



Reg No.: \_\_\_\_\_

Name: \_\_\_\_\_

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**  
 B.Tech S1 (Special Improvement) Examination January 2021 (2019 scheme)

Course Code: EST1301

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

**PART I: BASIC ELECTRICAL ENGINEERING**

Max. Marks:50

Duration: 90 min

**PART A**

*Answer all questions, each carries 4 marks.*

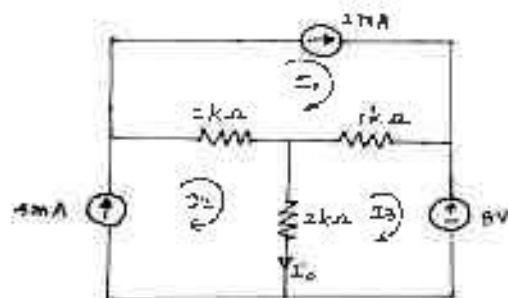
- 1 Derive the expression for rms value of a sinusoidal wave form.
- 2 Define self inductance of a coil and derive an expression for the same.
- 3 Derive an expression for energy stored in a capacitor.
- 4 Prove that in a purely inductive circuit, current lags behind the applied voltage by 90 degrees and the power consumed is zero.
- 5 With the help of circuit diagram and phasor diagram, derive the relation (5x4=20) between line and phase voltage in a three phase star connected system.

**PART B**

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

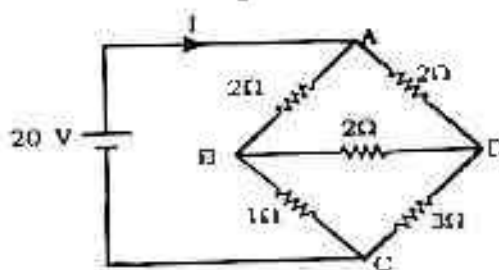
**Module-I**

- 6 Find  $I_o$  in the circuit using mesh current analysis. (10)



**OR**

- 7 Find the source current  $I$  in the figure using star-delta transformation. (10)



**Module-II**

- 8 a) An iron ring of mean diameter 10cm is uniformly wound with a coil of 2000 turns. When a current of 0.25A is passed through the coil a flux density of 0.4T is set up in the iron ring. Find i) the magnetizing force and ii) the relative permeability of iron. (4)
- b) Define i) self-inductance of a coil ii) coefficient of coupling and iii) relative permeability (6)

**OR**

- 9 Two coils A and B have 12000 turns and 14000 turns respectively. 80% of the flux produced by coil A links with coil B. A current of 6A in coil A produces 0.05mwb in coil A while the same current in coil B produces 0.085mwb in coil B. Calculate i) Mutual inductance and ii) Coefficient of coupling. (10)

**Module-III**

- 10 Coil A having resistance of  $20\ \Omega$  and inductance of  $0.2\ \text{H}$  is connected in series with another coil B having resistance of  $15\ \Omega$  and inductance of  $0.1\ \text{H}$ . The two coils in series are fed from 220V, 50 Hz, single phase power supply. Determine (i) the voltage across each coil (ii) power dissipated in each coil (iii) power factor of the whole circuit. (10)

**OR**

- 11 Three similar coils connected in star draw a total power of 1.5kW at a power factor of 0.2 lagging from a 3 phase 400V, 50Hz power supply. Calculate the resistance and inductance of each coil (10)

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## PART II: BASIC ELECTRONICS ENGINEERING

Duration: 90 min

Max. Marks: 50

## PART A

*Answer all questions, each carries 4 marks.*

12. What are the different types of capacitors? Find the value of the capacitor coded as 103. (5x4=20)
13. Sketch the energy band diagram of conductors, insulator and semiconductors.
14. With a neat diagram explain the working of an instrumentation system.
15. What is biasing? List the advantages of potential divider biasing.
16. Discuss the need for modulation.

## PART B

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

## Module-IV

17. a) Give the specifications of a resistor. The colour bands marked on a resistor are Green, Blue, Orange and Gold. What are the minimum and maximum resistance values expected from that resistance? (5)
- b) Explain the working of a diode under forward and reverse biased condition. Draw its VI characteristics? (5)

OR

18. a) Differentiate between avalanche breakdown and zener breakdown. (4)
- b) Narrate the working of an NPN transistor. (6)

## Module-V

19. a) Explain the working of a bridge rectifier. (5)
- b) Describe the block diagram of a public addressing system. (5)

OR

20. a) Define line regulation and load regulation. (4)
- b) Draw the frequency response curve of a CE amplifier and explain. (6)

## Module-VI

21. a) Describe the basic principles of a cellular communication system. (5)
- b) Write the expression for an AM wave. Draw the frequency spectrum and find the associated bandwidth? (5)

OR

22. a) What are the advantages of GSM network? (4)
- b) Explain the roles of BTS, BSC and MSC in a GSM network. (6)

