

Chittagong Veterinary and Animal Sciences University
Faculty of Food Science and Technology
BFST 1st year 2nd Semester Final Examination, 2017
Course Title: Biochemistry
Course Code: BCM-102

Full Marks: 70

Time: 3 hours

Figures in the right margin indicate Full Marks. Answer any three questions from each section where question no. 1 & 5 are compulsory. Use separate answer scripts for each section. Split answer is discouraged.

SECTION-A

1. a) Define Biochemistry. Who is known as the father of modern Biochemistry? 2
b) As an undergraduate student of the Faculty of Food Science & Technology, how could you explain the scopes for Food Science? 3
c) How will you get D-fructose from D-glucose? 3
d) Write the monomeric unit of the following carbohydrate a) Chitin b) Starch c) Cellulose d) Inulin 2
e) Write down the structure of the following 1
 i) β -D glucopyranosyl α -D-glucopyranoside
 ii) α -D-fructofuranosyl β -D glucopyranose
2. a) Write down the structure of the amino acid containing the following groups: 2
 i) Thiol group ii) Indole group
 iii) Amide group vi) Phenolic group
b) Mention the source, amino acid number and function of the following peptide : 4
 a) Oxytocin b) Bradykinin
 c) Glutathion d) Vasopression
c) Define Zwitterion. Write down the structure of an amino acid from each group; 1+2=3
 a) Sulphur containing amino acid
 b) Acidic amino acid
d) Describe a reaction in which we can identify the N-terminal residue in a protein. 3
3. a) What are steroids? What are some examples of steroids with a biological function? 3
b) "Polyunsaturated fatty acids are more beneficial than saturated fatty acids for human health" explain with specific example. 3
c) Distinguish fat and fatty acids. Briefly point out the fundamental role of lipids in membrane structure formation. 2+2= 4
d) Illustrate the importance of Omega-3 and Omega-6 fatty acids. 2
4. a) Differentiate between aerobic and anaerobic glycolysis. 3
b) How many ATP is produced in the citric acid cycle? 3
c) What is the fate of pyruvate under different condition? Mention the major site of gluconeogenesis. 4
d) Outline one mechanism by which the electrons in the NADH formed during the oxidation of glyceraldehyde-3-p in the cytoplasm enter the electron transport chain in the mitochondrial inner membrane. 2

SECTION-B

- | | | |
|----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|
| 5. | <p>a) What are pentoses? To what organic group do pentoses belong? Are nucleotides formed of only one type of pentose?</p> <p>b) Name the components of a nucleotide and show the order in which they linked together?</p> <p>c) What do you mean by central dogma? Mention the enzymes involved in transcription and reverse transcription procedure.</p> <p>d) Distinguish between</p> <p style="margin-left: 20px;">i) Nucleoside and Nucleotide.</p> <p style="margin-left: 20px;">ii) Ribonucleotide and Deoxyribonucleotide.</p> | <p>1+1+
3
1+1=2
2</p> |
| 6. | <p>a) Do enzymes act better under acidic or alkaline pH? What happens to pepsin when it enters the duodenum?</p> <p>b) Why enzymes are said to be specific? What is feedback inhibition of an enzyme? What is meant by allosteric regulation?</p> <p>c) What is co-enzyme? Define isozyme and pro-enzymes. Cooperativity is the key property of allosteric protein- explain.</p> <p>d) What happens to the functionality of a denatured enzymes? How can that result be explained with the help of the lock and key model?</p> | <p>3
3
3
1.5+1.5=
3</p> |
| 7. | <p>a) Can NADH cross the inner mitochondrial membrane? What is the purpose of the malate aspartate shuttle system?</p> <p>b) Reactive Oxygen Species (ROS) are a consequence of aerobic metabolism.</p> <p style="margin-left: 20px;">i) What are ROS?</p> <p style="margin-left: 20px;">ii) How are they formed?</p> <p style="margin-left: 20px;">iii) Why are they dangerous?</p> <p style="margin-left: 20px;">iv) How do organisms protect themselves from these dangerous molecules?</p> <p>c) What is the role of urea in the body?</p> <p>d) What are the enzymes involved to complete the urea cycle in animal's body?</p> | <p>1.5+1.5=
3
4
2
3</p> |
| 8. | <p>a) How lipids are metabolized? Where does fatty acid metabolism occur in human body?</p> <p>b) Define amphibolic pathways with specific examples.</p> <p>c) Write down the differences between glucokinase and hexokinase .</p> <p>d) The t_m value of DNA molecule depends on different factors – how?</p> | <p>3
3
3
3</p> |

