DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

UNIVERSITY INSTITUTE OF ENGINEERINGAND TECHNOLOGY, CSJM UNIVERSITY, KANPUR

(Subject Name: Basic Electrical & Electronics Engineering)
(Subject Code: ESC-S101) [Branch: ECE]

Semester: 2022-23 (Odd Semester) **Year: 1st Year (2K22)**

End Semester Examination Feb-2023

Time: 3 h **Maximum marks: 50**

All questions are compulsory

Section-A

Note: 10 marks (10 questions of 1 mark each)

1. The Shockley's diode current equation is _____
2. Reverse saturation current in a Silicon PN junction diode is depend on_____
3. In the forward active region, the transistor acts like a_____
4. Expression of the controlling torque in repulsion type instrument is _____
5. The measure of a coil's ability to produce flux is called_____
6. If there are n nodes, then _____ node-voltage equations are required.
7. Voltage division rule applicable for _____ circuit.
8. The Power factor in series AC circuits at resonance is _____
9. The phase difference between voltage and current in purely inductive circuit is _____
10. A voltage across a series resistor circuit is proportional to_____

Section B

Note: 20 marks (5 questions of 4 marks each)

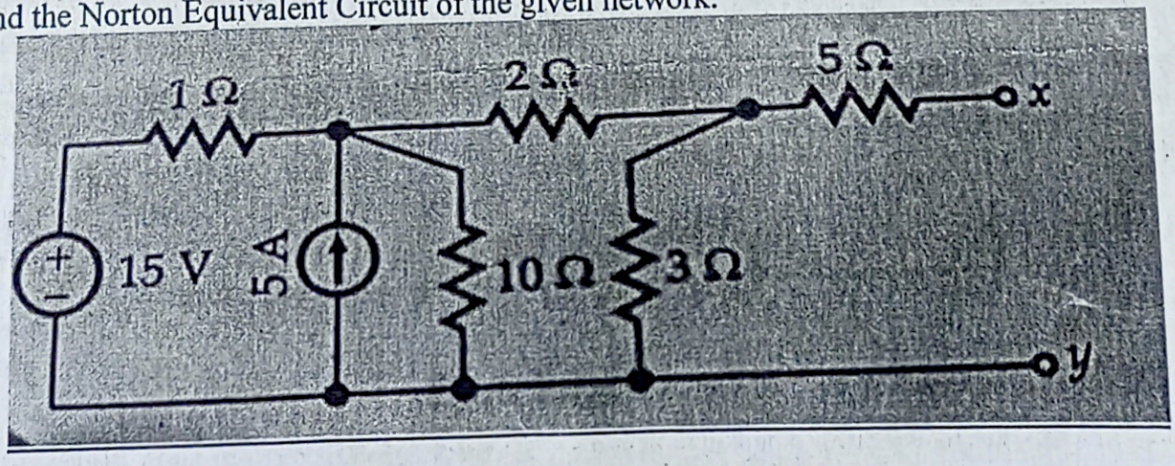
1. What is PN junction diode resistance? Show that the junction resistance for a Si or Ge diode is gives the equation $r_j = 26/I_F$, where I_F is the forward current in mA.

2. Sketch and Explain the basic action of NPN transistor in common collector (CC) configuration and its input-output V-I characteristics.

3. In a purely capacitive a. c. circuit, the applied voltage is $v(t) = V_m \sin(\omega t)$; ω=anguler frequency. Derive an expression for circuit current i(t), and instantaneous power p(t).

4. Derive the equation for star-delta and delta-star transformation and when do you use.

5. Find the Norton Equivalent Circuit of the given network.



P.T.O.

Section C

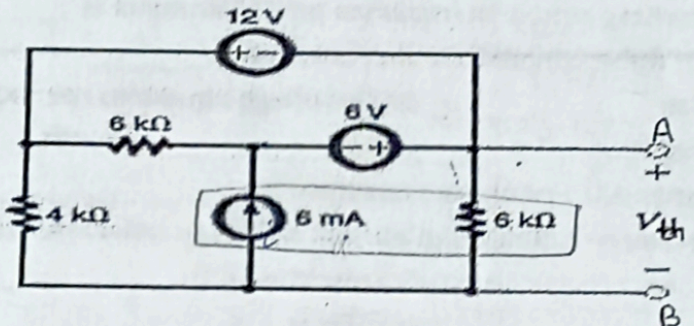
Note: 20 marks (2 questions of 10 marks each, Each question should have two parts)

1.(a) Derive an expression for the resonant frequency and impedance at resonance of a circuit consisting of Tank Circuit. Also derive the quality factor at resonance.

