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

Total Marks: 70 Time: 3 Hours

Answer any 5 (Five) of the following Questions

1. a) What is a computer? 2
   b) Describe the four parts of a computer system. 4
   c) Classify the computer by size and power and describe them. 8

2. a) Describe the storage device and its categories. 8
   b) Briefly explain the Cache Memory. 4
   c) Describe the role of a computer's system dock. 2

3. a) What is IP address? 2
   b) Why MAC address is important? 4
   c) What is a bit, byte, word, and double word? 4
   d) Write the full form of WWW, HTTP, URL, HTML, and WAN? 4

4. a) What is exactly a web browser? What are the purposes of it? List five recently best-ranked web browsers? 5
   b) Write short note on star and bus topology? 4
   c) Convert the following: 5
      (i) $(1203)_{10} = (?)_2$
      (ii) $(1011.110)_2 = (?)_{10}$

5. a) What is a computer program? 2
   b) What is the difference between an algorithm and a flowchart? 6
   c) Describe about compiler and interpreters. 6

6. a) Covert 2GB to Kilobyte. 2
   b) What are the differences between RAM and ROM? 4
   c) Why Unicode is important? 3
   d) Discuss memory hierarchy in a short. 5

7. a) Define keywords and identifiers? What are the rules for naming identifiers? 4
   b) Briefly discuss about C fundamental data types with examples. 6
   c) Write a C Program to find the minimum value among three numbers? 4

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Department of Computer Science and Engineering
1st Year 1st Semester B.Sc. Examination, 2020 (Special)
CSE – 1102, Discrete Mathematics

Total Marks: 70 Time: 3 Hours

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

1. a) Define Universal quantifier and Existential quantifier. 2

b) Let p, q and r be the propositions: 3

p : You have the flu
q : You miss the final examination
r : You pass the course

Translate the following logical expression into an English sentence.

$(p \rightarrow \neg r) \vee (q \rightarrow \neg r)$

c) State the converse, contrapositive, and inverse of the following conditional statements: 5

i) If it snows tonight, then I will stay at home.
ii) I go to the beach whenever it is a sunny summer day.

d) d) Show that $\neg (p \vee (\neg p \wedge q))$ and $\neg p \wedge \neg q$ are logically equivalent by developing a series of logical equivalences. 4

2. a) Define conditional and Proposition. Verify that $(p \wedge q) \wedge \neg (p \vee q)$ is a contradiction by using the truth table. 5

b) Determine which rule of inference is used in the following arguments? 4

i) If it rains today, then we will not have a barbecue today. If we do not have a barbecue today, then we will have a barbecue tomorrow. Therefore, if it rains today, then we will have a barbecue tomorrow.

ii) If it snows today, the university will close. The university is not closed today. Therefore, it did not snow today.

c) What are argument and fallacy? Is the following argument valid? 5

If you do every problem in this book, then you will learn discrete mathematics.
You learned discrete mathematics.
Therefore, you did every problem in this book.

3. a) Given A={1,2,3,4} and B={x, y, z};let R be the following relation from A to B:

R={(1,y), (1,z), (3,y), (4,x), (4,z)}

i) Determine the matrix of the relation. 2
ii) Draw the arrow diagram of R. 2

b) Let A={1,2,3,4,5,6} and let R be the relation on the set A; R={(x, y)| x divides y}

i) Write R as a set of ordered pairs. 2
ii) Draw its directed graph. 3

c) Let A={1,2,3}, B={a, b, c} and C={x, y, z}; Consider the following relations R and S from A to B and from B to C, respectfully.

R={(1, b), (2, a), (2, c)}
S={(a, y), (b, x), (c, y), (c, z)}

i) Find the composition relation R∘S with arrow diagram. 3
ii) Find the matrices M_R, M_S, and $M_{R \circ S}$ 2

4. a) What is recursion? A function f is defined recursively by f (0)=3, f (n+1)=2 f (n)+3; Find the value of f (4). 3

b) What is recurrence relation? Obtain the recurrence relation for: 6

$$G(k) = 2.4^k - 5.(-3)^k$$

c) Find the solution to the recurrence relation: $a_n = 6a_{n-1} - 11a_{n-2} + 6a_{n-3}$ with the initial conditions $a_0=2$, $a_1=5$ and $a_2=15$ 5

