Chattogram Veterinary and Animal Sciences University
Faculty of Food Science & Technology
BFST 1st year 2nd Semester Final Examination, 2021
Session: 2020-2021
Course Title: 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 number 1 and 6 are compulsory. Use separate answer script for each section. Split answers are strongly discouraged.)

SECTION-A

1. a) State Faraday's law and Lenz's law for electromagnetic induction and hence show that electromagnetic induction is a consequence of principle of conservation of energy. 3
   b) State Kirchhoff's current law (KCL) and voltage law (KVL). 2

2. a) Define current density. Derive an expression for drift velocity of charge carriers. 3
   b) Calculate the electric field strength at a point along the perpendicular bisector of the line joining of an electric dipole. 5
   c) "Electric force between two particles stronger than gravitational force between these two particles"- explain. 2

3. a) Derive Lorentz transformation equations. Show that Galilean transformation is a special case of Lorentz transformation. 7
   b) A spacecraft is moving relative to the earth. An observer on the earth finds that according to his clock 3601sec elapse between 1:00pm and 2:00pm on the spacecraft's clock. What is the spacecraft's speed relative to the earth? 3

4. a) What do you mean by the term "energy band"? In terms of energy band diagram, make a clear distinction among conductor, semiconductor and insulator? 3
   b) Explain the formation mechanism of potential barrier in a *pn* junction diode. 4
   c) What do you understand by the concept "Hole current" for semiconductors? Explain the mechanism of hole current flow in a semiconductor? 3

5. a) Define fringe width. Show that for dark and bright fringe, fringe width, $\beta = \lambda \frac{D}{d}$, Where the symbols have their usual meanings. 5
   b) Derive a relation between path difference and phase difference. 2
   c) Light from a sodium vapour lamp is 5890Å forms an interference pattern on a screen 0.8m from a pair of slits. The bright fringes in the pattern are 0.35mm apart. Calculate the slit separation. 3

SECTION-B

6. a) Establish a relationship between radioactive half-life and decay constant. 2
   b) Write down the assumptions of Bohr atomic model. 2
   c) What do you mean by wave-particle duality? 1

7.	a)	State the fundamental postulates on special theory of relativity.	2
	b)	Show that length has relativistic effect and the relativistic length is shorter than the length measured at rest.	4
	c)	Derive the equation $E = mc^2$, Where the symbols have their usual meanings.	4
8.	a)	Define magnetic materials. Distinguish among the dia, para and ferro magnetism.	4
	b)	Briefly explain the hysteresis of ferromagnetic material with the help of hysteresis curve and hence, explain the terms retentivity and coercivity.	4
	c)	Define transistor? Draw the symbol of *npn* and *pnp* transistor and specify the leads.	2
9.	a)	What do you mean by the term Newton's rings? Show that for two reflected rays to form Newton's rings, the apparent path difference between them is $x = 2\mu d \cos r$, Where the symbols have their usual meanings.	5
	b)	Define self-induction and mutual induction? Derive an expression for magnetic field intensity of a solenoid wound in a close packed helix and carrying current, i.	5
10.	a)	State Einstein's photoelectric effect? Establish the photoelectric equation to show the relationship between the energy of incident photon with the kinetic energy of the released photoelectron.	4
	b)	Show Compton effect diametrically and state the physical principle involved here.	2
	c)	Represent the graphical *V-I* characteristics of a *pn* junction diode and explain in brief.	4

BFST 1st year 2n Semester Final Examination, 2021

Subject: Physical Chemistry (Theory)

Course Code: PCM-102 (T)

Full Marks: 70 **Time: 3 hours**

(Figures in the right margin indicate full marks. Answer any four questions from each section, where 1 and 6 are compulsory. Use separate answer script for each section. Split answers are strongly discouraged.)