1.(b) A 230V and 50 Hz is applied to a coil of 0.06H inductance and 25Ω resistance connected in series with a 6.8μF capacitor. Find (a) Current drawn by the circuit (b) Phase angle b/w voltage and currents (c) Total power consumed (d) Power factor (e) Quality factor of the circuit.

2.(a) Explain operating principle and construction of Energy Meter. Also enlist the advantages and disadvantages.

2.(b) Find the Thevenin's equivalent circuit across the terminal A-B in the circuit shown in fig.



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Semester: 2022-23 (Odd Semester) **Year: 1st Year (2K22)**

First mid Semester Examination Dec - 2022

Time: 1.5 h **Maximum marks: 30**

All questions are compulsory

Section A

Note: 9 marks (9 questions of 1 mark each)

1. Ideal PN junction diode offers...low.....resistance.
2. The Energy gap for GaAs semiconductor is.....1.....ev.
3. Transition capacitance is also called as.....
4. The reverse leakage current I_{CBO} flows in the.....open.....leads.
5. A transistor amplifier has high output impedance because ..high resistance
6. Transistor works as a closed switch when emitter junction is..f.....biased and collector junction is..f....biased.
7. The real diode dose not behaves as perfect conductor and insulator due to..low...ckt...diode...resistance
8. The most commonly used transistor configuration is...p-n-p.....(CB).....
9. In Zener diode, for currents greater than the knee current, the v-i curve is almost..linear.....

Section B

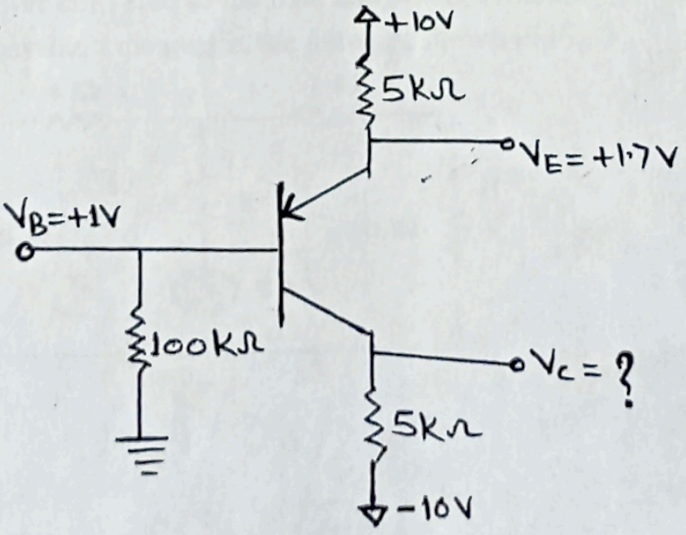
Note: 9 marks (3 questions of 3 marks each)

1. Explain the transition and diffusion capacitance of PN junction diode. Also derive the mathematical expression for diffusion capacitance.
2. Sketch and explain working of the common base configuration of **PNP** transistor. Also derive total collector current in terms of current gain $\mathbf{I_C = (\alpha / 1- \alpha)\, I_B + (1 / 1- \alpha)\, I_{CO}}$.
3. Drive the expression for rectification efficiency and ripple factor of Centre-Tap Full wave rectifier.

Section C

Note: 12 marks (2 questions of 6 marks each)

1. In a full wave rectifier, the load resistance $\mathbf{R_L = 1K\Omega}$. Each diode has a forward dynamic resistan $\mathbf{r_d = 10\Omega}$. The voltage across half of the secondary winding is **220sin314t** volts. Determine___
   (a) D.C. voltage across the load. (b) Current flowing through the load.
   (c) Rectification efficiency. (d) Ripple factor of the rectifier.
2. In CC Configuration determine the voltage Vc and current amplification factor α, β in given circuit.



