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Question Paper Code : 42438

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2018

Second Semester

Electronics and Communication Engineering

EC 2151 – ELECTRIC CIRCUITS AND ELECTRON DEVICES

**(Common to Biomedical Engineering, Computer Science and Engineering,
Medical Electronics Engineering and Information Technology)**

(Regulations 2008)

Time : Three Hours

Maximum : 100 Marks

Answer ALL questions

PART – A

(10×2=20 Marks)

1. State KVL and KCL.
2. State Thevenin's theorem.
3. Define natural response and forced response.
4. Give the condition for resonance and resonant frequency of the tuned circuit.
5. Define peak inverse voltage.
6. Distinguish between intrinsic and extrinsic semiconductors.
7. Compute the current gain of the transistor in CE configuration. Assume the collector current is 0.96 mA and the base current is 22 μ A.
8. Differentiate between BJT and FET.
9. Draw the Volt-ampere characteristics of tunnel diode.
10. Draw the symbol of varactor diode and DIAC.

11. a) i) Write the mesh equations for the circuit shown in Figure 11 (a) (i). (6)

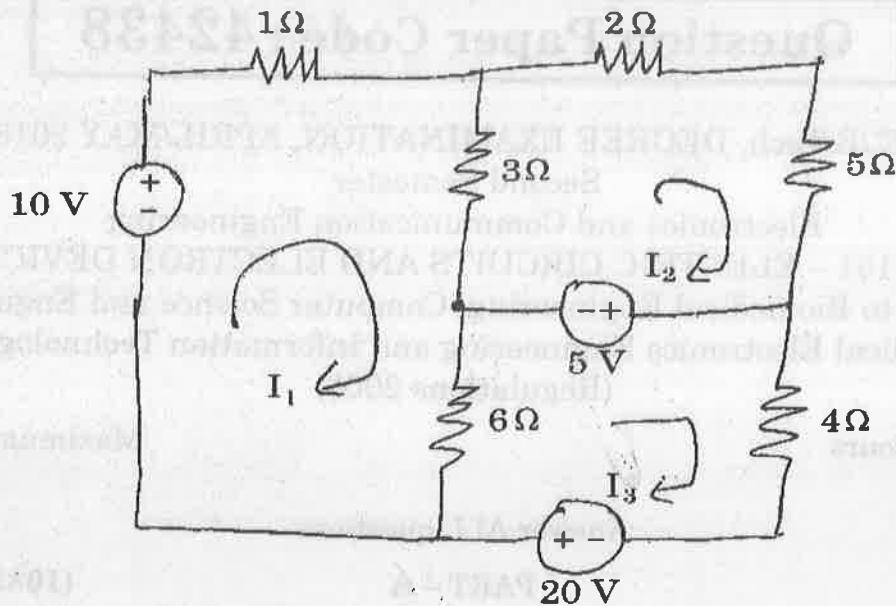


Figure 11 (a) (i)

- ii) The star connected load circuit is shown in Figure 11 (a) (ii). The impedances in each branch are $Z_R = (2 + j3)\Omega$, $Z_Y = (1 - j2)\Omega$ and $Z_B = (3 + j4)\Omega$. Find the equivalent delta connected load circuit. The sequence is RYB. (10)

