Code: 20ES1101

I B.Tech - I Semester – Regular / Supplementary Examinations – APRIL 2022

BASIC ELECTRICAL & ELECTRONICS ENGINEERING

(Common to CIVIL, CSE, IT)

Duration: 3 hours   Max. Marks: 70

Note: 1. This paper contains questions from 5 units of Syllabus. Each unit carries 14 marks and have an internal choice of Questions.
2. All parts of Question must be answered in one place.

UNIT – I

1. a) Determine the value of resistance between the terminals A-B (R_{AB}) for the network shown in Figure.1?   7 M
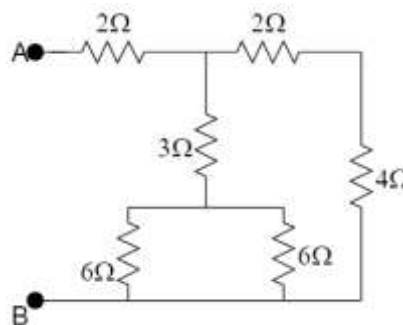

Figure.1

b) Apply the superposition theorem to the circuit shown in Figure.2 to find the current flowing through 6 Ω resistor.   7 M
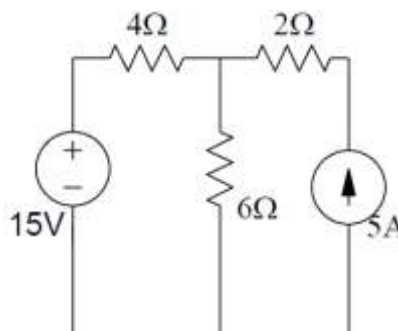

Figure. 2

<div align="center">OR</div>

2. a) Apply the mesh analysis on the circuit shown in Figure.3 and find the current I flowing in the 2Ω resistor.   7 M
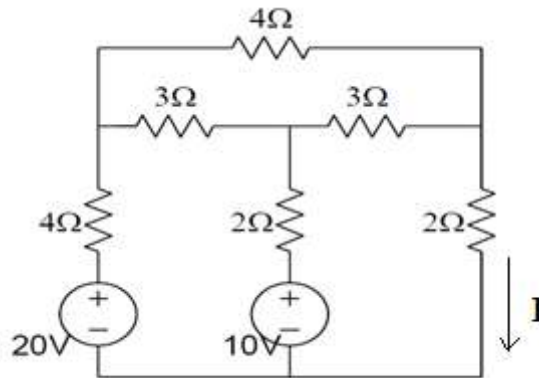

<div align="center">Figure.3</div>

b) Simplify the circuit shown in Figure. 4 using the Norton's theorem and determine the current through 4 Ω resistor.   7 M

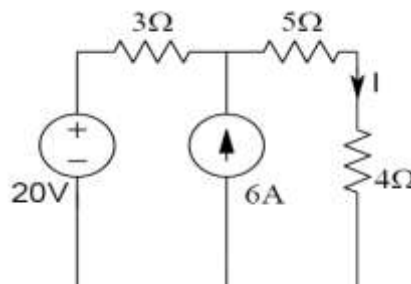<div align="center">Figure. 4</div>

UNIT – II

3. a) (i) Draw the constructional features of a DC machine and give their functions.   5 M

    (ii)Why is commutator employed in DC machines?   2 M

    b) Derive emf equation of a DC generator (or DC machine).   7 M

<div align="center">OR</div>

4. a) Explain the working principle of a DC motor with appropriate sketches.   7 M

    b) Derive an expression for the speed of a DC motor in terms of back emf and flux per pole.   7 M

UNIT-III

5. a) Develop an expression for the emf induced in a transformer winding. Show that the emf induced per turn in primary is equal to the emf per turn in secondary.   7 M

    b) Determine the efficiency of a single-phase transformer by utilizing the open circuit and short circuit tests. Draw the circuit diagrams for each test and mention uses of these tests.   7 M

OR

6. a) Illustrate the constructional details of single phase transformer.   7 M

    b) Explain the working principle of a three phase induction motor with relevant sketches.   7 M

UNIT – IV

7. a) Draw the circuit diagram of Half-wave rectifier and derive the expressions for average value and R.M.S value.   7 M

    b) Generalize the working of Zener diode as a voltage regulator.   7 M

OR

8. a) Explain the working of p-n junction diode in forward and reverse bias conditions. Draw its V-I characteristics. 7 M

    b) What is the use of filter capacitor? With suitable example, differentiate the operation and output of rectifiers with and without filter capacitor. 7 M

UNIT – V

9. a) Obtain the expression for gain of the non- inverting configuration of op-amp. 7 M

    b) Distinguish the different characteristics of ideal and practical op-amp. 7 M

OR

10. a) What is a voltage follower? Explain its operation with necessary diagrams and expressions. 7 M

    b) Explain how an op-amp can be used as an inverting amplifier, non-inverting amplifier? Derive expressions for output voltages. 7 M