Code No: 181AB **R22**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech I Year I Semester Examinations, September - 2023

BASIC ELECTRICAL ENGINEERING

(Common to CSE, IT, CSIT, CE(SE), CSE(CS), CSE(DS), CSD)

Time: 3 Hours **Max. Marks: 60**

Note: This question paper contains two parts A and B.
i) **Part- A** for 10 marks, ii) **Part - B** for 50 marks.

- Part-A is a compulsory question which consists of ten sub-questions from all units carrying equal marks.
- Part-B consists of **ten questions** (numbered from 2 to 11) **carrying 10 marks each**. From each unit, there are two questions and the student should answer one of them. Hence, the student should answer five questions from Part-B.

PART- A

(10 Marks)

1.a)	What are the limitations of Ohm's law?	[1]
b)	State Norton's theorem.	[1]
c)	Write any two advantages and disadvantages of 3-phase system.	[1]
d)	Define power factor of an AC circuit.	[1]
e)	Write the applications of auto-transformer.	[1]
f)	Define the regulation of a transformers.	[1]
g)	Why the core of the machine is laminated?	[1]
h)	Why single-phase induction motor is not self-starting?	[1]
i)	What is the function of MCCB?	[1]
j)	What are the characteristics of batteries for longer life?	[1]

PART - B

(50 Marks)

2.a) What is difference between a current source and a voltage source? Explain about ideal and practical voltage and current sources.

b) A series R-C circuit consists of a resistor of 10 Ω and capacitor of 0.1 F with a constant voltage of 20 V, is applied to the circuit at t=0. Obtain the current equation. Determine voltage across resistor and capacitor. [5+5]

OR

3.a) Obtain the Transient Response of series R-L circuit with DC excitation.

b) Three resistances 2 ohms, 4 ohms and 6 ohms are connected in series across 24V supply. Find the voltages across three resistors and current through each resistor. Also calculate the total power consumed in the circuit. [5+5]

4.a) Derive expression of resonance frequency for series RLC circuit.

b) Derive the relation between line current and phase current in case of three phase delta connected balanced load. [6+4]

OR

5.a) A voltage of 125 V, 50 Hz is applied across a non-inductive resistor connected in series with a capacitor. The current in the circuit is 2.2 A. The power loss in the resistor is 96.8 W and that in the capacitor is negligible. Calculate the resistance and the capacitance.

b) With the help of phasor diagram, show that the current drawn by the R-L series circuit lags the applied voltage by an angle θ with respect to voltage. [5+5]

6.a) Draw and explain the equivalent circuit of a single-phase transformer.

b) The efficiency of a 10 kVA, 2000/400 V single phase transformer at unity power factor is 97% at rated load and at half rated load. Determine the transformer core losses and copper losses. [5+5]

OR

7.a) Explain briefly the principle of working of a transformer and show the voltage ratio of the primary and secondary windings is same as their turn's ratio.

b) Find the efficiency of a 150 kVA transformer at 25% of its full load at 0.8 power factor lagging if copper losses are 1600 W at full load and iron losses are 1400 W. [5+5]

8.a) With the help of a neat sketch, explain the construction and working principle of a DC machine.

b) The frequency of the e.m.f. in the stator of a 4-pole induction motor is 50 Hz, and that in the rotor is 2 Hz. What is the slip and at what speed is the motor running? [5+5]

OR

9.a) Explain the concept behind the generation of rotating field in a three-phase induction motor.

b) Explain the construction and working of a three-phase induction motor. [5+5]

10.a) Explain the working principle of SFU and MCB.

b) What are the drawbacks of low power factor? Describe how it is improved? [5+5]

OR

11.a) Explain the components of LT switch gear in detail.

b) Briefly explain following: (i) Need of Earthing (ii) Battery backup. [5+5]

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