5. a) Define reflexive, symmetric and transitive relation. 3

b) Consider the following five relations on the set A = {1, 2, 3, 4}: 6

R = {(1, 1), (1, 2), (2, 3), (1, 3), (4, 4)}
S = {(1, 1), (1, 2), (2, 1), (2, 2), (3, 3), (4, 4)}
T = {(1, 3), (2, 1)}
U = A × A, the universal relation
V = ∅, the empty relation

Determine whether or not each of the above relations on A is
i) Reflexive ii) Symmetric iii) Transitive

c) Define one to one, onto and inverse function with example. 5

6. a) Define with figure: 6
   i) Regular graph
   ii) Bipartite graph
   iii) Complete graph
   iv) Complement of a graph

b) Draw the graph G corresponding to the adjacency matrix: 3

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

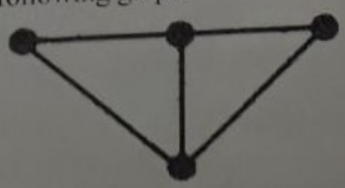
c) What is isomorphism? Draw two graphs that are isomorphic and describe them briefly. 5

7. a) Consider Universal set U and two sets A and B. Shade the following sets using Venn Diagram: 3
   i) $A \cap B^C$ ii) $(B/A)^C$

b) Explain Pigeonhole Principle with example. 3

c) Define with figure: 5
   i) Binary tree
   ii) Complete binary tree
   iii) Rooted tree

d) Find all spanning trees of the following graph: 3



University of Dhaka
Affiliated Engineering Colleges
Department of Computer Science and Engineering
1st Year 1st Semester B.Sc. Examination, 2020 (Special)
EEE – 1103, Electrical Circuits

Total Marks: 70 Time: 3 Hours

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

1. a) State and explain the Kirchhoff's Current and Voltage law. 4
   b) Use the superposition theorem to find V in the circuit of **Fig.1** 5

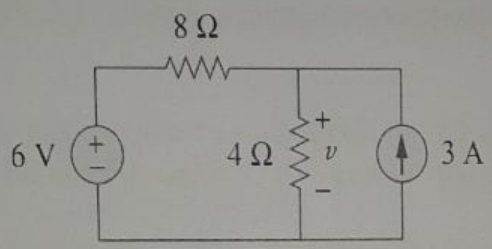


Fig. 1

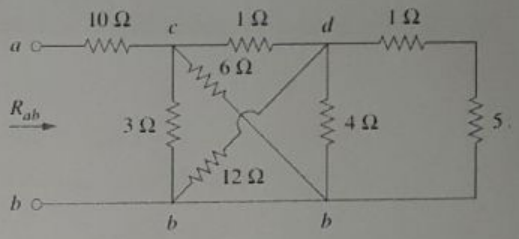


Fig. 2

   c) Calculate the equivalent resistance R_{ab} in the circuit shown in **Fig. 2** 5

2. a) Prove that short circuit current may be infinite. 4
   b) For Electric Circuit, state Kirchhoff's voltage law and it's significance. 5
   c) Find the value of I_1, I_2, I_3, I_4 and I_5 using Kirchhoff's current law shown in **Fig. 3**. 5

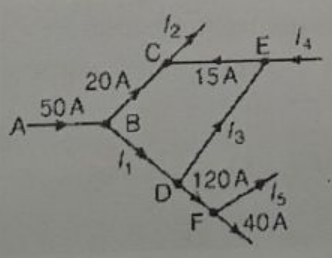


Fig. 3

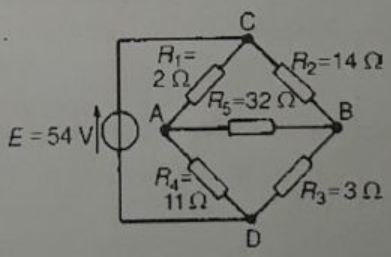


Fig. 4

3. a) What do you mean by current source and voltage source? 4
   b) States Thevenin's theorem and how to find Thevenin's equivalent resistance? 4
   c) A Wheatstone Bridge network is shown in **Fig. 4**, calculate the current flowing in the 32 Ω resistor and it's direction using Thevenin's Theorem. Assume source of e.m.f . to have negligible resistance. 6

4. a) What is super node and super mesh? Write some steps to determine node voltage. 4
   b) Use mesh analysis to find the current I_o in the following circuit shown in **Fig. 5**. 10

