**Code No: 181AB**
**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**
**B. Tech I Year I Semester Examinations, March/April - 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 is ideal voltage source? | [1] |
| b) | Define KVL. | [1] |
| c) | What is active power? | [1] |
| d) | Define average value of sinusoidal quantity? | [1] |
| e) | What is a step up Transformer? | [1] |
| f) | Define regulation of a transformer. | [1] |
| g) | What type of material is used for brushes of a d.c machine? | [1] |
| h) | How many windings are present at the time of starting a single phase Induction motor? | |
| | | [1] |
| i) | What is the full form of M.C.C.B? | [1] |
| j) | What is the energy consumed by 1000 watts heater in 3 hours? | [1] |

## PART-B

**(50 Marks)**

2.a)      State and explain Thevenin's theorem.
   b)      For the bridge network shown in figure below, find the current in the 5 resistor, and its direction, by using Thevenin's theorem.                  [5+5]
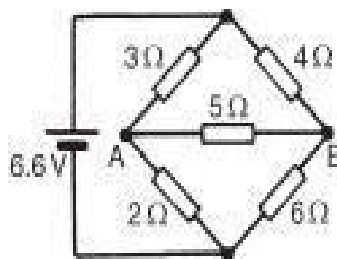
3.a) Derive an expression for transient current in R-L series circuit excited by a d.c source.
  b) Explain the V-I relation of R, L and C elements. [6+4]

4. The following table gives the corresponding values of current and time for a half cycle of alternating current.

| Time t (msec) | 0 | 0.5 | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 | 3.5 | 4.0 | 4.5 | 5.0 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Current i (A) | 0 | 7 | 14 | 23 | 40 | 56 | 68 | 76 | 60 | 5 | 0 |

Assuming the negative half cycle is identical in shape to the positive half cycle, plot the waveform and find (a) the frequency of the supply, (b) the instantaneous values of current after 1.25 ms and 3.8 ms, (c) the peak or maximum value, (d) the mean or average value, and (e) the r.m.s value of the waveform. [10]

**OR**

5.a) Derive an expression for resonance frequency of R-L-C series circuit connected to an alternating supply of variable frequency.
  b) A coil has an inductance of 40 mH and negligible resistance. Calculate its inductive reactance and the resulting current if connected to a 240 V, 50 Hz supply. [6+4]

6.a) Derive an e.m.f equation of a single phase transformer.
  b) A 4500 V/225 V, 50 Hz single-phase transformer is to have an approximate e.m.f. per turn of 15 V and operate with a maximum flux of 1.4 T. Calculate (i) the number of primary and secondary turns and (ii) the cross-sectional area of the core. [6+4]

**OR**

7.a) What is an Auto transformer? Give its advantages and state its applications.
  b) What are the advantages of 3-phase transformers? Draw various schemes of 3-phase transformer connections. [5+5]

8.a) Explain the constructional details of a d.c machine. Explain the working of a d.c generator.
  b) Draw the various characteristics of a d.c shunt motor. [6+4]

**OR**

9.a) Explain the working of a 3-phase Induction motor with a neat sketch.
  b) The stator of a 3-phase, 4-pole induction motor is connected to a 50 Hz supply. The rotor runs at 1455 rev/min at full load. Determine (i) the synchronous speed and (ii) the slip at full load. [6+4]

10.a) Explain the working of (i) SFU (Switch Fuse Unit) (ii) ELCB.
  b) What are the advantages of improving the power factor of a system? [6+4]

**OR**

11.a) What are the differences between primary cells and secondary batteries?
  b) Explain different types of wires used in domestic as well as commercial buildings. [4+6]

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