Chittagong Veterinary and Animal Sciences University
Faculty of Food Science and Technology
BFST 1st Year 2nd Semester Final Examination, 2017
Subject: Physics-II
Course Code: PHC-102(T)

Full Marks: 70

Time: 3

hours

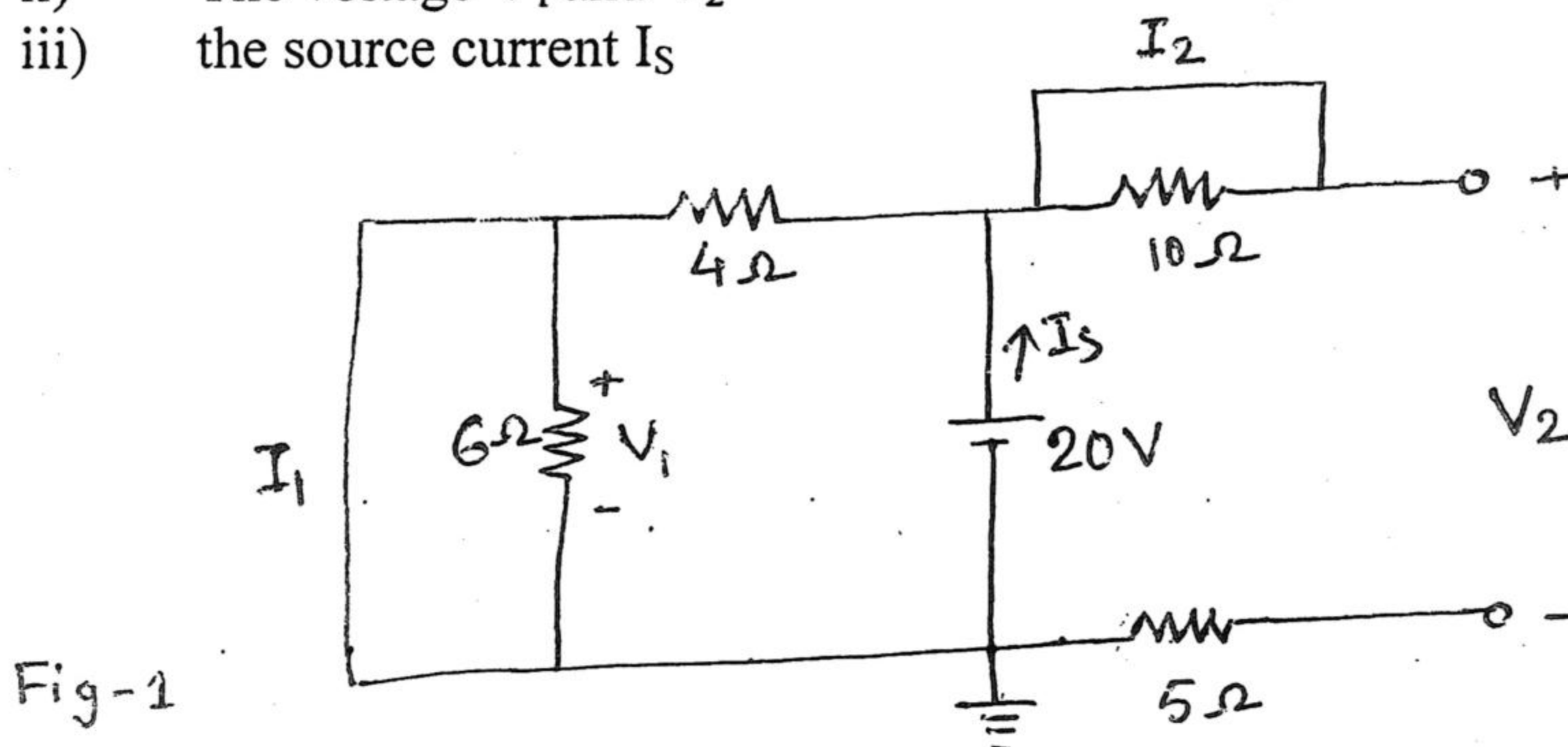
(Figures in the right margin indicate full marks. Answer Four (4) questions from each section where question no. 1 and 6 are compulsory. Use separate answer script for each section. Split answer is discouraged.)