Section-A

1. a) How can you differentiate solution and mixture? Explain with example. 2
   b) Define the terms: i) Extensive properties. 2
      ii) Intensive properties.
   c) Why vapour pressure increases with increase of temperature? 1

2. a) What is meant by degree of dissociation? Calculate the degree of dissociation of an acid. 4
   b) What is Ostwald's dilution law? Deduce an expression of this law. 3
   c) What is osmosis? Write down the significance of osmosis in biological systems. 3

3. a) What is emulsion? Write down the roles of emulsion. 2
   b) Discuss in detail about Bredig's Arc method for sol solution preparation. 4
   c) Illustrate the formation of electrical double layer in colloidal system. 2
   d) Explain fully what happens when a colloidal solution is brought under influence of an electric field. 2

4. a) Explain the term "law of mass action". 2
   b) Why is chemical equilibrium called a dynamic equilibrium? 2
   c) At a certain temperature, 0.1 mole of H_2 and 0.1 mole of I_2 were placed in a one-liter flask. After a time, the equilibrium $H_2 + I_2 \rightleftharpoons 2HI$ was established and it was found that the concentration of I_2 decreased to 0.02 mole/liter. Calculate the value of K_C for the reaction. 4
   d) Describe homogeneous and heterogeneous equilibrium. 2

5. a) Write down the difference between order and molecularity of reaction. 2
   b) Derive a second order rate equation for the reaction $2A \longrightarrow$ Product. 4
   c) Why half life period of second order reaction depends upon initial concentration of reactants? 2
   d) For a certain first order reaction $t_{1/2}$ is 100 sec. How long will it take for the reaction to be completed 75%? 2

Section-B

6. a) Why the reactions of higher order are rare? 2
   b) Discuss the effect of temperature on reaction rate. 2
   c) Explain the term "Pseudo-order reaction". 1

7. a) Derive Van't Hoff equation showing the variation of equilibrium constant with temperature. Also obtain its integral form. 8
   b) What is the value of $K_P : K_C$ for the equilibrium $N_2\,(g) + O_2\,(g) \rightleftharpoons 2NO\,(g)$ at 27^0 C. 2

8. a) What is meant by molarity, normality, molality and mole fraction of solutions? 4
   b) What is the molality of a 5.86 M ethanol solution whose density is 0.927 g/ml? 4
   c) What are exothermic and endothermic reactions? 2

9. a) State Raoult's law of elevation of boiling point. 2
   b) Is it possible to determine molecular mass of a solute from elevation of boiling point? If so, then how you can determine this? 4
   c) Discuss the validity of Raoult's law. 2
   d) The vapour pressure of ether (molecular mass 74) is 442 mm Hg at 293^0 K. 3 gm of compound A is dissolved in 50 gm ether and the vapour pressure reduces to 426 mm Hg. Calculate the molecular mass of A. Assume that the solution is very dilute. 2

10. a) What is activation energy? What is the effect of catalyst on the activation energy? Write equation of Gibb's free energy. 5
    b) Define chemical kinetics. What factors affect the reaction rates? 5

Chattogram Veterinary and Animal Sciences University
Faculty of Food Science & Technology
BFST 1st year 2nd Semester Final Examination, 2021
Session: 2020-2021
Course Title: Mathematics-II
Course Code: MTH-102(T)

Full Marks: 70 Time: 3 Hours

(Figures in the right margin indicate full marks. Answer five (5) questions from each section. Use separate answer script for each section. Split answers are strongly discouraged.)

SECTION-A

1. a) Define differential equation with its order and degree. Write down the order and degree of the following differential equations: 3

(i) $\frac{d^2y}{dx^2} = \left[1 + \left(\frac{dy}{dx}\right)^5\right]^{1/3}$

(ii) $\left(\frac{d^3y}{dx^3}\right)^4 - 6x^2\left(\frac{dy}{dx}\right)^2 + e^x = \sin xy$

b) Form the differential equation of simple harmonic motion given by $x = A\cos(nt + \alpha)$. Also write down the order and degree of the obtained differential equation. 4

2. a) Solve the following differential equations: 4

(i) $e^x \tan y\ dx + (1 - e^x)\sec^2 y\, dy = 0$

(ii) $\frac{dy}{dx} = \frac{y}{x} + x\sin\frac{y}{x}$

b) Solve $\frac{dy}{dx} + 2y\tan x = \sin x$, given that $y = 0$ *when* $x = \frac{\pi}{3}$. 3

