PAPER TYPE

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NNAMDI AZIKIWE UNIVERSITY, AWKA
Faculty of Physical Sciences
Department of Physics and Industrial Physics
Second Semester Examination 2018/2019
Course Code//Title: PHY 202 Electric Circuit and Electronics
Date:31/10/2019 Time:2½ hrs

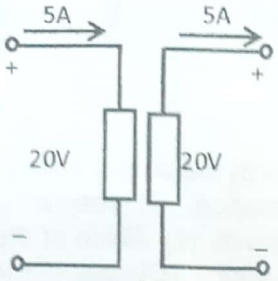
Instruction: Ensure you shade the paper option/type

Answer all questions

(1) In transistor operation, a graph showing how the output current varies with the output voltage with fixed value of the input current is called the (A) output impedance (B) reactance (C) feedback characteristics (D) output characteristics (E) none of the above. **(2)** Which of the following is an acceptor atom (A) arsenic (B) carbon (C) phosphorous (D) silicon (E) none of the above. **(3)** How many diodes of the seven segment LED displays will be needed to illuminate the letter F (A) 3 (B) 4 (C) 5 (D) 6 (E) 7. **(4)** The electricity distribution companies in Nigeria measures energy in Kilo-Watt-Hour (kwh) in Joule, one Kilowatt-Hour equals (A) 4.186J (B) 860J (C) 3600J (D) 3.6×10^6J (E) 3.6×10^5J. **(5)** If PN junction diode is added to another PN diode to produce a single PNPN material, this material is called a (A) pentode (B) tetrode (C) thermistor (D) thyratron (E) thyristor. **(6)** The number of junctions in PNPN material is (A) 2 (B) 3 (C) 4 (D) 5 (E) 1. **(7)** An NPN transistor is connected in the Common Emitter configuration where no signal is applied at the input. Which of the following statements is correct? (A) DC. Conditions prevail in the circuit (B) the D.C. load line is represented by the equation $V_{CC} = V_{CE} + I_C R_C$ (C) when the collector current I_C is zero, the collector-Emitter voltage is maximum (D) the supply voltage V_{CC} is equal to the collector-Emitter voltage is maximum (E) none of the above. **(8)** A load line is plotted on the output characteristics of an NPN transistor to investigate the behavior of the transistor amplifier. Which of these statements is/are correct? (I) when signal is applied the variations of I_C and V_{CE} take place about a point called the silent point (II) the zero signal values of I_C and V_{CE} are known as the operation point (III) the difference between the Q-point and the silent point is about 5μA. (A) I only (B) II only (C) III only (D) I and III only (E) I and II only. **(9)** Two wires having equal lengths and made of the same material have resistances of 25Ω and 49Ω respectively. Find their relative diameter (A) $d_1 = 1.96\ d_2$ (B) $d_1 = 0.51\ d_2$ (C) $d_1 = 1225\ d_2$ (D) $d_1 = 1.4\ d_2$ (E) $d_1 = 35\ d_2$. **(10)** A copper coil has a resistance of 3.146Ω at 40^0C and 3.767Ω at 100^0C. Find the resistance at 0^0C (A) 2.732Ω (B) 2.904Ω (C) 2.409Ω (D) 3.372Ω (E) 2.672Ω. **(11)** An electrical heater uses 3A when connected across 110V. Find the resistance of the heater (A) 0.0287Ω (B) 330Ω (C) 36.67Ω (D) 2.870Ω (E) 3.330Ω. **(12)** What colour of light will an LED made of gallium phosphate produce (A) Green (B) Blue (C) Yellow (D) Violet (E) Red. **(13)** An LED that emits one colour when forward biased and another colour when reverse biased is called (A) Arsenic LED (B) Germanium LED (C) Silicon LED (D) Phosphorous LED (E) None of the above. **(14)** Which of the following statements is/are incorrect about junction breakdown (I) the breakdown voltage depends on the width of the depletion region which in turn depends on the doping level (II) Zener breakdown occurs in junctions which are lightly doped and have wide depletion layers (III) Avalanche breakdown occurs in junctions which are heavily doped. (A) I only (B) II only (C) III only (D) II and III only (E) I and III only. **(15)** Which of the following is/are incorrect (I) When a pentavalent material is added to a pure germanium crystal, a P-type extrinsic semi-conductor is obtained (II) In a P-type semiconductor, conduction is by means of holes in the valence band (III) Boron and antimony are examples of donor impurities. (A) I only (B) II only (C) III only (D) I and II only (E) I and III only. **(16)** Which of the following is/are correct (I) Semiconductors have an almost empty conduction band and an almost filled valence band with a very narrow energy gap between them (II) A semiconductor in its purest form is called an intrinsic semiconductor (III) An intrinsic semiconductor when doped by a suitable pentavalent of trivalent material becomes an extrinsic semiconductor. (A) I only (B) II only (C) III only (D) I, II and III only (E) II and III only. **(17)** The transistor relationship where the input current is fixed and the output curve indicates the variation of input voltage against output voltage is known as (A) Admittance (B) Mutual characteristics (C) Feedback characteristics (D) Output characteristics (E) Transfer characteristics. **(18)** The slope of the curve in the transistor relationship where the input current is fixed and the output curve indicates the variation of input voltage against the voltage is known as (A) Feedback gain (B) Voltage gain (C) Transfer gain (D) Current gain (E) Impedance matching. **(19)** In a common Emitter CE transistor configuration, D.C. current gain h_{FE} is the ratio I_C/I_B, what is the minimum