Section-A

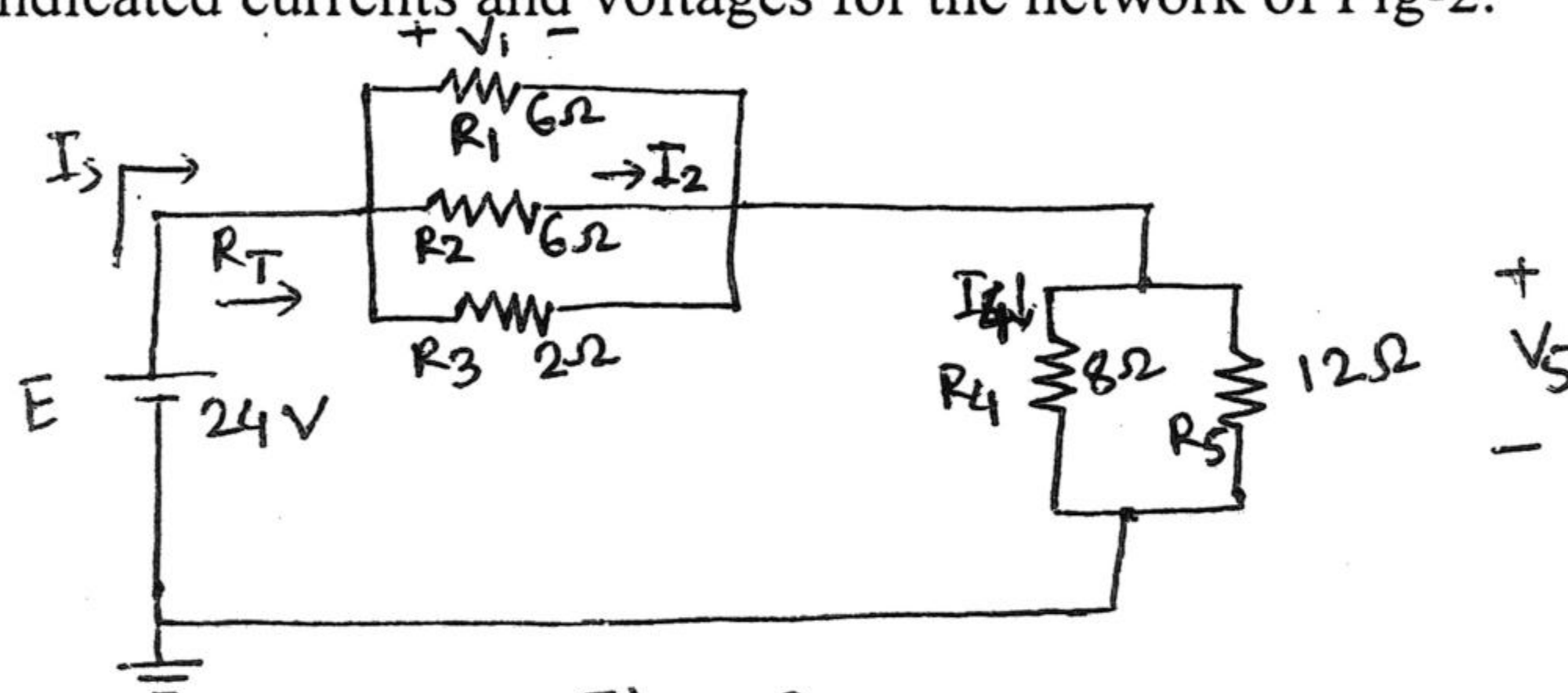
1. a) What is the benefit of using AC for power distribution and in household supplies? 1
 b) Explain what would be the condition occur of current and voltage for both cases if voltage sources are connected in series and in parallel? 4

2. a) Demonstrate the effect of using dielectric between the plates of a capacitor. 4
 b) "The voltage across a capacitor in a dc network is essentially equal to the applied voltage after five time constants of the charging phase have passed"- Explain with all necessary diagrams. 6

3. a) Define short and open circuits. For the network of Fig-1, determine 1+5=6
 - i) The short-circuit currents I_1 & I_2
 - ii) The voltage V_1 and V_2
 - iii) the source current I_s