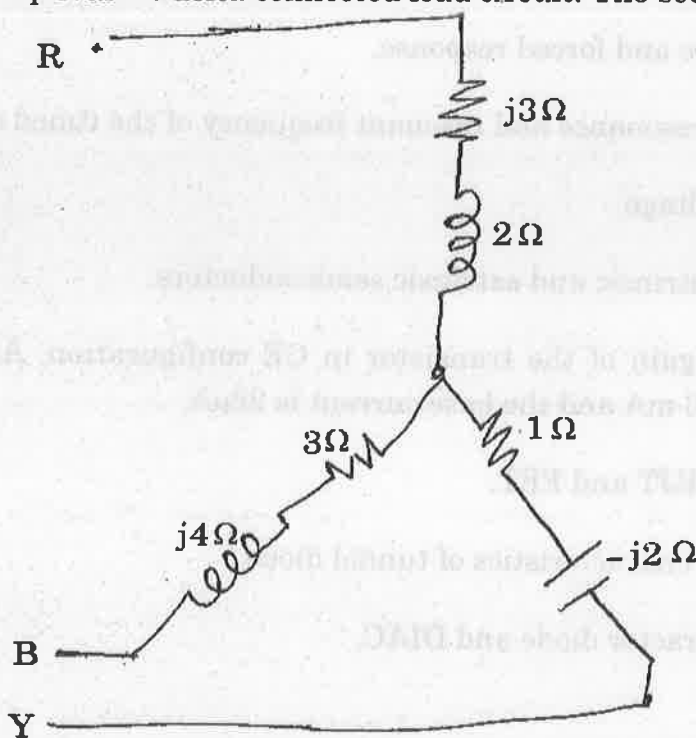


Figure 11 (a) (ii)

(OR)



b) i) Use nodal analysis to find the power dissipated in the 6Ω resistor for the circuit shown in Figure 11 (b) (i). (10)

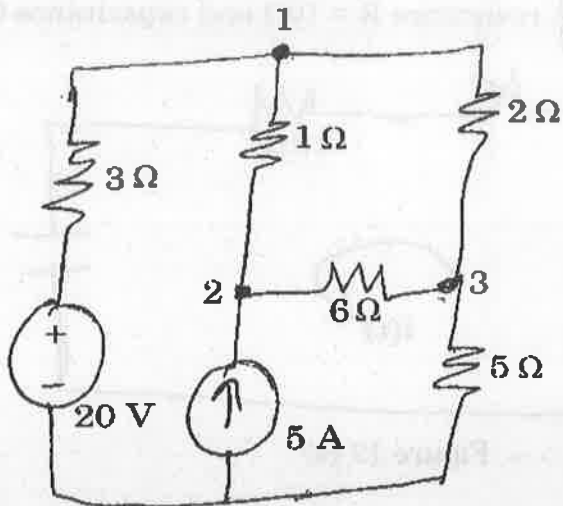


Figure 11 (b) (i)

ii) For the circuit shown in Figure 11 (b) (ii) determine the Thevenin's Equivalent across AB. Also find the current flowing through the load resistance of 36Ω . (6)

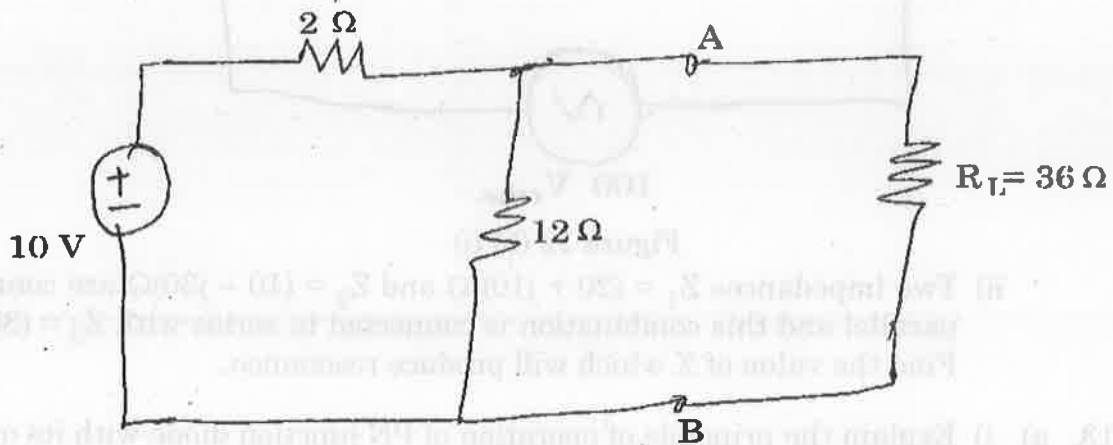


Figure 11 (b) (ii)



