

Department of Computer Science and Engineering, Dhaka University
First In-Course Examination
1st Year 1st Semester, Session: 2015-2016
EEE – 1103, Electrical Circuits

Total Marks: 35

Time: 1 Hour

1. a) Define power and energy. 3
 b) i) Given no load voltage 120 V and full load voltage 118 V with full load current 10 A, 4
 determine the voltage regulation of the supply.
 ii) Determine the internal resistance of the supply.
2. a) Read the following information regarding the series circuit and write down the counterpart/
 complementary statement for the parallel circuit. 4
 i) *The total resistance of a series configuration is the sum of the resistance levels.*
 ii) *The more resistors we add in series, the greater the resistance, no matter what their
 value.*
 iii) *The largest resistor in a series combination will have the most impact on the total
 resistance.*
 iv) *The current is the same at every point in a series circuit.*
- b) Using Kirchhoff's voltage law, find the unknown voltages for the configurations in **Fig. 1**. 3

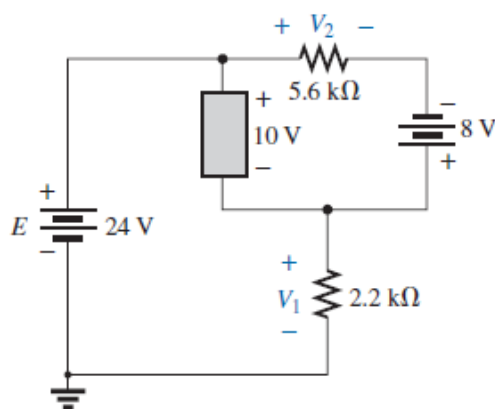


Fig.1

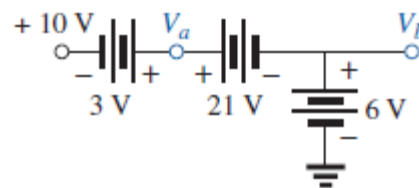


Fig 2

- c) Determine the voltages V_a , V_b , and V_{ab} for the networks in **Fig. 2**. 3
- d) For the integrated circuit in **Fig. 3**, determine V_0 , V_{03} , V_2 , V_{23} , V_{12} , and I_i . 4

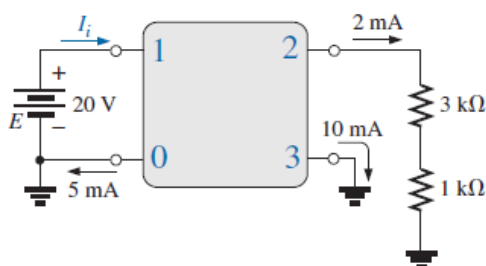


Fig. 3

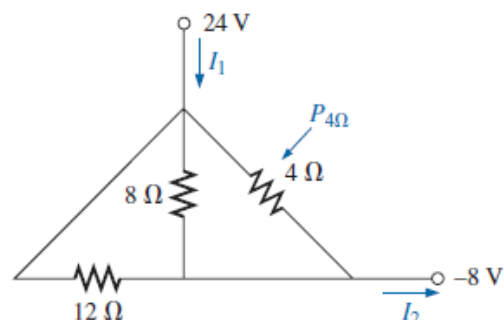


Fig. 4

3. a) Find the unknown quantities for the networks in **Fig. 4** using the information provided. 4
 b) Using Kirchhoff's current law, determine the unknown currents for the networks in **Fig. 5**. 3
 c) Assuming identical supplies, determine the current I and resistance R for the parallel
 network in **Fig. 6**. 4
 d) Determine the voltage V and the current I for the network in **Fig. 7**. 3

