Department of Computer Science and Engineering
University of Dhaka

1st Year 1st Semester In-course Examination 2016-17

Course # CSE 1101, Title: Introduction to Computing

Answer all questions. Full Marks: 30

1. a) A language is composed of *primitives* and *means of combination*. What do you understand by the terms *'primitives'* and *'means of combination'*? 4

   b) Classify the primary data of the Universe. 3

   c) What are the primary two parameters that we use to express the computing power of a computer (as well as, computer program)? Explain. 4

2. a) How would you classify the computer memory? 3

   b) Can the same memory chip be of both ROM and RAM types? Justify your answer. 3

   c) Draw a simple 8-byte memory block diagram and explain how can we read/write data from/to the memory. 4

3. a) *Convert the decimal numbers* 19 and 17 into BCD and binary and add them. 2+3

   b) *Suppose, you will have to write a program for calculating the area and circumference of a rectangle. How would you model a rectangle?* 5

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(Class test 2017 CSE-1102 Time: 1 hour 20 m Marks: 35)

1. Express the following statements using quantifier: i) Nothing is in right position 3
   ii) All Bangladeshi movies are not funny.
2. Translate the statement into a logical expression: 1.5
   "The sum of a positive integer and a negative integer is not always positive"
3. Is the given implication true? Show the logic: If pigs can fly then 1+1= 2. 3
   State the inverse and contrapositive of this implication.
4. Are the propositions logically equivalent? $(p \to q) \wedge (q \to p)$ and $p \leftrightarrow q$ 2
5. Using rules of inferences prove the argument: Linda, a student in this class, knows how to write program in JAVA. Everyone who knows JAVA can get a high paying job. Therefore, someone in this class can get a high paying job. 4
6. Determine whether the following argument is correct or incorrect and explain why: 1.5
   Rahim likes all action movies. He likes the movie 'Eight men out'.
   Therefore, 'Eight men out' is an action movie. (no need to apply rules of inferences)
7. Prove that if *n* is an integer greater than 4 then $2^n > n^2$. 3
8. Mention the difference between mathematical induction and strong induction. 1
9. Find out the cardinality of the set A = {2,4,8,16,.....} 2
10. Find out transitive closure of relation R' = {(x,y),(y,x),(z,x),(z,z)} defined on set B = {x,y,z} 2.5
11. Is the function invertible? f = {(1,3), (2,2),(3,3)} defined on set D ={1,2,3} 1
12. Elaborate the relation $xy = 12$ (defined on N). Is the relation i) reflexive? ii) antisymmetric? 4
    iii) transitive?
13. Distinguish between one-one and onto functions. 3.5
14. Let A be a set of nonzero integers and $\approx$ be a relation on A×A defined by $(p,q) \approx (r,s)$ 3
    whenever $p+s = q+r$. Is $\approx$ an equivalence relation?

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University of Dhaka
Department of Computer Science and Engineering
In-Course Examination
1st Year 1st Semester, Session: 2016-2017
EEE – 1103, Electrical Circuits

Total Marks: 35 Time: 1 Hour 30 Minutes

1. a) On which factors the resistance of a material depends? Relate those factors to find the resistance of a material. 1

b) If an electric motor having an efficiency of 76% and operating off a 220 V line delivers 3.6 hp, what input current does the motor draw? 2

[illegible] total resistance and total current in a circuit 2

i) if an **open** occurs in (ka) a parallel branch, and (kha) in a series portion?
ii) if a **short** occurs in (ka) a parallel branch, and (kha) in a series portion?

