University of Dhaka
Affiliated Engineering Colleges
Department of Computer Science and Engineering
1st Year 1st Semester B.Sc. Examination, 2020 (Improvement)
CSE-1101: Fundamentals of Computers and Computing

Total Marks: 70 Time: 3 Hours

Answer any 5 (Five) of the following Questions

1.	a)	Define Computer System. With a suitable diagram explain the organization of a computer system.	8
	b)	RAM is called the working memory of the computer. Explain.	3
	c)	Define: i) Port ii) Interface iii) Bus	3
2.	a)	What are the differences between data and information?	4
	b)	Write the purpose of a microprocessor.	4
	c)	Describe the types of computer generations.	6
3.	a)	What do mean by Operating System?	3
	b)	Explain the classification of Software with examples.	5
	c)	Explain different types of storage that are used in computers with proper diagrams and examples.	6
4.	a)	Define: i) Intranet ii) Extranet.	4
	b)	What is DNS? How does DNS work?	6
	c)	Write short notes on: i) Bandwidth ii) Firewall	4
5.	a)	What is an algorithm? Explain with an example.	2+2
	b)	Explain the different symbols with the appropriate figure used in the flowchart?	6
	c)	Briefly describe about compiler and interpreter.	4
6.	a)	Explain Bit, Byte, Word, and Double Word.	4
	b)	Write the base and symbols used in following number systems: i) Decimal ii) Binary iii) Hexadecimal and iv) Octal.	5
	c)	Convert: i) Binary number 110111 into a decimal number. ii) Octal number 407 into Hexadecimal number.	5
7.	a)	Show the basic structure of the C program.	4
	b)	Describe the basic data types in C.	4
	c)	Write a program in C to find the largest among three whole decimal numbers using nested if-else.	6

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1st Year 1st Semester B.Sc. Examination, 2020 (Improvement)
CSE – 1102, Discrete Mathematics

Total Marks: 70 Time: 3 Hours

(Answer any 5 (Five) of the following Questions)

1. a) Prove $\neg (p \vee (\neg p \wedge q)) \equiv \neg p \wedge \neg q$. 4
   b) Consider the conditional proposition $p \rightarrow q$ and construct a truth table for converse, inverse and contrapositive of $p \rightarrow q$. 6
   c) Define tautology and contradiction. Find if $\sim A \wedge B \Rightarrow \sim (A \vee B)$ is a tautology or not. 4

2. a) Define set with proper example. 2
   b) Let A and B be the sets and Prove the following statements 6
      i) A is the disjoint union of $A \setminus B$ and $A \cap B$.
      ii) AUB is the disjoint union of $A \setminus B$ and $A \cap B$ and $B \setminus A$.
   c) Write down the fundamental laws of set algebra. 3
   d) Show that $A=\{2,3,4,5\}$ is not a subset of $B=\{x: x \in N, x \text{ is even}\}$ 3

3. a) Let R and S be the following relations on $A=\{1,2,3\}$ and $R=\{(1,1),(1,2),(2,3),(3,1),(3,3)\}$ and $S=\{(1,2),(1,3),(2,1),(3,3)\}$. 6
   Find i) $R \cap S$ ii) RUS iii) R^c and iv) $R^o S$ and v) $S^2 = S^o S$
   b) Given $A=\{1,2,3,4\}$. Consider the following relation in A: 4
   $R=\{(1,1),(2,2),(2,3),(3,2),(4,2),(4,4)\}$ and draw its directed graph using this relation.
   c) State and proof the principles of inclusion and exclusion. 4

4. a) Find the direct and indirect proof of $a \rightarrow b, c \rightarrow b, d \rightarrow (a \vee c)$, $d \Rightarrow b$. 6
   b) What is a group? Write down the relationship between Semigroup and Monoids. 5
   c) Distinguish between Directed and Undirected graphs. 3

5. a) Define Equivalence Relation with example. 4
   b) Find the solution to the recurrence relation: $a_n = 3a_{n-1} - 2a_{n-2}$ with the initial condition $a_1=5$ and $a_2=3$. 6
   c) Let A= { 1,2,3 } and R be the relation, R= {(1,2), (1,3),(2,2),(2,3),(3,3)}. Draw the diagraph by using this relation. 4

6. a) Define Finite and Infinite sets with Example. 4
   b) If relations R and S are reflexive, symmetric, and transitive, show that $R \cap S$ is also reflexive, symmetric, and transitive. 4
   c) Explain with examples of each of the following: 6
      i) A relation which is reflexive and symmetric but not transitive.
      ii) A relation which is symmetric but not reflexive and not transitive.
      iii) A relation which is transitive but neither reflexive nor symmetric.