Base current required for a gain of 100 if the collector current gain is 5mA (A) 0.05mA (B) 0.005mA (C) 0.5mA (D) 50mA (E) 500mA. **(20)** The energy associated with electron orbits for a single isolated hydrogen for 3rd energy level E_3 corresponds to (A) –13.6eV (B) –3.39eV (C) –1.51eV (D) –0.85eV (E) –0.54eV. **(21)** The S.I. Prefix for the multiplier 10^{-18} is the (A) atto (B) femto (C) nano (D) pico (E) milli.

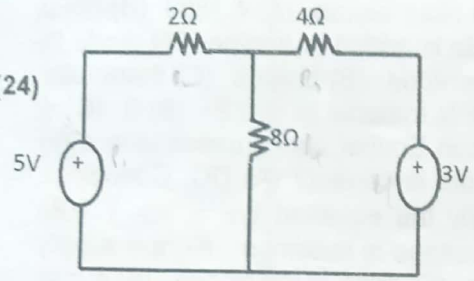
(22)



In the simple circuits shown, by passive sign convention, power is equivalent to _____ (A) 100W, 100W (B) -100W, 100W (C) 100W, - 100W (D) -100W, - 100W (E) 4W, -4W.

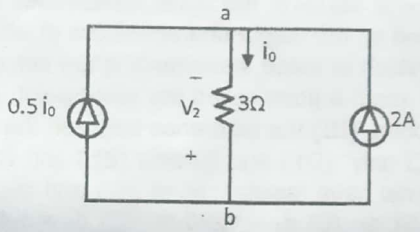
(23) In the circuit shown, the power P_4 is (A) 3.0W (B) -3.0W (C) -75W (D) 15W (E) 36W.

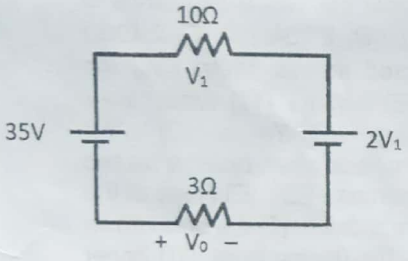
(24)



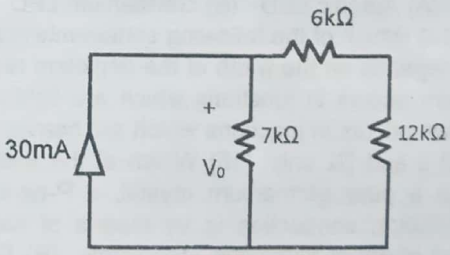
In the circuit shown, find V_1 and the current through the 8Ω resistor. (A) 2V, -1.5A (B) 2V, -0.25A (C) 2V, 1.25A (D) 2V, 0.25A (E) 2V, -0.25A. **(25)** In Kirchhoff's Voltage law, which of these equations is correct. (A) $-V_2 + V_3 + V_5 = V_1 + V_4$ (B) $-V_2 - V_3 + V_5 = V_1 + V_4$ (C) $V_2 + V_3 - V_5 = -V_1 + V_4$ (D) $V_2 + V_3 - V_5 = -V_1 - V_4$ (D) $V_2 + V_3 + V_5 = V_1 + V_4$.

(26) Use the circuit shown to calculate the values of i_o and V_o (A) 4A, –12V (B) 4A, 12V (C) –4A, –12V (D) –4A, –12V (E) –4A, 12V.