- b) Find the indicated currents and voltages for the network of Fig-2. 4



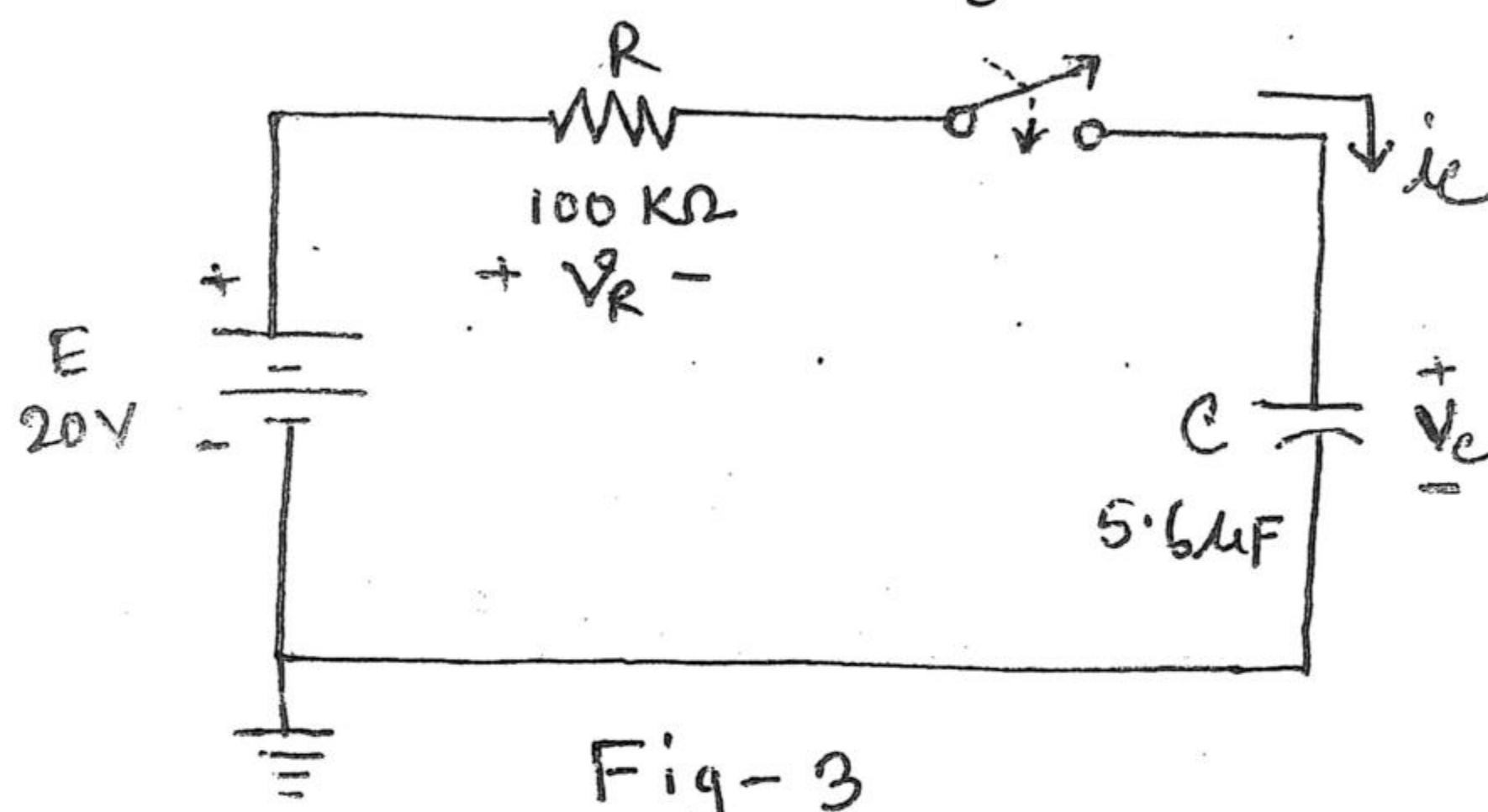
4. a) State KCL and KVL. 2
 b) Discuss "Hole current". 3
 c) State and explain Huygen's Principle. 3
 d) What are self and mutual inductances? Show how mutual inductance is used in a transformer. 1+1=2