3. a) Solve the following higher order differential equations (any two) 3.5×2=7

(i) $(D^3 + 3D^2 - 4)y = xe^{-2x}$

(ii) $(D^2 + 4)(D^2 + 1)y = \cos 2x + \sin x$

(iii) $(D^2 - 2D + 1)y = xe^x \sin x$

4. a) Define vector product. Find the area of a parallelogram whose adjacent sides are $\hat{\imath} - 2\hat{\jmath} + 3\hat{k}$ and $2\hat{\imath} + \hat{\jmath} - 4\hat{k}$. 3

b) What is the geometrical interpretation of scalar triple product? Find the constant λ such that the vectors $2\hat{\imath} - \hat{\jmath} + \hat{k}$, $\hat{\imath} + 2\hat{\jmath} - 3\hat{k}$ and $3\hat{\imath} + \lambda\hat{\jmath} + 5\hat{k}$ are coplanar. 4

5. a) Define gradient of a scalar function. Find the unit normal to the surface $xy^3z^2 = 4$ at $(-1, -1, 2)$. 3

b) Define irrotational vector field. A fluid motion is given by $\vec{V} = 2xyz\,\hat{\imath} + (x^2z + 2y)\,\hat{\jmath} + x^2y\,\hat{k}$. Is the motion irrotational? 4

6. a) Find the angle between the surface $x^2 + y^2 + z^2 = 9$ and $z = x^2 + y^2 - 3$ at $(2, -1, 2)$. 4

b) A force $\vec{F} = 2x^2y\,\hat{\imath} + 3xy\,\hat{\jmath}$ displaces a particle in the xy-plane from (0, 0) to (1, 4) along a curve $y = 4x^2$. Find the work done. 3

SECTION-B

7. a) Define relative error. Given that $u = \frac{5xy^2}{z^3}$, find the relative error at $x = y = z = 1$ when the errors in each of x, y, z *is* 0.001. 3

   b) Find a root of $f(x) = xe^x - 1$, using Bisection method, correct to three decimal places. 4

8. a) Define first and second forward and backward difference. 2

   b) From the following data, estimate the number of students who obtained marks between 40 and 45. 5

Marks	30-40	40-50	50-60	60-70	70-80
No. of Students	31	42	51	35	31

9. a) Define divided difference. Show that $\triangle^3_{bcd}\left(\frac{1}{a}\right) = -\frac{1}{abcd}$ 3

   b) Find the polynomial of the lowest possible degree which assumes the values -21, 15, 12, 3 for x taking the values -1, 1, 2, 3 respectively, using any appropriate formula and hence find $f'(2.5)$. 4

10. a) The following table gives the velocity v of a particle at time t. Find its acceleration at $t = 2$. 3

t	0	2	4	6	8	10
v	4	6	16	34	60	94

   b) Evaluate $\int_0^1 \frac{dx}{1+x}$ by taking $h = 0.1$ and applying 4

   (i) Simpson's 1/3 rule

   (ii) Simpson's 3/8 rule

11. a) Define Fourier series with Euler's integral. 1

   b) Find the Fourier series expansion of the periodic function of period 2π 6

   $f(x) = x^2, \quad -\pi \le x \le \pi.$

   Hence find the sum of the series

   $\frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \ldots\ldots$

12. a) Find a real root of $x - \cos x = 0$ by Newton-Raphson method correct to three decimal places up to 3rd approximation. 4

   b) Find the Fourier cosine series of the function $f(x) = x^2, \ 0 < x < \pi$. 3

Chattogram Veterinary and Animal Sciences University
Faculty of Food Science & Technology
BFST 1st year 2nd Semester Final Examination, 2021
Course Title: Fundamentals of Food Engineering
Course Code:FFE-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 number 1 and 6 are compulsory. Use separate answer script for each section. Split answers are strongly discouraged.)