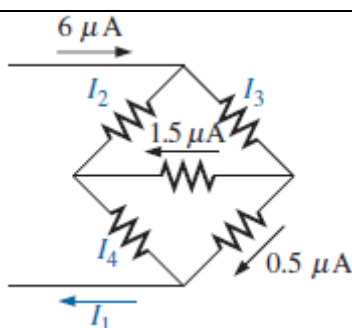


Fig 5

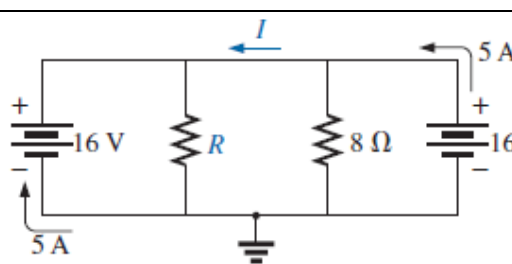


Fig. 6

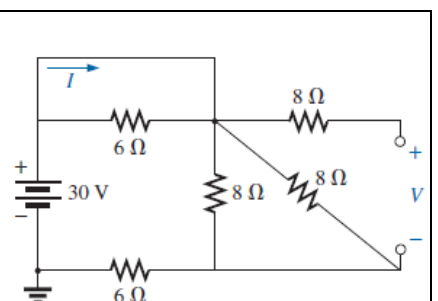


Fig. 7

Max Marks: 35

For the network in Figure 1, determine the value of R for maximum power to R .

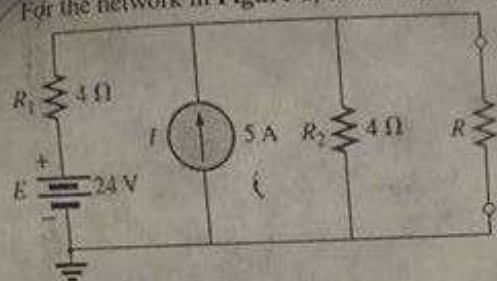


Figure 1

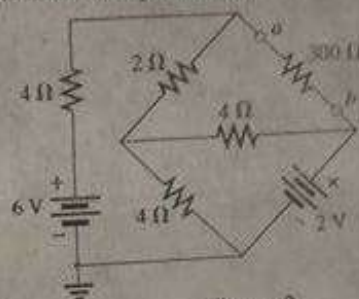


Figure 2

2. Determine the Thévenin equivalent circuit for the portion of the network in Figure 2 external to branch $a-b$.
3. How many ways (with brief explanation) you can find current through and voltage across R_1 for the network in Figure 3(I)

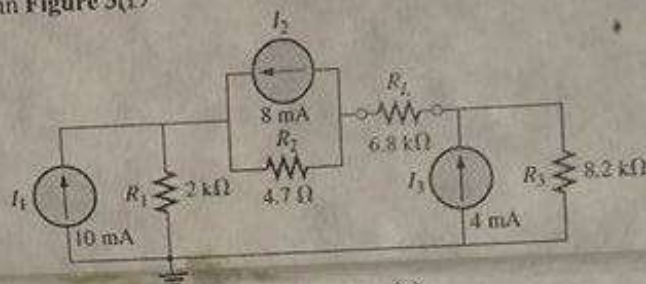


Figure 3(I)

4. a) Using Millman's theorem, find the current through and voltage across R_2 for the network in Figure 3(II)
- b) Find the same as part(a) using superposition theorem to prove the correctness of Millman's theorem.

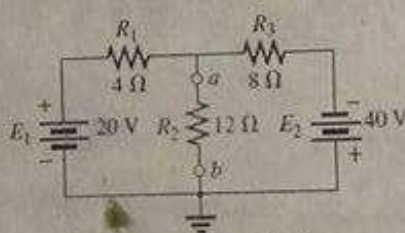


Figure: 3(II)

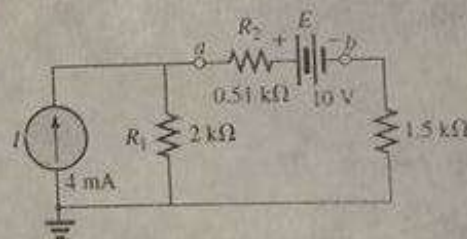
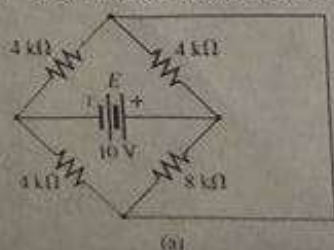


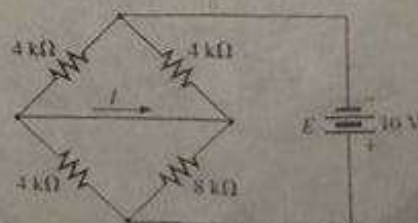
Figure: 4

Using the substitution theorem, draw three equivalent branches for the branch $a-b$ of the network in Figure 4.