5. a) Define spherical aberration and optical aberration. 2
 b) Briefly describe the theory of interference fringes and hence calculate the difference between two consecutive bright fringes and dark fringes. 5
 c) In Young's double slits experiment the separation of the slits is 1.9 mm and the fringe spacing is 0.31 mm at a distance of 1 meter from the slits. Calculate the wavelength of light. 3

Section-B

6. a) Describe the difference between majority and minority carriers. Sketch the energy level diagram for insulator, semiconductor and conductor. 1+1=2
- b) Describe the condition established by forward and reverse bias conditions on a p-n junction diode and how the resulting current is affected. 3

7. a) 1×5 = 5



For the circuit of Fig-3, composed of standard values:

- i) Determine the time constant of the circuit
 - ii) Write the mathematical equation for the voltage V_C following the closing of the switch.
 - iii) Determine the voltage V_C after one, three and five time constants
 - iv) Write the equations for the current i_C and the voltage V_R
 - v) Sketch waveforms for V_C and i_C
- b) During discharging phase describe the transients occurred in a capacitive network. 5
8. a) Deduce the expression for impedance in a RLC series AC circuit and graphically show the relationship of voltage with current. Find out the resonant frequency of that circuit. 4+2=6
- b) For a RLC series circuit having a 40.0Ω resistor, a 3.00 mH inductor and a $5.00 \mu\text{F}$ capacitor 2+2=4
- i) Find the resonant frequency
 - ii) Calculate I_{rms} at resonance if V_{rms} is 120 V
9. a) Write short notes on 1×3 = 3
- i) Break down voltage
 - ii) Knee voltage
 - iii) Peak inverse voltage
- b) Draw and explain the V-I characteristics of p-n junction. 2
- c) Explain the working principle of full wave bridge rectifier. What are its advantages over center tap circuit? 3+2=5
10. a) Explain the terms 2+2=4
- i) Time dilation
 - ii) Length contraction
- b) Deduce an expression for decay rate, $R = \lambda N_0 e^{-\lambda t}$. 4
- c) Define inertial and non-inertial frames. 2

Chittagong Veterinary and Animal Sciences University
Faculty of Food Science and Technology
BFST 1st Year 2nd Semester Final Examination, 2017
Subject: Mathematics-II
Course Code: MTH-102(T)

Full Marks: 70

Time: 3 hours

(Figures in the right margin indicate full marks. Answer any Five (5) questions from each section. Use separate answer script for each section. Split answer is discouraged.)

Section-A

1. a) What do you understand by the order and degree of a differential equation? Find the order and degree of the following differential equations and also classify them as linear and non-linear. 1+3+1= 5
 - i) $y = \sqrt{x} \left(\frac{dy}{dx} \right) + \frac{k}{\left(\frac{dy}{dx} \right)}$
 - ii) $dy = (y + \sin x) dx$
 - iii) $\left(\frac{d^2 y}{dx^2} \right)^3 + x \left(\frac{dy}{dx} \right)^5 + y = x^2$

- b) Show that $y = a \cos(mx + b)$ is a solution of the differential equation 2

$$\frac{d^2 y}{dx^2} + m^2 y = 0$$

2. a) Discuss the working rule for an Exact differential equation. 1
 b) Test each of the following equations for exactness and solve the equations. 2 × 3 = 6
 - i) $3x(xy - 2)dx + (x^3 + 2y)dy = 0$
 - ii) $(2x^3 - xy^2 - 2y + 3)dx - (x^2 y + 2x)dy = 0$

3. a) During a chemical reaction substance A is converted into Substance B at a rate that is proportional to the square of the amount of A. When $t = 0$, 60 grams of A are present and after 1 hour ($t = 1$) only 10 grams of A are remain unconverted. How much of A is present after 2 hours? 4

- b) When a cake is removed from an oven, its temperature is measured at $300^\circ F$. Three minutes later its temperature is $200^\circ F$. How long will it take for the cake to cool off to a room temperature of $70^\circ F$? 3

4. a) When do you need complementary function to find the general solution of linear differential equation? Give Example. 1
 b) Solve any two of the following higher order differential equations 2 × 3 = 6
 - i) $(D^2 - 2D + 1)y = x^2 e^x$
 - ii) $(D^2 + 3D + 2)y = e^{2x} \sin x$
 - iii) $(D^3 - D^2 - 6D)y = 1 + x^2$
 - iv) $(D^3 + 1)y = 3 + e^{-x} + 5e^{2x}$