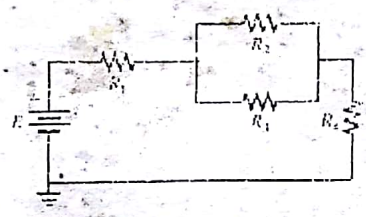

Fig. 1.1

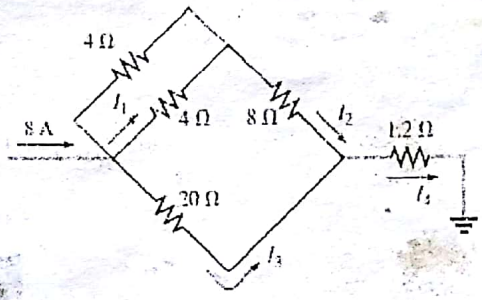

Fig. 1.2

d) For network in **Fig. 1.2**, find the unknown currents. 2

2. a) State voltage divider rule. Verify the statement with the help of a series circuit and Ohm's law. 3

b) Using Kirchhoff's voltage law, find the unknown voltages for the configurations in **Fig. 2.1**. 3

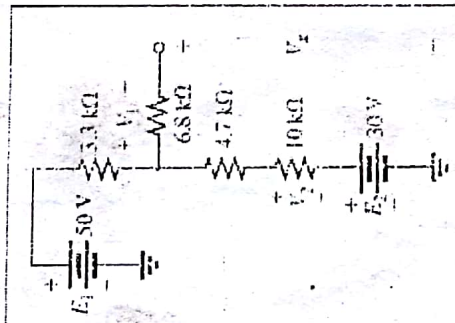

Fig. 2.1

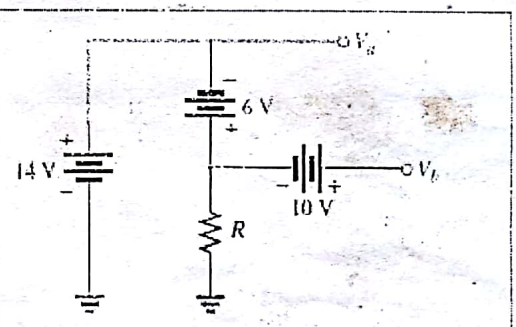

Fig. 2.2

c) For the network in **Fig. 2.2**, determine the voltages: *Va, Vb, Vab* 3

3. a) Given the information provided in **Fig. 3.1**, find the unknown quantities: E, R_1, and I_3. 3

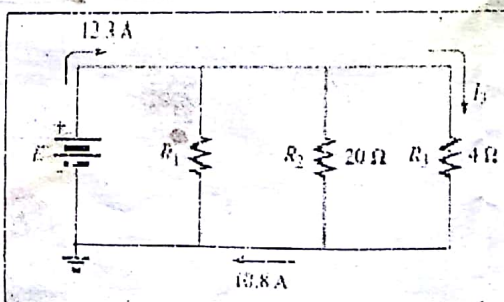

Fig. 3.1

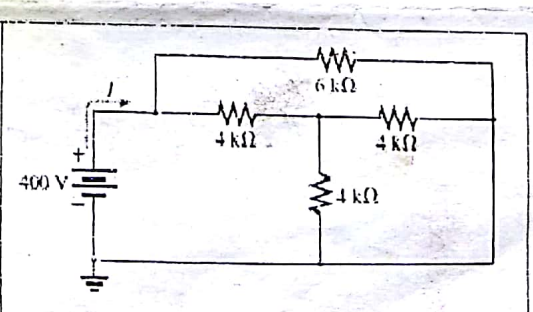

Fig. 3.2

b) For the network in Fig. 3.2, Find I: 3

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c) For the network in **Fig. 3.3**, determine:
i) the short-circuit currents I_1 and I_2.
ii) the voltages V_1 and V_2.
iii) the source current Is.