12. a) In the circuit shown in Figure 12 (a), determine the complete solution for the current, when the switch is closed at $t = 0$. The circuit parameters are : applied voltage $v(t) = 50 \cos \left(100t + \frac{\pi}{4} \right)$, resistance $R = 10\Omega$ and capacitance $C = 1\mu\text{F}$. (16)

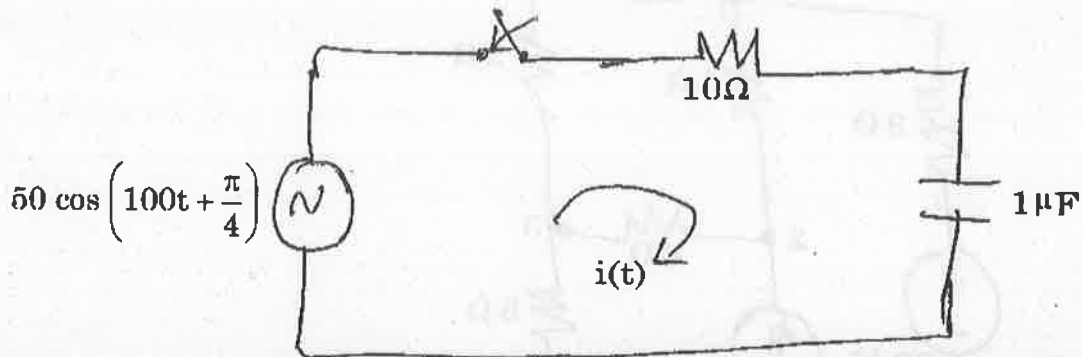


Figure 12 (a)

(OR)

- b) i) For the circuit shown in Figure 12 (b) (i), determine the frequency at which the circuit resonates. Also find the voltage across the inductor at resonance and Q factor of the circuit. (8)

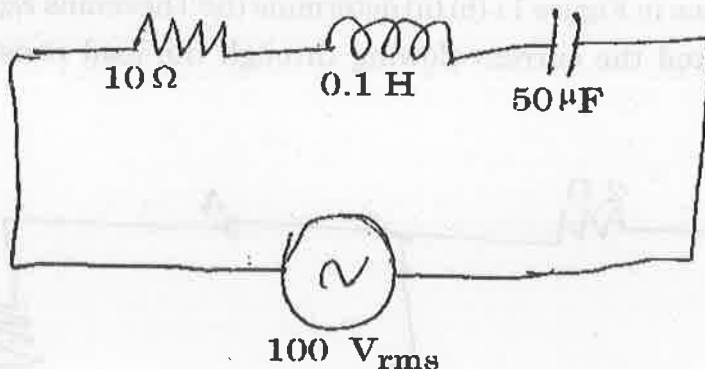


Figure 12 (b) (i)

- ii) Two impedances $Z_1 = (20 + j10)\Omega$ and $Z_2 = (10 - j30)\Omega$ are connected in parallel and this combination is connected in series with $Z_3 = (30 + jX)\Omega$. Find the value of X which will produce resonance. (8)
13. a) i) Explain the principle of operation of PN junction diode with its open circuited energy band structure and current voltage characteristics. (8)
- ii) Derive the expression for PN junction diode current equation. (8)
- (OR)
- b) i) Explain in detail about zener diode and its characteristics. (8)
- ii) Explain and derive the expressions for space charge and diffusion capacitances. (8)



14. a) i) Derive the relationship between dc current gain α , β of CB and CE configuration. Find α value for $\beta = 50$ and $\beta = 190$. Also find β value for $\alpha = 0.995$ and $\alpha = 0.9765$. (8)
ii) Compare CB, CE and CC configurations. (8)

(OR)

- b) i) Explain the principle of operation and characteristics of N-channel JFET. Also give the expressions for drain current and amplification factor. (10)
ii) Draw the output characteristics and derive the drain current equation in triode and saturation region of n-channel enhancement type MOSFET. (6)
15. a) i) Explain the principle of operation and VI characteristics of TRIAC. (10)
ii) Write short notes on UJT. (6)

(OR)

- b) i) Explain the working principle and characteristics of PIN diode in detail. (8)
ii) Explain in detail about phototransistor and its characteristics. (8)
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