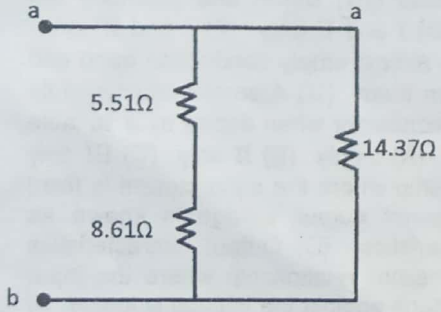




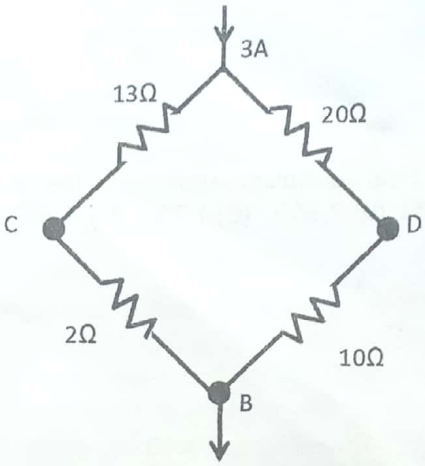
(27) Determine the values of V_1 and V_0 in the figure shown. (A) 10V, –5V (B) –10V, –5V (C) –10V, 5V (D) 10V, 5V (C) –10V, 3V



(28) The circuit shown has the resistors in KΩ, find I_1 and I_2. (A) 26.6mA, 8.0mA (B) 26.3mA, 8.1mA (C) 21.6mA, 8.4mA (D) 21.2mA, 8.2mA (E) 20.5mA, 8.5mA.



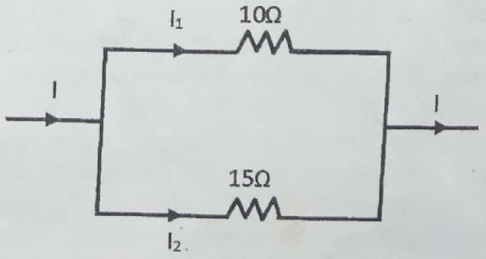
(29) Determine the equivalent resistor in the figure shown. (A) 7.13Ω (B) 7.55Ω (C) 7.71Ω (D) 7.18Ω (E) 7.12Ω

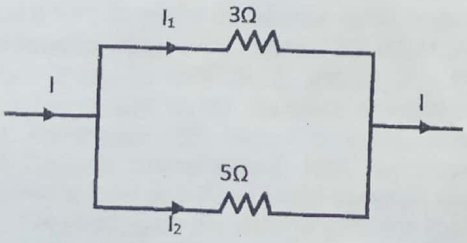


(30) The currents I_C and I_D from the figure given as are, (A) 1.00A, 2.00A (B) 2.00A, 3.00A (C) 3.00A, 4.00A (D) 2.00A, 1.00A (E) 1.00A, 3.00A.
(31) The voltage V across a resistor is directly proportional to the current I flowing though the resistor is a statement of whose law? (A) Kirchhoff's (B) Faraday's (C) Henry's (D) Maxwell's (E) Ohm's.
(32) Two major variables in electric circuit include (I) resistance (II) capacitance (III) inductance (IV) current voltage (A) I and II only (B) II and III only (C) III and IV only (D) IV and V only (E) II and IV only.
(33) The equivalent of capacitance of three parallel capacitors 3μF, 5μF and 10μF is (A) 8.0μF (B) 15μF (C) 18.0μF (D) 2.0μF (E) 5.0μF. **(34)** To get the Norton current, one has to (A) short the load resistor (B) open the load resistor (C) short any resistor (D) open the voltage source (E) short the current source. **(35)** To get the Thevenin's Voltage, one has to (A) short the load resistor (B) open the load resistor (C) short the voltage source (D) open the voltage source (E) short the current source. **(36)** At parallel resonance, the circuit impedance is (A) $\frac{C}{LR}$ (B) $\frac{R}{LC}$ (C) $\frac{CR}{L}$ (D) $\frac{L}{CR}$ (E) $\frac{LC}{R}$. **(37)** Which of the following is not an active electronic component? (A) diodes (B) transistors (C) thyristors (D) integrated circuits (E) All of the above. **(38)** In pure Ohmic resistance (A) alternating voltage and current are in phase (B) voltage leads the current (C) current leads the voltage (D) current lags the voltage (E) voltage lags the current. **(39)** Q-factor of a circuit is given as