- a) For the network in Figure: 5 (a), determine the current I .
- b) Repeat part (a) for the network in Figure: 5 (b)
- c) Explain if the reciprocity theorem satisfied.



(a)



(b)

Figure: 5

University of Dhaka
Department of Computer Science and Engineering
1st Year 1st Semester B. Sc (Hons.) In-course Examination #02, 2016
CSE – 1101: Fundamentals of Computer and Computing

Total Marks: 100

Time: 1 Hours

1. Explain working principle of keyboard using block diagram. ✓ [25]
2. What are the responsibilities of an operating system? Write very briefly. ✓ [25]
3. Briefly discuss about different network topologies using diagram. What kind of topology is used in our computer labs? Explain. ✓ [20 + 10]
4. Say you are buying a Printer for different purposes mentioned below. What type (dot matrix, daisy wheel, line, inkjet and laser) would you buy? Explain your answer very briefly for each purpose. [20]
 - a) Day to day printing at your home
 - b) Receipt printing at a medical diagnostic center
 - c) Question printing for Final Exam of DU
 - d) A shop at nilkhet which prints photo from scanned image
3. You are given a number in unknown base. You want to determine the minimum possible base of the number. Write a flow chart that will determine the minimum possible base of the number. You can assume that the number is given as $d_0d_1d_2\dots d_n$, where d_i is the i^{th} digit of the number. [15]
Example:
Input: 1230

Department of Computer Science & Engineering, Dhaka University
 Second In-Course Examination
 1st Year 1st Semester B.Sc., Session: 2015-2016
 EEE - 1103, Electrical Circuits

Total Marks: 35

Time: 1 Hour

1. How many equations are required to solve the following window system networks? Consider:
 i) each branch contains some element/s (voltage source, current source or resistor)
 ii) each network meets the conditions of the mentioned approaches.

No. of Nodes				
Mesh Analysis (General Approach)				
Mesh Analysis (Format Approach)				
Nodal Analysis (General Approach)				

2. Consider the network in Figure: 1.

- a) Find the current through $6\ \Omega$ resistor using nodal analysis.
 b) Find the current through $4\ \Omega$ resistor using mesh analysis.
 c) Is there any other approach to find the above currents mentioned in a) and b)?

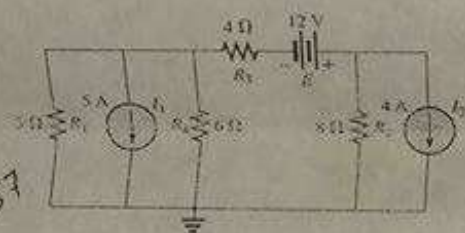


Figure: 1

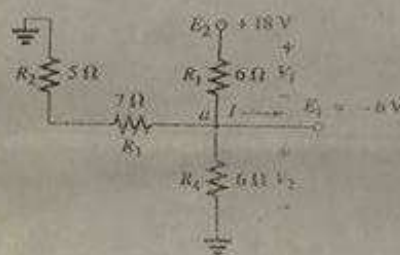


Figure: 2

3. For the network in Figure 2, determine voltages V_1 , V_2 , and current I .

4. Determine the power delivered to the $10\ \Omega$ load in Figure 3.

5. Using a Δ -Y or Y- Δ conversion, find the current I in the networks in Figure: 4

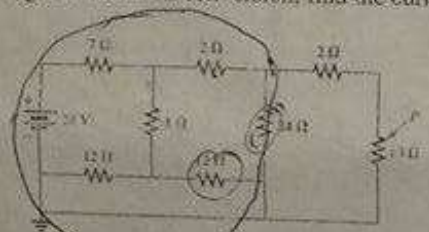


Figure: 3

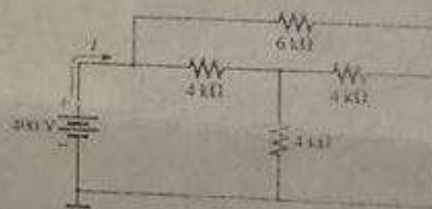


Figure: 4

6. For the network in Figure: 5, use mesh and nodal analysis approach to determine I_2 and voltage V_{ab} and check the results.

