R22 Regulation *Subject code:4B1AL*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A' Grade)

B.Tech I Semester Regular Examinations, April 2023

Basic Electrical Engineering

(Common to IT and CSE(DS))

Maximum Marks: 60 Date:15.04.2023 Duration: 3 hours

Note:
1. **This question paper contains two parts A and B.**
2. **Part A is compulsory which carries 10 marks. Answer all questions in Part A.**
3. **Part B consists of 5 Units. Answer any one full question from each unit.**
4. **Each question carries 10 marks and may have a, b, c, d as sub questions.**

Part-A

All the following questions carry equal marks (10x1M=10 Marks)

1. a State Superposition theorem.
   b List out the advantages of parallel circuit over series circuit.
   c Show that the power consumed by a pure inductor is zero.
   d List the advantages of AC system over DC system.
   e Why a transformer cannot operate on a DC supply?
   f Compare an ideal and practical transformer.
   g Write the EMF equation of a DC generator.
   h What is slip speed in induction motor?
   i How fuse protects an electrical apparatus?
   j What does an earthing ensure?

Part-B

Answer All the following questions. (5X10M=50Marks)

2 A) A circuit consists of two parallel resistors having resistance of 20Ω & 30Ω respectively. Connected in series with 15Ω. If current through 15Ω resistor is 3A, Find i) current in 20Ω & 30Ω resistors, ii) Voltage across the whole circuit. iii) The total power & power consumed in all resistance. (6)
B) State and explain Ohm's law with an illustration. List its limitations. (4)

OR

3 A) State and explain the Thevenin's theorem with an example. (5)
B) Give a brief account of Kirchoff's laws. (5)

4 A) How the power consumed by a pure capacitor is zero. (3)
B) A balanced 3 phase, star connected load of 150kW takes a leading current of 100A with a line voltage of 1100V, 50Hz. Find the circuit constants of load per phase. (7)

OR

5 The three arms of a three-phase load each comprise an inductor of resistance 25Ω & an inductance 0.15H in series with a 120μF capacitor. The supply voltage is 415V,50Hz. Calculate the line current & total power in watts, when the three arms are connected delta. (10)

6 Explain the principle and construction of a single-phase transformer. List its advantages and disadvantages. (10)

OR

7 A) What are the losses in transformer? Obtain the condition for maximum efficiency. (5)
B) Derive an expression for the electromotive force induced in the secondary winding of a transformer. (5)

8 A) Explain the principle of operation of DC motor. (5)
B) Derive EMF equation of a DC generator. (5)

OR

9 A) Explain the Torque-Slip characteristics of 3-phase induction motor. (5)
B) What are the functions of yoke, armature, poles and brushes in a DC generator? (5)

10 Explain the operation of the following (a) Miniature circuit breaker (b) Molded case circuit breaker. (10)

OR

11 Describe in detail about the important parts, working principle and applications of lead-acid battery. (10)