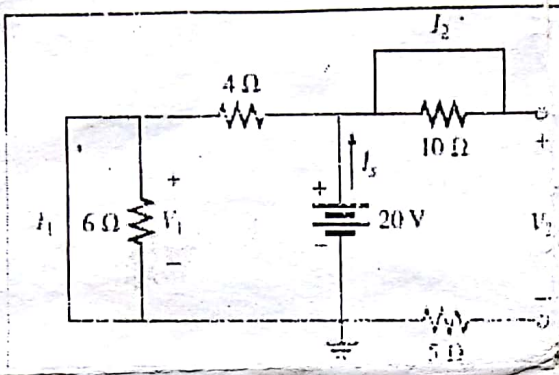

Fig. 3.3

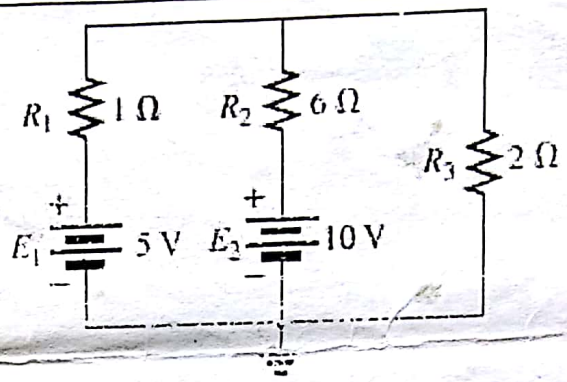

Fig. 3.4

d) Find the current through and voltage across the resistor R_3 in **Fig. 3.4**. 4

4. a) Find the current I for both the circuits in **Fig. 4.1** and **Fig. 4.2**. 5
b) Based on the finding of 4. a), comment on circuits in **Fig. 4.1** and **Fig. 4.2**. 1

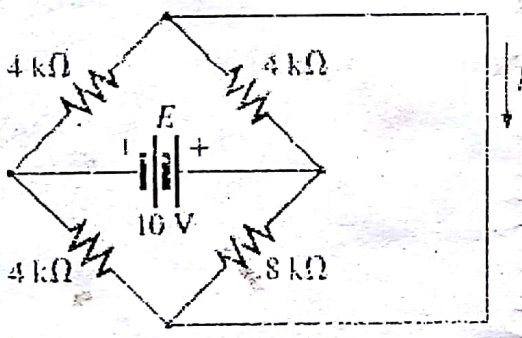

Fig. 4.1

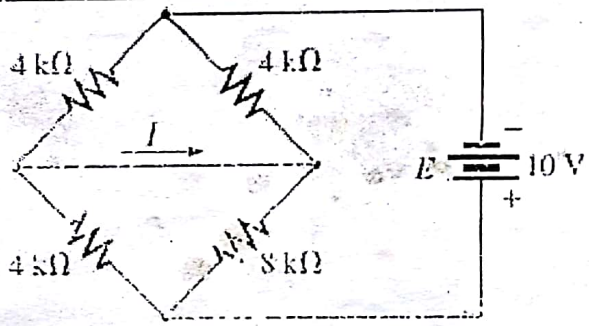

Fig. 4.2

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Department of Computer Science and Engineering, University of Dhaka

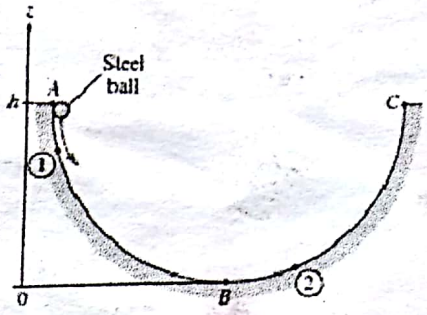
Mid-Term Examination-2017 ; Course PHY-1104 (Physics)

Time: 60 Minutes | Answer any Three Questions | Full Marks: 60

1. (a) State 1st Law of Thermodynamics. What do you understand by "Internal Energy"

(c) With appropriate diagram describe the phase change process of water at 1atm pressure.

(b) The motion of a steel ball in a hemispherical bowl of radius h shown in Fig. is to be analyzed. The ball is initially held at the highest location at point A, and then it is released. Obtain relations for the conservation of energy of the ball for the cases of frictionless and actual motions. (3+3)+7+7



2. (a) Derive an expression for work done during a polytropic process.