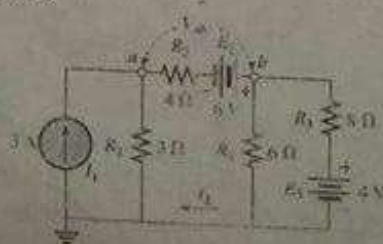


Figure: 5

$$I = \frac{P}{R}$$

$$I = \frac{E}{R}$$

University of Dhaka
Department of Computer Science and Engineering
First Year 1st Semester 2015-16 2nd Incourse Examination
Course No. MATH1124 Calculus Marks: 30

Answer any 5 questions. All questions are of equal value. Time: 1 (One) hour.

1. (a) Let $f(x) = x + \frac{4}{x}$. Find the intervals where $f(x)$ is increasing, decreasing also find the local extrema.

(b) Show that $f(x) = \frac{x}{\ln x}$ has a minimum value which is e .

2. Evaluate the following integrals:

(i) $\int \frac{y}{\sqrt{y+1}} dy$ (ii) $\int \frac{7-6\sin^2 \theta}{\sin^2 \theta} d\theta$ (iii) $\int x \cos^2 x dx$ (iv) $\int \frac{e^x}{e^{2x} + 2e^x + 5} dx$

3. Compute the value of the following integrals:

(i) $\int_1^2 (3x^2 - 2)^4 x dx$ (ii) $\int_0^1 \tan^{-1} x dx$ (iii) $\int_0^{\log 2} \frac{e^x}{e^x + 1} dx$ (iv) $\int_0^{\pi/2} \cos 2x \cos 3x dx$

4. Obtain a reduction formula for $\int_0^{\pi/2} \sin^p x \cos^q x dx$ and hence evaluate

$\int_0^{\pi/2} \sin^6 x \cos^5 x dx.$

$x \frac{1}{4}$

5. Define gamma and beta functions. Write the relation between them. Evaluate the following integrals:

(i) $\int_0^{\infty} \sqrt{x} e^{-\sqrt{x}} dx$

(ii) $\int_0^1 x^4 (1 - \sqrt{x})^5 dx$

(\sqrt{x})

6. (a) Evaluate: $\lim_{n \rightarrow \infty} \left[\frac{n}{n^2 + 1^2} + \frac{n}{n^2 + 2^2} + \dots + \frac{1}{2n} \right].$

$n^2 + (n+1)^2$
 $n^2 + n^2 + 2n + 1$

(b) State Taylor's series and Mean value theorem. Verify Mean value theorem for the function $f(x) = 2x^3 - 8x + 1$ on $[1, 3]$.

$6x^2$

$6x - 8 = 18$

$6c = 26$

$(x^{1/2})$

$2n^2 + 2$

Dept. of Computer Science and Engineering, DU
B. Sc First Year (1st Semester) 2nd In-course Exam, 2016
CSE-1104: Physics (3 Credits)

Time: 50 Minutes

Answer any four questions

Full Marks: 24

1. Define heat engine, heat pump, and the Kelvin Planck statement of the second law of thermodynamic. 6
2. What is Carnot's theorem? Prove it. 6
3. What is Carnot's cycle? Explain the cycle. 6
4. A Carnot engine is operated between two reservoirs at temperatures of 450K and 350K. If the engine receives 1 kcal of heat from the source in each cycle, calculate (a) amount of heat rejected to the sink in each cycle, (b) efficiency of the engine and (c) work done by the engine in each cycle. 6
5. A refrigerator is driven by a 1000 watt electric motor, which is operating at an efficiency of 60%. If the refrigerator can be treated as a reversible heat engine operating between 0°C and room temperature which is 20°C, calculate the time required by it to freeze 100 kg of water, which is at 0°C. Heat loss may be neglected. (Latent heat of fusion of ice = 80 cal/gm, J = 4.2 joule/cal). 6