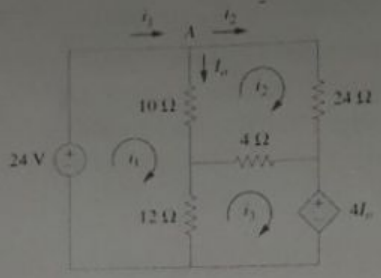


Fig. 5

5. a) What is superposition theorem? Write some steps to apply superposition principle. 4

   b) For the circuit shown in **Fig. 6** use the superposition theorem to find i. 10

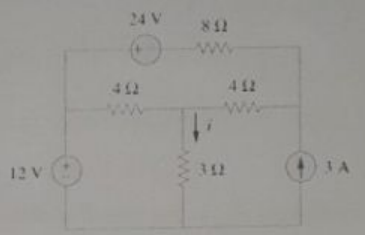


Fig. 6

6. a) Why capacitor acts like an open circuit and inductor acts like a short circuit in DC? 4

   b) Find the Thevenin equivalent circuit of the circuit shown in **Fig. 7** to the left of the terminals a-b. Also find the maximum power transferred to the load. 10

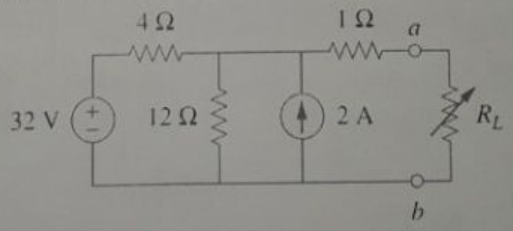


Fig. 7

7. a) Define the term i) R.M.S Value ii) Instantaneous value iii) Form Factor iv) Peak Factor. 4

   b) When AC and DC power supply on RL and RC circuit, What happens? 4

   c) An alternating voltage is given by v = 75sin(200πt −0.25) volts. Find: 6

      i) the amplitude
      ii) the peak-to-peak value
      iii) the r.m.s. value
      iv) the periodic time
      v) the frequency and
      vi) the phase angle (in degrees and minutes) relative to 75 sin 200πt.

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1st Year 1st Semester B.Sc. Examination, 2020 (Special)
CHE – 1104, Chemistry

Total Marks: 70 Time: 3 Hours

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

1. a) Describe Rutherford's atom model. How was it improved by Bhor? 4
   b) What are quantum numbers? Mention all values of quantum numbers when n=3. 3
   c) Discuss the following rules for electronic configuration of atom: 4
      (i) Pauli Exclusion Principle (ii) Hund's rule
   d) Write the electronic configuration of the following atom or ions 3
      Cr, Fe^{3+}, Br^-

2. a) What is chemical bonding? Describe the electronic theory of chemical bonds. 4
   b) Mention the reason for the variation of the bond angels among the following molecules: H_2O, NH_3, CH_4 3
   c) What is polarization? Explain Fajan's rule 4
   d) "H_2O is a liquid but H_2S is a gas at ordinary temperature" -Explain 3

3. a) State phase rule and explain its applications to the Ice-water-vapor system. What is meant by the triple point? 6
   b) For one component system, the triple point is an invariant point. Discuss. 4
   c) In each of the following systems state the number of phases. 4
      i) Mixture of N_2, H_2 and O_2.
      ii) A piece of molten ice placed in a beaker covered with a watch glass.

4. a) What is chemical equilibrium? Explain the characteristics of chemical equilibrium. 3
   b) State & explain the law of mass action. 3
   c) Derive the relation between Kc and Kp. 4
   d) Explain with the help of Le Chatelier's principle the effect of temperature and pressure on the reaction: $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g) + heat$. 4

5. a) State the Mendeleev's periodic law. What are the merits of the modern periodic table? 4
   b) Derive an expression for the rate constant of the first-order reaction. Show that the half-life period is independent of initial concentration. 6
   c) What are the different blocks constituting the periodic table? 4

6. a) What are colligative properties and give examples of each property? 4
   b) State and deduce the Raoult's law for lowering of vapour pressure. 5
   c) Electrolytes have an abnormally high value of colligative properties –Explain by giving proper reasons. 5

7. Write short notes on the following topic (any four): 14
   i) Azotropic Mixture
   ii) Buffer Solution
   iii) Hybridization
   iv) Hund's Rule
   v) Biomolecules
   vi) Electrochemical behavior of molten salt.