(b) Imagine you had the unfortunate occasion of being slapped by an angry person, which caused the temperature of the affected area of your face to rise by 1.8°C (ouch!). Assuming the slapping hand has a mass of 1 kg and about 0.120 kg of the tissue on the face and the hand is affected by the incident, estimate the velocity of the hand just before impact. Take the specific heat of the tissue to be 3.9 kJ/kg ·°C.

(c) Define Entropy. Prove that the entropy of an isolated system never decreases [6+7+7]

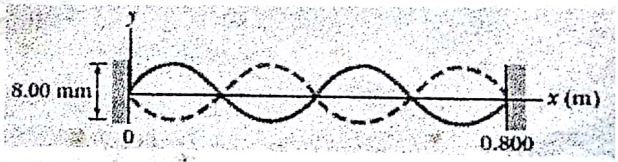
3.(a) In case of damped harmonic motion show that amplitude decreases exponentially.

(b) In the same displacement vs. time graph show the cases of three types of damping.

(c) For a mass–spring system with $m = 250$ g, $k = 85$ N/m, and $b = 70$ g/s, what is the ratio of the oscillation amplitude at the end of 25 cycles to the initial oscillation amplitude? [7+6+7]

4. (a) Derive the general differential wave equation.

(b) Figure shows resonant oscillation of a string of mass m =2.500 g and length L =0.800 m and that is under tension T = 325.0 N. What is the wavelength of the transverse waves producing the standing wave pattern, and what is the harmonic number n? What is the frequency f of the transverse waves and of the oscillations of the moving string elements? [12+8]



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University of Dhaka
Department of Computer Science and Engineering
First year first semester 2017
Mid term examination
Course No.: **MATH 1105**, Course Name: **Differential and Integral Calculus**

Full Marks: 30 Time: 1 hour

Answer all the questions

1. Draw the graph of the following functions. Also evaluate their domain and range **(any three)**. You can evaluate domain and range by observing graphs or any other means. **[9 Marks]**
(i) $y = \frac{|x-4|}{x-4}$ (ii) $y = x^2 + 4x + 5$ (iii) $y = \ln(1+x)$ (iv) $y = \frac{2+x}{2-x}$.

2. Determine whether $f(x) = x^2, x \leq 0$ is invertible. If so, then find $f^{-1}(x)$. Also sketch f and f^{-1} in the same axes. Hence, comment on their symmetry. **[4 Marks]**

3. Discuss the continuity of the following function at $x = 0$. Is there any removable discontinuity? If yes, then remove the discontinuity by redefining the function. **[6 Marks]**

$$f(x) = \begin{cases} x\sin(\frac{1}{x}), & x \neq 0 \\ 1, & x = 0 \end{cases}.$$

4. What is the geometrical interpretation of the derivative of a function at a specific point? *If a function is differentiable at a point then it is also continuous at that point.* Is the converse always true? Verify your answer using an appropriate function. **[2 + 6 Marks]**

5. Answer the following MCQs: **[3 Marks]**

i. Which of the following statement is not true?
A. the graph of $y^2 = x$ represents a function of x B. the graph of $y^2 = x$ represents a function of y C. the graph of $y^2 = x$ is symmetric about x-axis

ii. The function $y = \sin(\frac{1}{x})$ is discontinuous at $x = 0$. This discontinuity is-
A. removable B. non removable C. both removable and non removable

iii. $\lim_{x\to 0+} e^{\frac{1}{x}} = ?$ A. 0 B. ∞ C. $-\infty$

iv. Which one is not the point of non-differentiability?
A. point of discontinuity B. corner points C. point of horizontal tangency

v. Which is of the following statements is true?
A. the function e^x and $\ln x$ increase in same rate B. e^x increases slowly and $\ln x$ increases rapidly as x increases C. e^x increases rapidly and $\ln x$ increases slowly as x increases

vi. Which statement is true for the function $y = |x - 1|$?
A. it is continuous every where except at $x = 1$ B. range of the function is $[0, \infty)$
C. it is differentiable at $x = 1$

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