7. a) Explain with proper diagram: i) Graph ii) Sub-graph iii) Isomorphic Graph iv) Directed Graph and v) Bipartite Graph. 5
   b) Draw the graph M corresponding to the following matrix: 5

$$A = \begin{matrix} 1 & 3 & 0 & 0 \\ 3 & 0 & 1 & 1 \\ 0 & 1 & 2 & 2 \\ 0 & 1 & 2 & 0 \end{matrix}$$

   c) Draw two graphs and describe the isomorphism between the graphs. 4

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1st Year 1st Semester B.Sc. Examination, 2020 (Improvement)
EEE – 1103, Electrical Circuits

Total Marks: 70 Time: 3 Hours

(Answer any 5 (Five) of the following Questions)

1. a) Define Voltage and Current. 2
   b) For the circuit in **Fig. 1(b)**, find voltage V_1, V_2, I_1, I_2, P, I 4

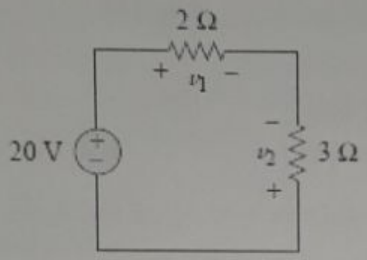

Fig. 1(b)

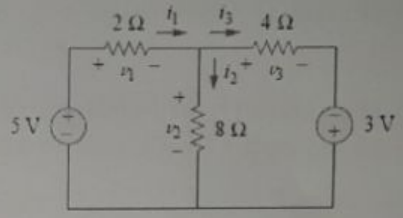

Fig. 1(d)

   c) Write the statements of KVL and KCL 3
   d) Find the current and voltages in the circuit shown in **Fig. 1(d)** 5

2. a) What is the difference between series circuits and parallel circuits 4
   b) Calculate the equivalent resistance R_{ab} in the circuit in **Fig. 2(b)**. 5

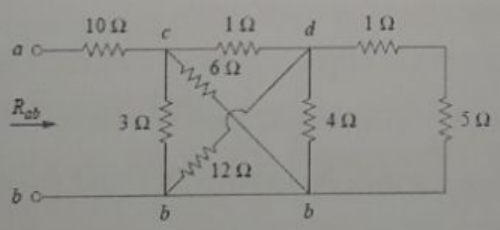

Fig. 2(b)

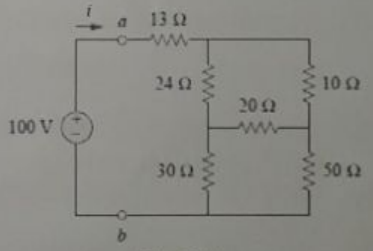

Fig. 2(c)

   b) For the bridge network in **Fig. 2(c)**, find R_{ab} and i 5

3. a) Using mesh analysis, find the currents in the network below in **Fig. 3(a)**. 8

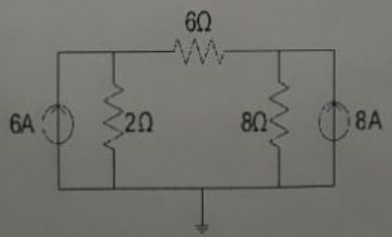

Fig. 3(a)

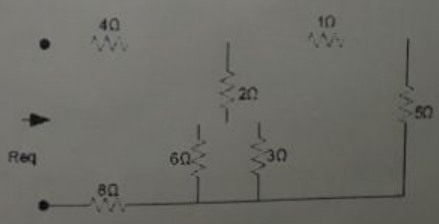

Fig. 3(b)

   b) Calculate the equivalent resistance for the circuit shown in **Fig 3(b)**. 4

c) State and explain Superposition Theorem for analyzing DC networks. 2

4. a) Using Thevenin's theorem calculate V_{th}, R_{th} and I for the circuit shown in **Fig. 4(a)**. 8

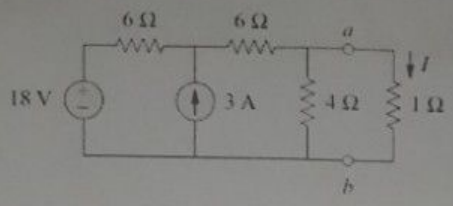

Fig. 4(a)

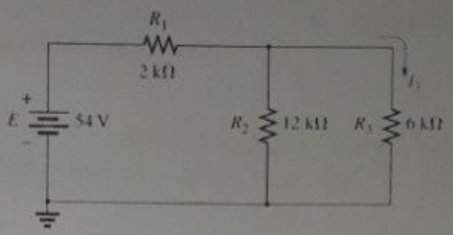

Fig. 4(b)

b) Find the current I_3 for the network shown in **Fig. 4(b)**. 4

c) State and explain Ohm's law with necessary equations. 2

5. a) Use superposition theorem to find v_0 for the circuit shown in **Fig. 5(a)**. 6