SECTION-A

1.		Write down the major difference among science, engineering and technology.	5
2.	a)	What are the fields of food science? Where do food scientists work?	6
	b)	Where does food loss and waste take place in the food? Mention the causes of food loss and waste at each level of the food production processes.	2+2=4
3.	a)	Briefly illustrate the causes of food spoilage and methods for food preservation.	5
	b)	Describe the possible approaches for reducing food loss and waste.	5
4.	a)	Briefly describe the effects of heat over protein, fat, carbohydrate, and vitamins.	5
	b)	"The characteristics of food raw materials are important in food conversion operation"- Describe it briefly.	5
5.	a)	Give an account of the electrostatic cleaning, radio isotope separation, and X-ray separation of dry-cleaning methods.	4
	b)	Write notes on (i) Soaking, (ii) Spray washing, and (iii) Ultrasonic cleaning.	6

SECTION-B

6.		Enumerate in brief the benefits of studying Food Science and Technology.	5
7.	a)	Describe in detail the different sorting methods used in food industry.	4
	b)	Briefly describe the grading parameters and grading methods.	4
	c)	What do you mean by microbial activity in food?	2
8.	a)	Illustrate the function of emulsifying agents. Why is exhausting necessary for canning operation?	3+2=5
	b)	Discuss briefly the principles and applications of membrane separation methods in food industry.	5
9.	a)	Give an account of the applications of extraction in food processing.	5
	b)	Write a brief note on the waste disposal system in food industries.	5
10.	a)	Enlist the different heat processing operations. How is heat applied to food?	5
	b)	Define blanching. Why is it carried out before freezing, canning, and in some cases of drying?	5

Chattogram Veterinary and Animal Sciences University
Faculty of Food Science & Technology
BFST 1st year 2nd Semester Final Examination, 2021
Session: 2020-2021
Course Title: Biochemistry (Theory)
Course Code: BCM-102 (T)

Full Marks: 70 Time: 3 Hours

(Figures in the right margin indicate full marks. Answer three (3) questions from each section where question number 1 and 5 are compulsory. Use separate answer script for each section. Split answers are strongly discouraged.)

SECTION-A

1.	a)	Distinguish between amylose and amylopectin.	3
	b)	Write down the ring structure of the following. i) α-D galactose. ii) β-D fructofuranose and iii) α-D glucopyranose.	3
	c)	Define mutarotation. Why table sugar is called invert sugar.	2
	d)	Write down the repeating unit, linkage and sources of glycogen, hyaluronic acid and lactose.	3
2.	a)	Classify proteins. Describe the forces of protein structures.	4
	b)	"All proteins are polypeptide, but all polypeptides are not protein"- justify this statement.	3
	c)	Write down the structure of Edman's reagent. What is the use of it in protein chemistry.	2
	d)	Draw the structure of α-helix and β-pleated sheet. Write down some differences among them.	3
3.	a)	Suppose, you store tallow and soybean oil in two separate bottles for few days in room temperature. What will happen to them?	3
	b)	Describe the function of cholesterol with its structure. Why it is called animal sterol in our body?	3
	c)	In between HDL and LDL, which one is bad for human health? Write down their effect heart and brain in human body.	3
	d)	What do you mean by ω-3 and ω-6 fatty acids? Write down the significance of saponification value and iodine value in lipid chemistry.	3
4.	a)	What are the sources of individual atoms in the purine rings? How are they incorporated into ring structure?	3
	b)	Justify the following statements: i) Thymidylate is derived from dCDP and dUMP. ii) Degradation of purines produces uric acid.	3
	c)	Write down the structure of the following compounds; i) Allopurinol. ii) Auxin. and iii) Cimetidine.	3
	d)	Diagrammatically show the synthesis of AMP and GMP from IMP.	3

SECTION-B

5.	a)	Write down the activation step of β- oxidation. Calculate total number of ATP in complete oxidation of one mole of palmitic acid.	4
	b)	Write down the reaction of EMP pathway in which glucokinase, aldolase and lactate-dehydrogenase enzymes act.	3
	c)	Why does gluconeogenesis not occur in muscle cell?	2
	d)	Write down the fate of glycerol and fatty acid.	2
6.	a)	Write down the salient features of active site of enzymes.	3
	b)	What is palindrome in nucleic acid chemistry? Write down the post-transcriptional	4

modification of mRNA.