5. a) Find the constant 'a' so that that the vectors 3

$$\vec{A} = 3\hat{i} - 3\hat{j} - \hat{k}, \quad \vec{B} = -3\hat{i} - 2\hat{j} + 2\hat{k} \quad \text{and} \quad \vec{C} = 6\hat{i} + a\hat{j} - 3\hat{k}$$
 are coplanar.

 b) A particle moves along a curve whose parametric equations are 4

$$x = e^{-t}, \quad y = 2 \cos 3t \quad \text{and} \quad z = 2 \sin 3t$$
 where t is the time.
 - i) Determine its velocity and acceleration at any time
 - ii) Find the magnitude of the velocity and acceleration at $t = 0$

6. a) Define Directional Derivative. Find the directional derivative of 1+2=3

$$\phi = 3xz^2 - 4x^2 yz$$
 at $(1, 2, -1)$ in the direction $\hat{i} + 2\hat{j} - 2\hat{k}$.

b) Evaluate $\iint_S (y^2 \hat{i} + y^3 \hat{j} + xz \hat{k}) \cdot dA$

where S is the boundary of the cube defined by $-1 \leq x \leq 1$, $-1 \leq y \leq 1$ and $0 \leq z \leq 2$.

Section-B

7. a) Discuss different types of errors in numerical analysis with examples. 2
 b) Find the relative error and percentage of error for $X_T = \pi$ and $X_A = \frac{22}{7}$. 2
 c) Determine the root of $x^4 + x^3 - 7x^2 - x + 5 = 0$ which lies between 2 and 3 correct to three decimal places. 3

8. a) What is interpolation? 1
 b) Write down the Newton's formulas of interpolation. 2
 c) Estimate the missing term in the following table: 4

x	1	2	3	4	5
f(x)	2	5	7	?	32

9. a) Show that the divided differences are symmetrical in their arguments. 2
 b) Construct the divided difference table from the following data and use it to obtain a polynomial of degree 4 that interpolate the function values indicated. 5

x	-1	0	3	6	7
f(x)	3	-6	39	822	1611

10. a) Discuss a method for finding an approximate area under a given curve. 3
 b) Apply Simpson's rule with five ordinates to find an approximate value for the 4

$$\text{integral } \int_4^6 \frac{1}{3 - \sqrt{x}} dx$$

Give your answer to the three decimal places.

11. a) Define Fourier Series. 1
 b) Let f(x) be the function of period 2π which is given on the interval $-\pi < x < \pi$ by $f(x) = x - x^2$. Find the Fourier series of f(x) and show that 6

$$\frac{\pi^2}{12} = \frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \dots$$

12. a) Define Fourier sine series and cosine series. Represent the following function by a Fourier sine series. 2+5=7

$$f(t) = \begin{cases} t; & 0 < t \leq \frac{\pi}{2} \\ \frac{\pi}{2}; & \frac{\pi}{2} < t \leq \pi \end{cases}$$

Chittagong Veterinary and Animal Sciences University
Faculty of Food Science and Technology
BFST 1st year 2nd Semester Final Examination 2017
Subject: Fundamentals of Food Engineering (Theory)
Course Code: FFE:102

Full Marks: 70

Time: 3 hours

(Figures in the right margin indicate full marks. Answer any four (4) questions from each section where question no. 1 and 6 are compulsory. Use separate answer script for each section. Split answer is strongly discouraged.)

Section-A

1. Explain the scope of food science and technology in Bangladesh. 5
2. a) Define food spoilage. Explain the causes of food spoilage. 1+4=5
b) Write down the importance of food preservation. Write down the principle and methods of food preservation. 2+3=5
3. a) Discuss the effect of heat treatment on composition and quality of food. 5
b) What is meant by F, Fo, D, Z and 12D value? 5
4. a) Write down the principle of canning. Explain the steps of canning involve in heat treatment. 3+4=7
b) Illustrate double seam. 3
5. a) Define leaching. Explain the factors affecting the leaching process. 1+5=6
b) Narrate gas absorption. Develop gas absorption equations for ideal and non-ideal gas. 1+3=4