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(Subject Name: Basic Electrical & Electronics Engineering)
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Semester: 2022-23 (Odd Semester) **Year: 1st Year (2K22)**

Second mid Semester Examination Jan - 2023

Time: 1.5 h **Maximum marks: 30**

All questions are compulsory

Section A

Note: 9 marks (9 questions of 1 mark each)

1. If there are 5 branches and 4 nodes in graph, then the number of mesh equations that can be formed are 3.
2. If there are 8 nodes in network, we can get 7 number of equations in the nodal analysis.
3. The Superposition Theorem is not applicable for _____.
4. Norton's Theorem is also known as the dual of Thevenin's Theorem.
5. The maximum power is delivered from a source to load when the load resistance is equal the source resistance.
6. The star equivalent resistance of 3 resistors having each resistance = 5 Ω is _____
7. Star connection is also known as Y-network
8. If there are 3 10V sources connected in parallel then on source transformation _____
9. The loop which does not contain any other inner loop is known as _____

Section B

Note: 9 marks (3 questions of 3 marks each)

1. State and prove the Superposition Theorem .
2. Using mesh analysis method find current through 10Ω resistor in the network shown in Fig.1
3. Find *Io* using Norton's theorem in the network shown in Fig.2

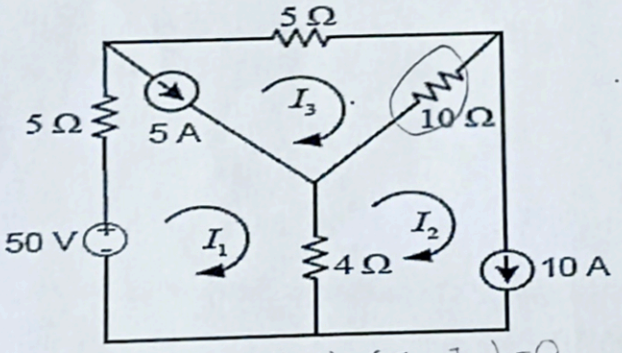

Fig.1

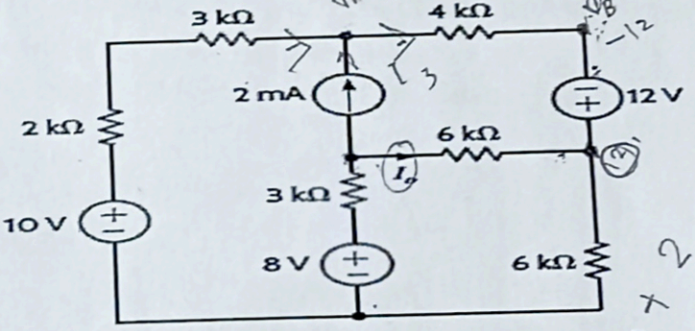

Fig.2

Section C

Note: 12 marks (2 questions of 6 marks each)

1. State and prove maximum power transfer theorem? Show that power lost in the internal resistance of a source is equal to the power delivered to the load and power efficiency is only 50%.
2. Find current Io using Thevenin's theorem in the network shown in Fig.3

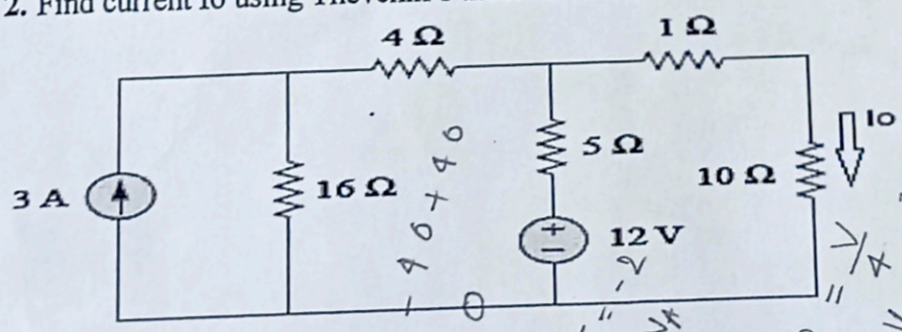

Fig.3