3. Compute the value of the following integrals:

(i) $\int_0^2 (3x^2 - 2x^4) dx$

(ii) $\int_0^1 \frac{1}{x^2 + 1} dx$

(iii) $\int_0^{\log 2} e^x dx$

(iv) $\int_0^{\pi/2} \sin x dx$

University of Dhaka
Department of Computer Science and Engineering
1st Year 1st Semester B. Sc (Hons.) In-course Examination #01, 2016
CSE – 1101 : Fundamentals of Computer and Computing

Total Marks: 100

Time: 1 Hours

1. Convert the following:

[40]

- a) $(AE12)_{16}$ to Decimal
- b) $(AE12)_{16}$ to Binary
- c) $(AE12)_{160}$ to Decimal
- d) $(AE12)_{32}$ to Binary (A smart way will get you full marks)

2. (All the numbers in Question 2 is given in Hex. Output your answers in Hex as well. Show intermediate calculations)

[15]

You have 70A apples. Your sister has 12A12 apples. How many apples do you and you sister have together?
You want to equally divide the apples among 4 persons. How many apples will each person get?

+

[10]

3. You are given a number in unknown base. You want to determine the minimum possible base of the number. Write a flow chart that will determine the minimum possible base of the number. You can assume that the number is given as $d_0d_1d_2\dots d_n$, where d_i is the i^{th} digit of the number.

[15]

Example:

Input: 1239 Output: 10

Input: 14342 Output: 5

*(If you can't figure out the flowchart, you can write the algorithm for partial marking)

Write the flow chart for crossing a road safely.

[20]

Total Marks: 35

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 iii) The largest resistor in a series combination will have the most impact on the total resistance.
 iv) The current is the same at every point in a series circuit.
 b) Using Kirchhoff's voltage law, find the unknown voltages for the configurations in Fig. 1. 3

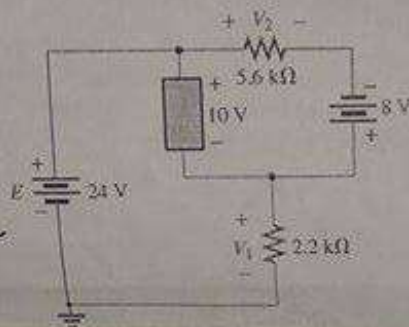


Fig. 1

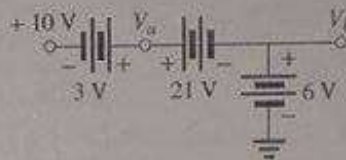


Fig. 2

- c) Determine the voltages V_a , V_b , and V_{ab} for the networks in Fig. 2. 3
 d) For the integrated circuit in Fig. 3, determine V_0 , V_{03} , V_2 , V_{23} , V_{12} , and I_1 . 4

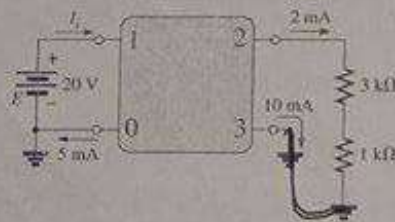


Fig. 3

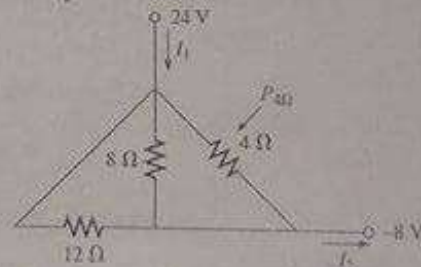


Fig. 4

3. a) Find the unknown quantities for the networks in Fig. 4 using the information provided. 4
 b) Using Kirchhoff's current law, determine the unknown currents for the networks in Fig. 5. 3
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 d) Determine the voltage V and the current I for the network in Fig. 7. 3

