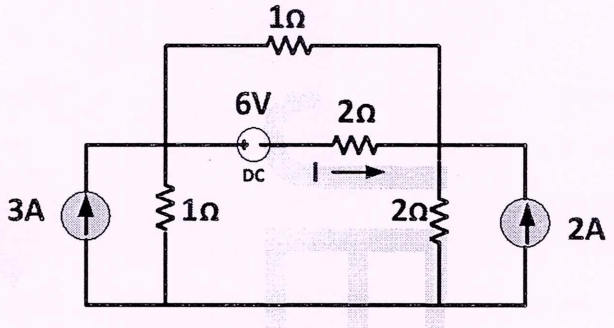

Figure 1

OR

7 Find the equivalent resistance between A and B for the network shown in Figure 2. (10)

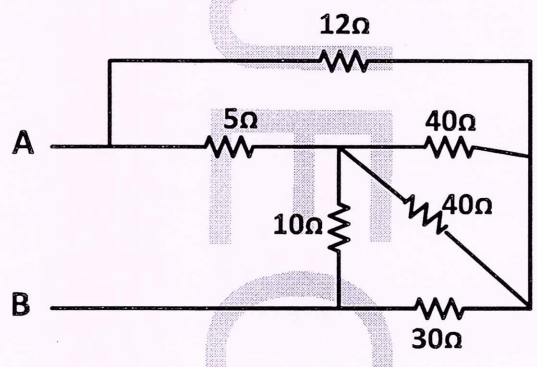

Figure 2

MODULE 2

8 a Two coils A and B, of 600 and 100 turns respectively are wound uniformly around a wooden ring having a mean circumference of 30 cm. The cross-sectional area of the ring is 4 cm^2. Calculate (a) the mutual inductance of the coils and (b) the e.m.f. induced in coil B when a current of 2 A in coil A is reversed in 0.01 second. (6)

b Derive an expression for coefficient of mutual coupling in magnetic circuit. (4)

OR

9 a Obtain the rms value and average value of an alternating voltage with amplitude V_m. (8)

b Sketch one cycle of $v = 50sin(100\pi t - 30)V$ for the period beginning at t=0s. (2)

MODULE 3

10 Two impedances $Z_1 = (5 + j7)\Omega$ and $Z_2 = (10 - j5)\Omega$ are connected in series across 200V supply. Determine the voltage across each impedances, current, active power, apparent power and power factor of the circuit. (10)

OR

11 a A balanced star connected load consumes a power of 3kW at a power factor of 0.8 lagging when connected to a 3 phase, 173.2V, 50 Hz supply. If the line current is 12.5A, calculate the resistance (6)

b and the reactance in each branch of the load. (4)

Discuss the advantages of three phase system over single phase system.

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PART 2:

BASIC ELECTRONICS ENGINEERING

PART A

Answer all questions, each carries 4 marks Marks

1		Compare passive and active electronic components.	(4)
2		Explain the principle of avalanche breakdown.	(4)
3		Describe the role of different capacitors in RC coupled amplifier	(4)
4		Explain the block diagram of a public address system.	(4)
5		Explain the working principle of an antenna? Mention any two types of antennas.	(4)

PART B

Answer one full question from each module, each question carries 10 marks.

MODULE 4

6	a.	Explain how carbon composition resistors are colour coded. Three 2.2 KΩ fixed resistors are connected in series. This combination is to be replaced by a single fixed resistor of nearest standard value and ± 5% tolerance. Find the 4 band colour code of this resistor.	(6)
	b.	Examine the formation of depletion region in a PN junction. Explain how the width of the depletion region is affected by applied bias in a PN junction diode.	(4)

OR

7	a.	What are the different types of variable capacitors? Quote a few applications of variable capacitors.	(5)
	b.	Define the parameters α and β of a transistor. A transistor has a value of β equal to 19. Find its value of α.	(5)

MODULE 5

8	a.	Explain the working of a bridge rectifier with the help of circuit diagram and waveforms.	(5)
	b.	Draw and explain the block diagram of an electronic instrumentation system.	(5)

OR

9	a.	Explain the frequency response of an RC coupled Amplifier	(5)
	b.	With a neat circuit diagram, describe the working of a simple zener voltage regulator.	(5)

MODULE 6

10	a.	What do you mean by the term 'frequency band' in a radio communication system. List down the commonly used frequency bands in a radio communication system and their applications.	(5)
	b.	Define amplitude modulation. Write the expression for amplitude modulated wave and plot the frequency spectrum and list the various frequency components in it.	(5)

OR

11	a.	Draw and explain the block diagram of a superheterodyne receiver.	(6)
	b.	Explain the concepts of cell splitting and frequency reuse in a cellular communication system.	(4)

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