Section: B

6. Briefly describe the factors affecting size reduction. 5
7. a) Illustrate the general graphical method of calculating lethal rate using TDT curve. 6
b) You are given a food with 10^7 heat resistant bacteria per gram for commercial sterilization in 400 gram of can. If the retort contains 2000 cans, using 12-D heating concept, how many cans would be sterilized? 4
8. a) Briefly describe the physical properties of food raw materials. 4
b) What principles are utilized during mechanical harvesting? 3
c) Describe the requirements necessary to satisfy a cleaning process. 3
9. a) Mention different cleaning methods. Illustrate aspiration cleaning system and flatbed screening system. 1+5=6
b) "Sorting plays an important part in controlling the effectiveness of many food processes"- Justify the statement. 4
10. a) Briefly describe the spoilage of canned food with their remedies. 4
b) Differentiate between sorting and grading. Explain process suitability and contract purchasing of raw materials. 3+3=6

Chittagong Veterinary and Animal Sciences University
Faculty of Food Science and Technology
BFST 1st year 2nd Semester Final Examination, 2017
Course Title: Physical Chemistry
Course Code: PCM-102

Full Marks: 70

Time: 3 hours

Figures in the right margin indicate Full Marks. Answer any four questions from each section where question no. 1 & 6 are compulsory. Use separate answer scripts for each section. Split answer is discouraged.

SECTION-A

1. a) Discuss the effect of temperature and concentration on vapor pressure of solution. 03
b) What are electrolytes? What is meant by electrolysis? 02
2. a) Briefly discuss about the Tyndall Effect of colloidal solutions. 04
b) State different methods of preparation of colloidal dispersions. Discuss in details one of these methods. 06
3. a) What is Le Chatelier's principle? Discuss its application citing examples. 2+4=06
b) Calculate the molarity and normality of Na_2CO_3 if 40gm of it is dissolved in 600ml water. 04
4. a) How can you determine the molecular mass from lowering of vapor pressure? 03
b) Derive a relation for the depression of freezing point of a solution with its molarity. 04
c) Calculate the boiling point of glucose solution that contains 0.3 moles of glucose in 400gm of water. (Note $K_b=0.52$) 03
5. a) Write the differences between order and molecularity of reaction? 03
b) Derive the expression for a second order reaction : $2A \rightarrow \text{Products}$ 03
c) For a certain first order reaction $t_{0.5}$ is 100 sec. How long will it take for the reaction to be completed 75%? 04

SECTION-B

6. a) Define reaction rate and rate constant of a reaction. 02
b) State and explain Hesse's law. 03
7. a) What do you mean by Heat of Neutralisation, Heat of Combustion and Heat of Solution? 04
b) What is buffer solution? Write down the mechanism of acidic and basic buffer solution. 2+4=06
8. a) What do you mean by equilibrium constant and activity co-efficient? 03
b) Derive the relation between free energy change and equilibrium constant. 07
9. a) Discuss in details about Faraday's law of electrolysis. 04
b) What do you mean by Conductometric titration? Discuss the acid base reactions in terms of this method. 04
c) Write down the Arrhenius theory of electrolytic dissociation. 02
- 10 Write short notes on the following: 2.5x4=10
 - i) Electro-Osmosis
 - ii) Dialysis
 - iii) Ionic Equilibrium
 - iv) Zeta Potential

Figures in the right margin indicate Full Marks. Answer any four questions from each section where question no. 1 & 6 are compulsory. Use separate answer scripts for each section. Split answer is discouraged.

SECTION-A

- | | | |
|----|-------------------------------------------------------------------------------------------------|---------|
| 1. | Derive Henderson-Hasselbalch equation for basic buffer solution. | 05 |
| 2. | a) What is hydrogen bond? | 02 |
| | b) Explain intra and inter molecular hydrogen bond. | 02 |
| | c) Discuss covalent bond with examples. | 03 |
| | d) Explain the term 'Variable Covalency'. | 03 |
| 3. | a) Define ionic bond. | 02 |
| | b) Write down differences between ionic and covalent bond. | 04 |
| | c) Which factors are involved for the formation of ionic Bond? | 04 |
| 4. | a) What is indicator? | 02 |
| | b) Discuss the mechanism of buffer solution. | 05 |
| | c) What is the p^H of human saliva?
($[OH^-] = 4 \times 10^{-8} M$) | 03 |
| 5. | a) What is the difference between oxidation and reduction reaction? Give example. | 03+01=4 |
| | b) Write down the significance of oxidation number. | 02 |
| | c) Balance the following equation
$K_2Cr_2O_7 + KI + H_2SO_4 \rightarrow Cr_2(SO_4)_3 + I_2$ | 04 |