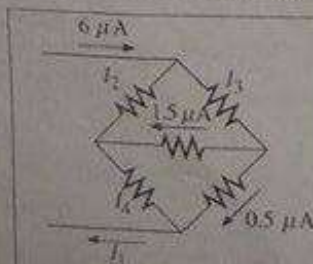


Fig. 5

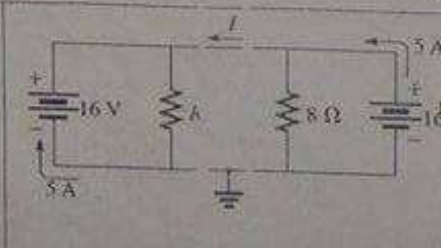


Fig. 6

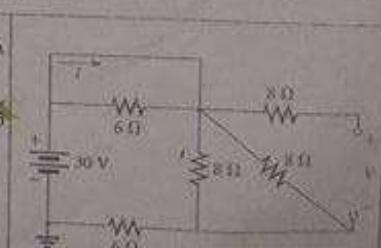


Fig. 7

University of Dhaka
Department of Computer Science and Engineering
First Year 1st Semester 2015-16 First Incourse Examination
Course No. MATH-1124 Calculus

Marks: 30

Time: 1 (One) hour

Answer any 5 questions.

All questions are of equal value.

1. Use the limit definition to compute the derivative, $f'(x)$, for $f(x) = \cos 3x$.

2. Test the continuity and differentiability of the following function at $x = 1$

$$f(x) = \begin{cases} x, & 0 < x < 1 \\ 1/x, & x \geq 1 \end{cases}$$

3. Find $\frac{dy}{dx}$ of the following:

(i) $e^{2x+3y} + \ln(xy^3) = x^2$

(ii) $\tan^3(xy^2 + y) = x$

(iii) $y = [\ln(\ln(\ln x))]$

(iv) $x = \sin^2 \theta, \quad y = \tan \theta$

4. State L' Hospital's rule and hence evaluate (i) $\lim_{x \rightarrow 0} \frac{e^x - e^{-x} + 2 \sin x - 4x}{x^3}$

(ii) $\lim_{x \rightarrow 0} \frac{e^x - e^{-x} - 2x}{x^2 \sin x}$

(iii) $\lim_{x \rightarrow 0} \left(\frac{1}{x} - \frac{1}{e^x - 1} \right)$

5. State Leibnitz's theorem. If $x = \tan(\ln y)$ then prove that

$$(1+x^2)y_{n+2} + (2nx + 2x-1)y_{n+1} + n(n+1)y_n = 0.$$

6. (a) Differentiate $\tan^{-1} \frac{x}{\sqrt{1-x^2}}$ with respect to $\sec^{-1} \frac{1}{2x^2-1}$.

(b) If $y = e^{ax} \sin bx$, then show that $y_2 - 2ay_1 + (a^2 + b^2)y = 0$.

Best of Luck

$\cos^2 \theta - \sin^2 \theta$
 $\cos^2 \theta - 1 +$
 $2\cos^2 \theta - 1$

Dept. of Computer Science and Engineering, DU
B. Sc First Year (1st Semester) In-course Exam, 2016
CSE-1104: Physics (3 Credits)

Time: 1 Hour

Full Marks: 25

Answer any five questions

1. What do you mean by thermodynamic property and thermodynamic equilibrium? 5
2. Prove that heat and work is a path function and their difference is a point function. 5
3. What is first law of thermodynamic? Derive the expression of the first law for a close system. 5
4. Derive the expression of first law of thermodynamic for a control volume system. 5
5. A piston cylinder arrangement with stops contains air at 250 kPa, 300°C. The 50 kg piston has a dia of 0.1m and initially pushes against the stops. The atmospheric pressure is 100 kPa and the temperature is 20°C. The cylinder cools as heat is transferred to ambient. At what temperature does the piston begin to move down? 5
6. A gas of mass 1.5 kg undergoes a quasi-static expansion which follows a relationship $P = a + bV$, where a and b are constants. The initial and final pressures are 1000 kPa and 200 kPa respectively and the corresponding volumes are 0.2 m³ and 1.2 m³. The specific internal energy of the gas is given by $u = 1.5pv - 85$ kJ/kg, where p is in kPa and v in m³/kg. Calculate the net heat transfer and the maximum internal energy of the gas during expansion. 5

3. Compute the value of the following integrals: