Roll No. of candidate

2022

B.Tech. 2nd Semester (Regular) End-Term Examination

BASIC ELECTRICAL ENGINEERING

(New Regulations & New Syllabus)

Full Marks – 70   Time – Three hours

The figures in the margin indicate full marks for the questions.

Answer question No. 1 and any *four* from the rest.

1. · Choose the correct answer from the following: (10 × 1 = 10)

    (i)   The circuit having the same properties in either direction is known as

        (a)   unilateral   (b)   reversible

        (c)   bilateral   (d)   none of the above

    (ii)   A network having one or more sources of emf is known as ———— network.

        (a)   Passive   (b)   linear

        (c)   active   (d)   nonlinear

    (iii) Which of the following statement is true?

        (a)   Norton's resistance is same as Thevenin's equivalent resistance

        (b)   Norton's equivalent is the current equivalent of the network

        (c)   The load is connected in parallel to Norton's equivalent resistance and Norton's current source

        (d)   (a), (b) and (c)

    (iv)   Three resistances of R Ω each are connected in delta Its equivalent star will comprises resistances of value,

        (a)   3R each   (b)   R/3

        (c)   R each   (d)   3R, R, R/3

[Turn over

(v) When a pure inductance is connected to a ac sources, the voltage ———.
The current through it by ———

(a) leads, 90°   (b) lags, 90°

(c) lags, 45°   (d) leads ,45°

(vi) When a phasor is multiplied by j and –j, it is rotated through ———
in anti-clock wise direction respectively,

(a) 90°, 270°   (b) 90°, 90°

(c) 90°, 180°   (d) 270°, 90°

(vii) In a balance 3-phase , star connected system, the phase voltage are
$100\angle 0°$, $100 \angle 120°$ and $100 \angle 240°$. Then the three line voltage will be
——— and ———

(viii) The dc generator works on the principle of

(a) Fleming's left hand rule

(b) Fleming's right hand rule

(c) Lenz's law

(d) None of the above

(ix) In a circuit electrical transformer transfer power from one circuit to another
circuit without change in

(a) voltage   (b) current

(c) frequency   (d) turns

(x) The permanent magnet moving coil meter can measure

(a) only ac quantities

(b) only dc quantities

(c) both ac and dc quantities

(d) only very high frequency quantities
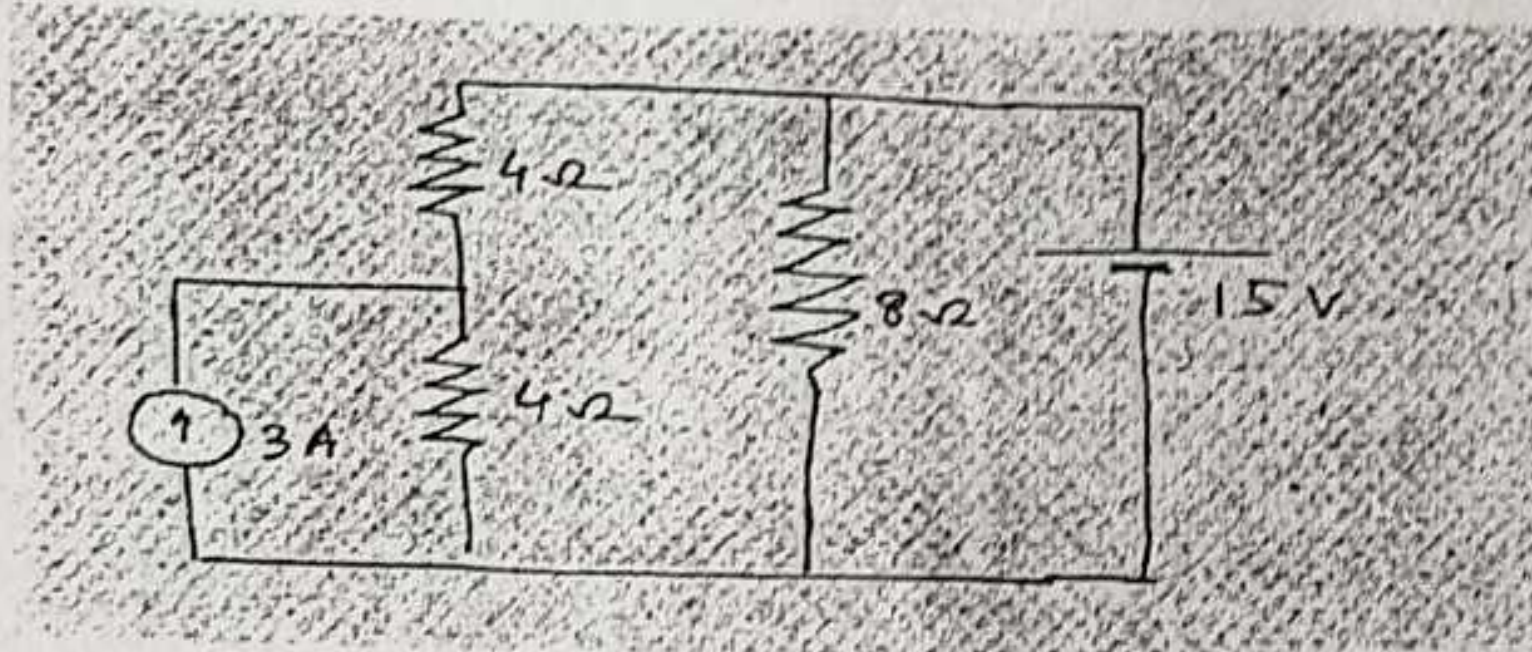
2. (a) Differentiate between the followings with example   (2 × 2 = 4)

(i) Unilateral and Bilateral Circuit

(ii) Linear and Nonlinear Circuit.

(b) State and prove maximum power transfer theorem.   (6)

(c) Using Superposition theorem determine the current following through 8 Ω resistor. (5)

3. (a) State and explain Norton's theorem with neat diagram. Why Norton's theorem is consider as dual of Thevenin's theorem. (4+1=5)

(b) Determine the equivalent resistance between X and Y using star-delta transformation (5)
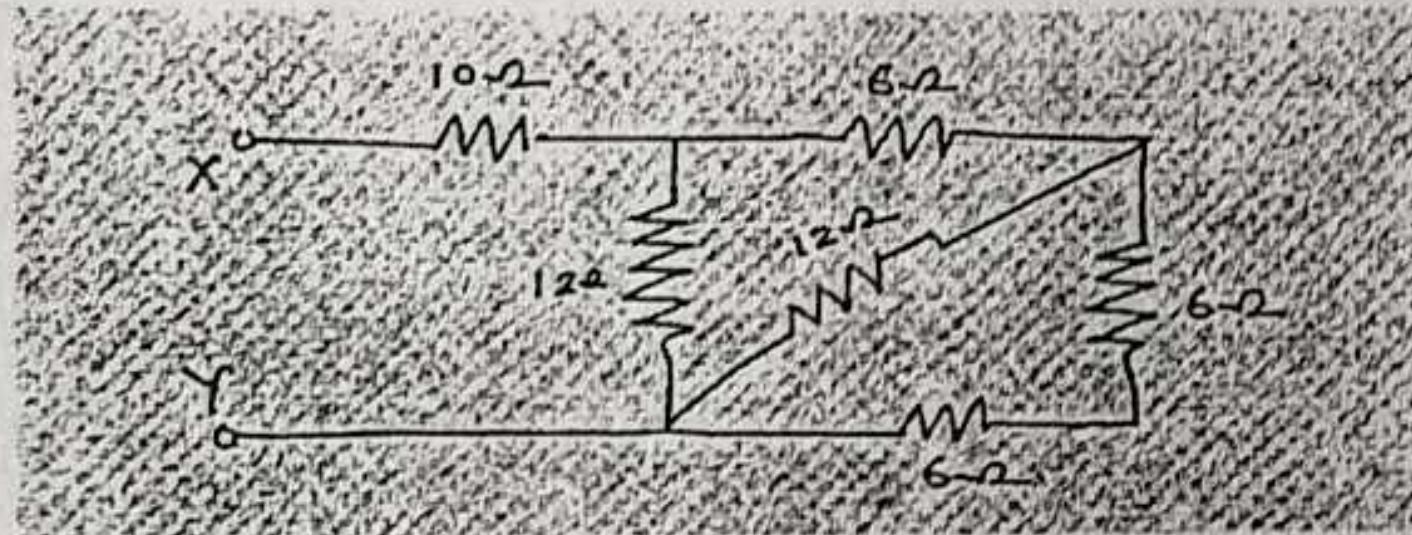
(c) Using mesh analysis determine the current following through 10 Ω resistance (5)
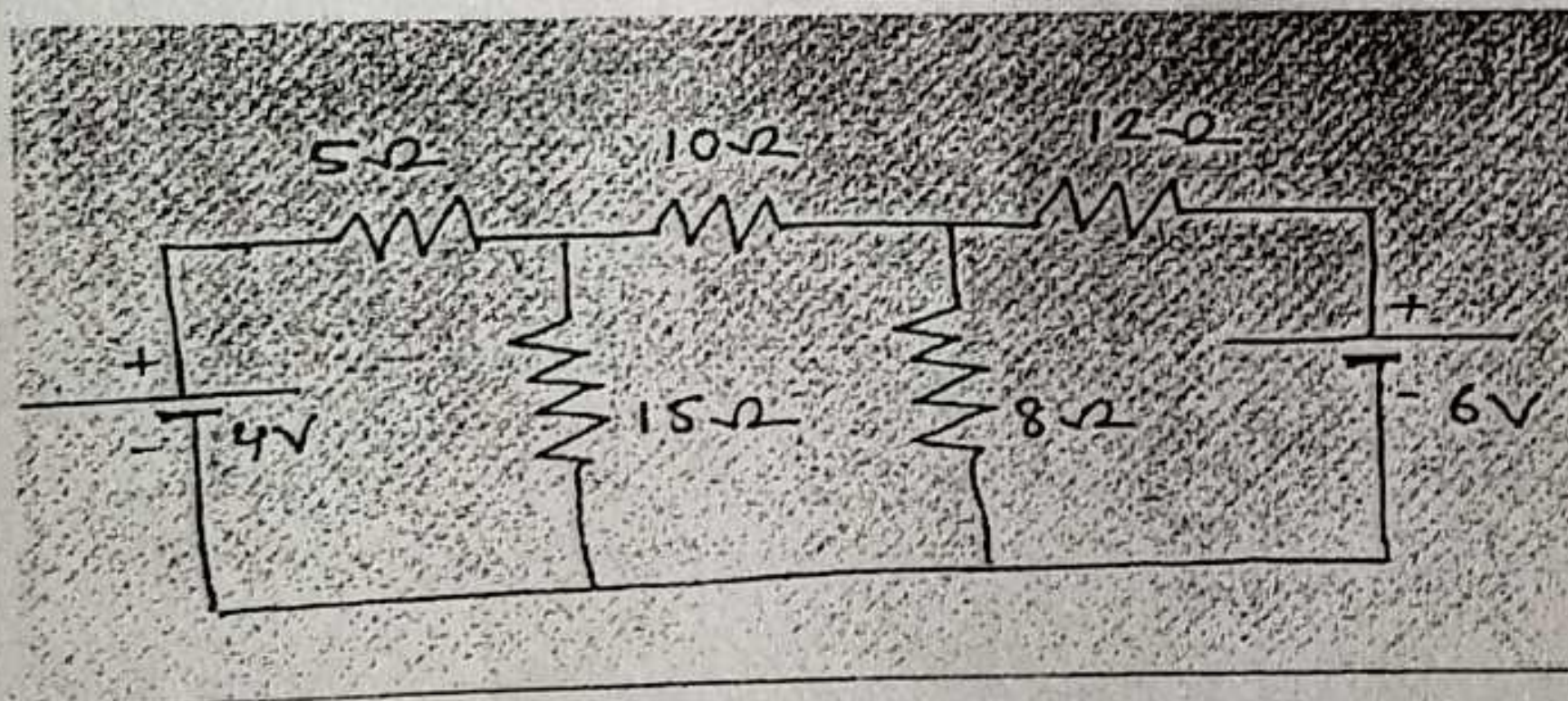
4. (a) In case of three phase balanced system answer the followings