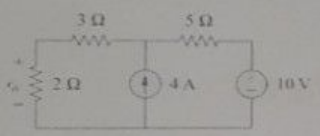

Fig. 5(a)

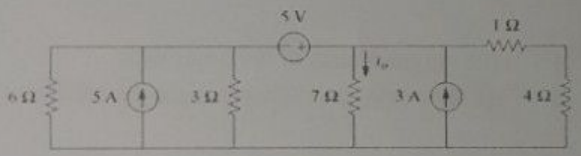

Fig. 5(b)

b) For the network shown in **Fig. 5(b)**, calculate i_0 using source transformation. 6

c) What do you understand by efficiency and voltage regulation? 2

6. a) Calculate the phase angle between $V_1 = -10\cos(wt+50^0)$ and $V_2 = 12\sin(wt-10^0)$. State which sinusoid is leading. 4

b) Write the important characteristics of the basic elements(R, C & L) with relation V-I, P and W. 3

c) The switch in **Fig. 6(c)** has been in position A for a long time. At t = 0, the switch moves to B. Determine V(t) for t > 0 and calculate its value at t = 1s and 4s. 7

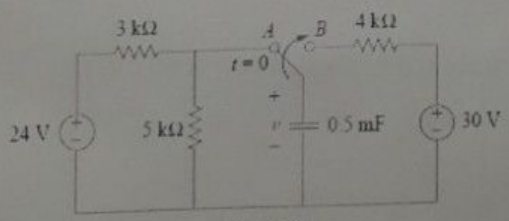

Fig. 6(c)

7. a) What do you understand by average value? Show that for a sinusoidal waveform, $V_{avg} = 0.637\ V_P$. 6

b) Find the amplitude, phase, period, and frequency of the sinusoid 6

$$v(t) = 30\cos(4t + 15^0)$$

c) What do you understand by capacitance and inductance? 2

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CHE – 1104, Chemistry

Total Marks: 70 Time: 3 Hours

(Answer any 5(Five) of the following Questions)

1. a) Write down the postulates of the Bohr atom model with limitations. 5
   b) Write the difference between orbit and orbital. 3
   c) Why do the last electrons of K occupy the 4s orbital rather than the 3d orbital? 3
   d) Explain the dual nature of an electron. 3

2. a) What is meant by an ionic bond? How ionic bond is formed? Explain with an example. 5
   b) Describe the shape of the following molecules: i) CH_4 ii) NH_3. 4
   c) Explain the following, PCl_5 exists but NCl_5 does not. 3
   d) What is a hydrogen bond? 2

3. a) What is meant by p^H of a solution? How p^H scale can be established from the ionic product of water? 5
   b) State and explain the Bronsted-Lowry or protonic concept of acids and bases. 3
   c) What is meant by buffer solutions and buffer action? 3
   d) Calculate the P^H value of 0.1M HCl solution. 3

4. a) What is Buffer solution? Deduce the equation of Henderson for buffer solution. 5
   b) State Roults law of lowering vapor pressure and give derivation. 4
   c) Define molarity and molality. 3
   d) What are colligative properties? 2

5. a) Write the difference between 'order' and 'molecularity' of a reaction. 4
   b) Drive an expression for the rate constant of a first-order reaction. 3
   c) How K_p and K_c are related. 4
   d) Dissociation of PCl_5 at 30°C temperature and $1.01\times 10^5 Nm^{-2}$ pressure is 15.6%. Calculate the value of K_p. 3

6. a) Discuss the mechanism of electrolytic conduction. 3
   b) Define electrode potential. 2
   c) Write down the difference between an electrolytic cell and an electrochemical cell 4
   d) Show the structure of the Daniel cell and explain the procedure with half cell and cell reaction. 5

7. Write Short notes on (any four) 3.5 x 4
   i. Sigma and π bonds
   ii. Enthalpy
   iii. Wurtz reaction
   iv. Cannizzaro reaction
   v. Hund's rule
   vi. Resonance

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1st Year 1st Semester B.Sc. Examination, 2020 (Improvement)
MATH – 1105, Differential and Integral Calculus

Total Marks: 70 Time: 3 Hours

(Answer any 5(Five) of the following Questions)

1. a) Define limit and continuity of a function? 3

   b) Solve: $(i)\lim_{x\to 0}[\frac{1}{x^2}-\frac{1}{\sin^2 x}]$ $(ii)\lim_{x\to 0}\frac{e^x-e^{-x}+2\sin x-4x}{x^3}$ by using L' hospitals rule. 3+3

   c) Test the differentiability of the following function at x=0 and x=1: 5

$$f(x)=\begin{cases}=-x & when \quad -2\le x<0\\ =x & when \quad 0<x<1\\ =3-x & when \quad 1\le x\le 2\end{cases}$$