SECTION-B

- | | | |
|----|--------------------------------------------------------------------------|--------|
| 6. | Draw a flowchart of isolation of inert gases by coconut charcoal method. | 5 |
| 7. | a) What do you mean by 'Fixation of Nitrogen'? Explain. | 03 |
| | b) Describe the production process of soda ash by Solvey process. | 07 |
| 8. | a) Differentiate between titrate and titrant. | 02 |
| | b) Describe the extraction process of Radium. | 03 |
| | c) Write down some uses of Be and Mg. | 02 |
| | d) How do you express concentration of solution | 03 |
| | i) Molarity | |
| | ii) Molality | |
| | iii) Normality | |
| 9. | a) Write down different uses of Boric Acid. | 02 |
| | b) Give a brief account of different oxides of P, S and N. | 03 |
| | c) Write down the extraction process of Aluminium from Alumina. | 05 |
| 10 | Write a short note on any two of the following : | 5x2=10 |
| | i) Compounds of Carbon | |
| | ii) Frasch process | |
| | iii) Drude & Laurentz theory | |

(Figures in the right margin indicate full marks. Answer **Four (4)** questions from each section where question no. **1** and **6** are compulsory. Use separate answer script for each section. Split answer is discouraged.)

Section-A

1. a) Companies are attempting to save telephone communication cost by implementing a technology. What is the technology called? Explain Briefly. 2
 b) Define DBMS. Briefly illustrate the E-R model with proper diagram. 3

2. a) A 64 bit operating system is installed on a computer. Now write down the size of word and how many bits can process that computer at a time? 2
 b) Define protocol. Briefly narrate all key components of TCP/IP protocol with figure. 1+3=4
 c) Define computer program. Write down some common extensions of program files for windows PC. 1+3=4

3. a) What is the basic difference between OMR and OCR? 4
 b) Write short note on MICR. 2
 c) What are I/O devices? List common I/O devices. 1+1=2
 d) List the features of Microsoft word. 2

4. a) Convert the following number by showing your conversion steps clearly- 1+1=2
 i) $(A8B79)_{16}$ to Octal
 ii) $(1010101100111)_2$ to Hexadecimal
 b) Evaluate the following : 1+1=2
 i) $1100101001 - 110110111$
 ii) $11100111000 + 110101001$
 c) What do you mean by LAN? Briefly discuss all types of communication with example. 1+2=3
 d) Write a short note on the followings : 0.75 × 4 = 3
 i) Entity ii) Attributes iii) Relationship iv) Field

5. a) Define Cache memory. Draw the functional diagram of Cache memory with the interaction of CPU and secondary memory. 1+2=3
 b) Write down all major differences between compiler and interpreter. 3
 c) What does E-commerce stand for? Write down all major threats of office automation. 1+3=4

Section-B

6. a) With the help of illustration briefly explain the following network topologies: 2+1.5+1.5=5
 i) Star topology
 ii) Ring topology
 iii) Bus topology

7. a) Calculate the 1's and 2's complement of the following number 3
 i) $(11001010110)_2$ ii) $(00101011001)_2$
 b) What is Bootstrap program? Briefly discuss all types of ROM with their programming style. 1+3=4
 c) Draw the figures of Multiprogramming and multiprocessing system. 3

8. a) What is a computer crime? Write short notes on 1+5=6
 i) Computer virus ii) Hacking
 b) Briefly discuss the influence of computers on 1+2+1=4
 i) Commerce ii) Education and iii) Communication

9. a) Suppose you set up a network to connect all digital devices of your home. What is the name of your designed network? Write down the properties of your designed network. 1+3=4
 b) Mention all the points where the Switch and Hub cannot match. 3
 c) Define virtual memory. Describe how does virtual memory work? 1+2=3

10. a) Name the common transmission media and briefly explain their characteristics. 4
 b) What is programming language? List some features of the C and Java. 1+3=4
 c) Classify computer systems on the basis of capacity. 2