(i) Derive the relation between line voltage, line current with phase voltage and phase current both star and delta system.

(ii) Deduce the expression of three phase active power

(iii) Draw the phasor diagram considering inductive load for star and delta system (5+2+2=9)

3

(b) A 400V ac source is applied to three star connected identical load consisting of 40 Ω resistance and 30 Ω inductive reactance Find (i) Line current, (ii) Apparent power, (iii) active power consumed $(2 \times 3 = 6)$

5. (a) State the working principle transformer and deduce the expression of emf induce in both primary and secondary winding $(3+3=6)$

(b) What is the significancy of back emf of DC motor. Classify DC machine based on its connection. (9)

6. (a) What are essentials torques of an indicating instrument? (3)

(b) A moving coil instrument has an internal resistance of 25 Ω. The instrument gives full scale deflection when a current of 100mA flows through it. The same instrument is to be used as an ammeter of range 0-30A and as voltmeter of range 0-300 V. Show how it can be done. $(2 \times 2 = 4)$

(c) Explain the following with respect to attraction type moving iron instrument. $(2 \times 4 = 8)$

    (i) Working principle

    (ii) Construction

    (iii) Operation

    (iv) Advantage and disadvantage

7. (a) Mention the importance of fuse. What are advantages and disadvantages of fuse $(1+2=3)$

(b) What is the purpose of earthing? Explain briefly any method of earthing with neat diagram. $(2+4=6)$

(c) Draw the wiring diagram of a circuit consists of one lamp, one fan and one 3-pin socket which are controlled by individual switches. (3)

(b) Mention different types of cable according to the insulation used. (3)

_____