c) "G-A-V" is the single letter symbol of amino acid abbreviation for a peptide. Draw the structure of this peptide. 2

d) Give the evidence that nucleic acid act as a genetic material. 3

7. a) Justify that Krebs cycle is the final common metabolic pathway for oxidation of food stuff. 3

b) What is biogenic amine? Draw the relationship between Urea cycle and TCA cycle. 3

c) Define β- oxidation. "Carnitine act as a ferry boat"- justify this statement. 3

d) Write down the sources of gluconeogenesis. Why store glycogen act as fuel reserve in human body? 3

8. a) Write short notes (any four) to the followings: (3x4)=12

i) Biological roles of nucleic acid

ii) Optical properties of carbohydrates

iii) Oligomeric protein

iv) Watson-crick model of DNA

v) Lipid profiling

vi) Triacylglycerol cycle

Chattogram Veterinary and Animal Sciences University
Faculty of Food Science & Technology
BFST 1st year 2nd Semester Final Examination, 2021
Session: 2020-2021
Course Title: Introductory Computer Science
Course Code: ICS-102 (T)

Full Marks: 70 Time: 3 Hours

(Figures in the right margin indicate full marks. Answer five (5) questions from each section. Use separate answer script for each section. Split answers are strongly discouraged.)

SECTION-A

1. a) Define computer system. Briefly describe the functionalities of essential hardware components of a computer system. 1+3=4
   b) What are the advantages of using a computer system in terms of "automation" and "accuracy"? 1
   c) Write down the characteristics of the following types of computers (any two): 2
      i) Handheld computer *ii)* Super computer *iii)* Workstation

2. a) What do you mean by data and information? Briefly explain the four phases of the information processing cycle. 1+3=4
   b) Write down the significant differences between system software and application software. 2
   c) Why is binary number system used in digital computer? 1

3. a) Define CPU and list its two main components. How do they work together in a computer system? - explain with a block diagram. 4
   b) Identify input and output devices from the following: 3
      i) Mouse *ii)* Joystick *iii)* Printer *iv*) Scanner *v*) Keyboard *vi)* OCR
      vii) Microphone *viii)* Plotter *ix)* MICR

4. a) How does the operating system communicate with CPU? 3
   b) Briefly explain the features of the following types of operating systems: 2×2=4
      i) Real time operating system
      ii) Single user and multitasking operating system

5. a) Two most common network topologies are Star Network and Ring Network. Sketch suitable figures to demonstrate configuration of these two networks. 2
   b) Compare the Star Network and Ring Network in terms of their *advantages* and *disadvantages*. 5

6. a) What is computer virus? How does a virus affect the computer performance? How can you secure your computer from virus attack? 4
   b) Write down the differences between interpreter and complier. 2
   c) Define web browser. List some popular web browser. 1

SECTION-B

7. a) Define positional and non-positional number system. 1
   b) Convert the following numbers by showing your conversion steps clearly: 1×3=3

i) $(7C.514)_{16} = (?)_8$

ii) $(565.75)_{10} = (?)_2$

iii) $(1010.011)_2 = (?)_8$

c) Perform the following binary operations: 1.5×2=3

i) $(11011.10)_2 - (111.1)_2$

ii) $(1100110)_2 \div (11)_2$

8. a) Define Database Management System (DBMS). Give some applications where DBMS is used. 2

b) "Flash memory combines the best feature of RAM and ROM" -explain this term with proper example. 3

c) List some benefits of computer network. 2

9. a) Define the following type of text codes: 3

i) ASCII *ii)* Unicode *iii)* EBCDIC

b) What is Cache memory? How does Cache memory reduce the mismatch of processor and main memory speed? 4

10. a) What do you mean by programming language? Write down the differences between high level and low level language. 1+3=4

b) How does MODEM work as modulator and demodulator? – explain briefly. 3

11. a) Explain how do barcode readers work as input devices? 3

b) For logical inputs A and B and output Y, please construct truth tables for the following logic operations: 2×2=4

i) NOR *ii)* XOR

12. a) What is GUI? Briefly explain GUI in context of windows operating system. 4

b) Write down the differences between storage and memory. 3