2. a) Find the maxima and minima of the function $f(x)=x^5-5x^4+5x^3-1$ 4
   b) State and prove L'Hospital's rule for indeterminate form. 1+3
   c) When the area of a rectangular with 100m perimeters will be maximum. 6

3. a) Find the area enclosed by the parabolas $y^2=4ax$ and $x^2=4ay$ 5
   b) Find the area included between the cycloid $x=a(\theta-sin\theta)$, $y=a(1-cos\theta)$ and 7
   it's base. 6
   c) Find $(fogoh)(x)$ if $f(x)=\sqrt{x}, g(x)=\frac{1}{x}$ and $h(x)=x^3$ 3

4. a) Prove that 2

$$\int_0^a f(x)dx=\int_0^a f(a-x)dx$$

   b) Evaluate 4 x 3

$$(i)\int_0^{\frac{\pi}{2}}\frac{\sqrt{tanx}}{1+\sqrt{tanx}}dx \qquad (ii)\int_0^1 x^3\sqrt{1+3x^4}\,dx$$

$$(iii)\int_0^1\frac{ln(1+x)}{1+x^2}\,dx \qquad (iv)\int_0^a\sqrt{\frac{a+x}{a-x}}dx$$

5. a) Find the area of the loop of the curve, $r=a\cos 2\theta$ Also, find the area all loops of the curve. 5
   b) Show that 3

$$\int_0^{\frac{\pi}{2}}\sin^6\theta\cos^3\theta\,d\theta=\frac{2}{63}$$

   c) Evaluate (any two): 3 + 3

i) $\int\frac{dx}{(1-x)\sqrt{1+x}}$

ii) $\int\frac{dx}{\sqrt{1-x^2}\sqrt{\sin^{-1}x}}$

iii) $\int\frac{x^2+1}{(x-1)(x-2)(x+2)}dx$

iv) $\int x\,\mathrm{Inx}\,dx$

6. a) Prove that 2

$$\int_a^b f(x)dx = \int_a^b f(z)dz$$

b) Evaluate 4 x 3

$(i)\int \frac{dx}{\cos^2 x \sin^2 x}$ $(ii)\int \frac{1-\sin x}{x+\cos x}dx$

$(iii)\int \sqrt{1+\sec x}\,dx$ $(iv)\int \frac{\ln(x+1)}{\sqrt{x+1}}dx$

7. a) Prove that 7

$$\beta(m,n) = \frac{\Gamma m \Gamma n}{\Gamma(m+n)}$$

b) Find the equation of the tangent and normal at the point (x, y) of the curve 7

$$x^{\frac{2}{3}} + y^{\frac{2}{3}} = b^{\frac{2}{3}}$$

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1st Year 1st Semester B.Sc. Examination, 2020 (Improvement)
SS-1106: Government and Public Administration

Total Marks: 70 Time: 3 Hours

Answer any 5 (Five) of the following Questions

1.	a)	Define Government. Explain the origin of the Government.	4
	b)	What is Democracy? Why do we need democracy? What are the differences between direct democracy and representative democracy?	6
	c)	Briefly describe the current electoral system in Bangladesh.	4
2.	a)	What do you understand by governance?	3
	b)	What are the differences between "good governance" and "bad governance"?	4
	c)	Discuss the elements of good governance with proper examples.	7
3.	a)	What is fundamental right?	2
	b)	Why should citizens possess fundamental rights?	3
	c)	Explore the historical background of the constitution of Bangladesh.	4
	d)	Explain the changes brought by the fifteenth amendment act of the constitution of Bangladesh.	5
4.	a)	What do you mean by Independence of Judiciary?	4
	b)	Describe the factors that affect the Independence of Judiciary in BD?	5
	c)	How to ensure the independence of Judiciary in Bangladesh?	5
5.	a)	What do you mean by Human Resource Management (HRM)?	3
	b)	Discuss the role of HRM in an organization?	5
	c)	Briefly discuss the scopes of Human Resource Management.	6

6. Imagine, Muhib is a student of Dhaka University. He lives in a small village under Bashantapur Union, Rajbari. One day he went to the Union Parishad for some services. He found a Citizen Charter in front of the Union Parishad that contains the service names as well as major functions of the union. He took services and returned home. From this story,

	a)	What do you mean by Local government?	3
	b)	Describe the composition of Union Parishad as a local government institution.	4
	c)	Briefly discuss the functions of Union Parishad.	7
7.	a)	Discuss the nature and scope of Public Administration in detail.	7
	b)	Explain the role of the Government in development based on the current socio-economic situations of Bangladesh.	7