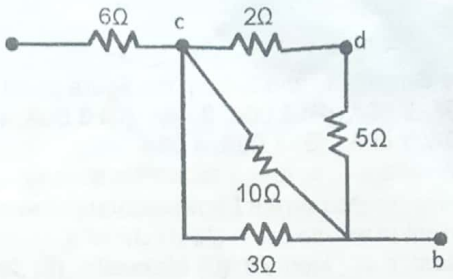
(A) $\frac{1}{R}\sqrt{\frac{C}{L}}$ (B) $\frac{1}{R}\sqrt{\frac{L}{C}}$ (C) $\frac{1}{R}\sqrt{LC}$ (D) $R(LC)$ (E) $R^2\sqrt{LC}$. **(40)** In RL circuit, the power loss in the inductor is given as (A) VI $\cos^2\theta$ (B) VI $\sin\theta$ (C) VI $\cos\theta$ (D) VI $\sin^2\theta$ (E) VI $\tan\theta$. **(41)** In a mesh analysis, the current values i_1 and i_2, from $\frac{\Delta_1}{\Delta}$ and $\frac{\Delta_2}{\Delta}$ if $\Delta_1 = \Delta_2 = 5$ and $\Delta = 2.5$ (A) 3A, 3A (B) 3A, 2A (C) 2A, 2A (D) 1A, 3A (E) 2A, 1A. **(42)** In the same way, determine i_1, i_2 and i_3 for $\frac{\Delta_1}{\Delta}$, $\frac{\Delta_2}{\Delta}$, $\frac{\Delta_3}{\Delta}$ if $\Delta_1 = 432$, $\Delta_2 = 144$, $\Delta_3 = 288$ and $\Delta = 192$. (A) 2.25A, 0.75A, 1.50A (B) 0.75A, 1.50A, 2.25A (C) 1.50A, 2.25A, 0.75A (D) 2.25A, 1.50A, 0.75A (E) 1.50A, 0.75A, 2.25A. **(43)** In the Thevenin circuit given as $I_L = \frac{V_{TH}}{R_{TH} + R_L}$ with V_{TH} as 36V, R_{TH} as 5Ω and R_L as 38Ω, determine the value of the load current I_L (A) 2.77A (B) 1.57A (C) 0.84A (D) 0.72A (E) 0.55A. **(44)** One of the reason why maximum power transfer theorem is restricted to power transmission and distribution networks as a result of (A) High efficiency (B) Low efficiency (C) High voltage (D) Low voltage (E) High voltage and low efficiency.

(45) Find the currents I_1 and I_2 in the circuit shown, if the source current 1 is given as 5A
(A) 3A , 2A (B) 3A, 1A (C) 2A, 4A (D) 1A, 2A (E) 5A, 3A

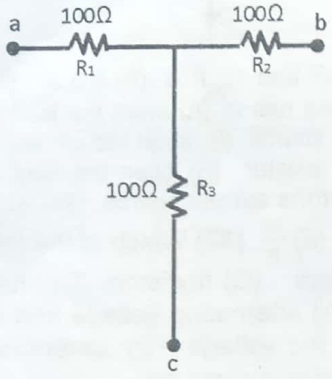




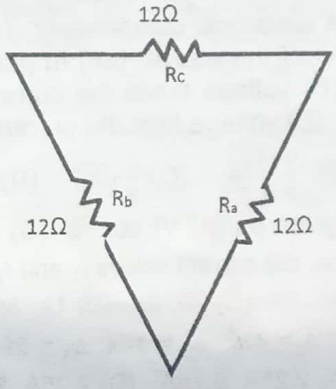
(46) In the circuit shown, find the current values I_1 and I_2 if the source current is 2A.
(A) 1.25A, 0.55A (B) 0.75A, 0.55A (C) 1.55A, 1.25A (D) 0.25A, 0.75A (E) 1.25A, 0.75A.



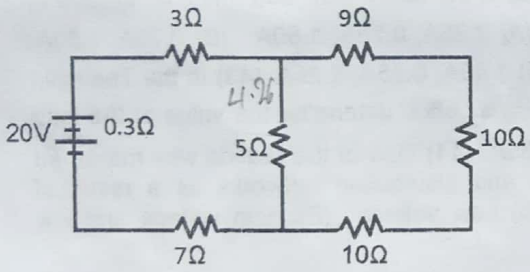
(47) Find the equivalent resistance in the circuit shown
(A) 7.79Ω (B) 7.95Ω (C) 7.75Ω (D) 7.25Ω (E) 7.35Ω



(48) In the T network shown, determine the equivalent values of the resulting delta ∇ network for R_a, R_b and R_C (A) 200Ω (B) 300Ω (C) 100Ω (D) 500Ω (E) 400Ω



(49) In the delta network shown, the equivalent values of T network for R_1, R_2 and R_3 gives
(A) 5Ω (B) 2Ω (C) 1Ω (D) 4Ω (E) 3Ω



(50) Determine the equivalent resistance R in the circuit shown (A) 14.61Ω (B) 14.51Ω (C) 14.31Ω (D) 14.21Ω (E) 14.71Ω.