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

Total Marks: 70 Time: 3 Hours

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

1. a) Define Continuity and Differentiability of a Function. 3
   b) Test the Continuity and Differentiability of the following function at x=0 5

$$f(x)=\left\{\sqrt{|x|} \text{ when } x\geq 0;\ -\sqrt{|x|} \text{ when } x<0\right\}$$

   Draw the graph of the following function

   c) $$f(x)=\left\{x-1 \text{ when } x>0;\ -\frac{1}{2} \text{ when } x=0;\ x+1 \text{ when } x<0\right\}$$ 6

2. a) Define Taylor's series? Find Taylor's series for $\ln \ln x$, where $x=1$ 4
   b) Find the equation of the tangent and normal at the point (x,y) of the curve 1+3

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

   c) Show that $\frac{d^{n+1}}{dx^{n+1}}(x^n \ln x)=n!$ 6

3. a) State Fundamental theorem of Integral Calculus. 2
   b) Evaluate(any two) 8

   i. $\int \frac{x^2+\sin^2 x}{1+x^2}\sec^2 x\,dx$

   ii. $\int \sqrt{1+\sec x}\,dx$

   iii. $\int \frac{x^2+1}{x^4+1}dx$

   c) Show that $\frac{x-\sin x}{x^3}=\frac{1}{6}$ 4

4. a) Evaluate the followings (any two): 3.5x2

   (i) $\int_0^{\frac{\pi}{2}} \frac{\cos x}{\sin x+\cos x}dx$

   (ii) $\int_0^1 x^3\sqrt{1+3x^4}\,dx$

   (iii) $\int_0^{\pi} \frac{x\sin x}{1+\cos^2 x}dx$

   b) Evaluate $\lim_{n\to\infty}\left[\frac{n}{n^2+1^2}+\frac{n}{n^2+2^2}+\ldots\ldots\ldots+\frac{n}{n^2+n^2}\right]$ 4

   c) Evaluate $\int \frac{dx}{2x^2+x+1}$ 3

5. a) What do you mean by Linear Approximation?

b) Find the Approximation of f(x)=$\sqrt{x}$ at x=16 with graph.

c) State L'Hospital Rule. Evaluate(Using L'Hospital rule) 8

i. $lim_{x \to \pi/2}\left(\frac{2}{x^2-1} - \frac{1}{x-1}\right)$

ii. $lim_{x \to 0}\frac{(1+x)^{\frac{1}{x}} - e}{x}$

6. a) Find maximum, minimum value and critical point of the function 7

$$f(x) = x^3 - 9x^2 + 15x - 3$$

b) Show that $\int_0^{\pi} x \log \sin x \, dx = \frac{\pi^2}{2} \log \frac{1}{2}$ 7

7. a) (a) Evaluate the followings (any two): 2x3

(i) $\int \tan^{-1} x dx$

(ii) $\int \frac{\sin x}{\sqrt{1+\cos x}} dx$

(iii) $\int x^3 \ln x dx$

b) Differentiate $\tan^{-1}\frac{\sqrt{1+x^2}-1}{x}$ with respect to $tan^{-1}x$ 4

c) Write the Walli's formula. Find the reduction formula of $\int \tan^n x dx$ 4

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

Total Marks: 70 Time: 3 Hours

Answer any 5 (Five) of the following Questions

1.	a)	Define State and Government.	3
	b)	Difference between State and Government.	5
	c)	Briefly discuss the functions of the modern State.	6
2.	a)	What is Constitution?	3
	b)	Mention various types of Constitution.	5
	c)	Briefly discuss the features of an ideal Constitution.	6
3.	a)	What is meant by Judiciary?	2
	b)	Briefly discuss the functions of Judiciary.	6
	c)	What are the safeguards of independence of the judiciary?	6
4.	a)	Briefly discuss the history of Language Movement.	7
	b)	Discuss the significance of Language Movement.	7
5.	a)	What do you mean by Democracy?	2
	b)	What are the principles of Democracy? Describe.	5
	c)	Briefly discuss the conditions for the success of Democracy in a country like Bangladesh	7
6.	a)	What is Local Government?	3
	b)	Describe the composition of Upazila Parishad as a local government institution.	4
	c)	Briefly discuss the functions of Upazila Parishad.	7
7.	a)	Good Governance is the highly used and prescribed term by International Development Agencies, as it ensures respect for Human Rights, Rule of Law, and Democracy. From this point of view, define 'Governance and Good Governance'.	3
	b)	What are the major characteristics of Good Governance, explain?	4
	c)	Which obstacles do you think hamper Good Governance in Bangladesh? Discuss.	7