

Roll No.

Total No. of Pages : 02

Total No. of Questions : 09

B.Sc. (BT) (Sem-2)

**PHYSICAL CHEMISTRY**

Subject Code : BSBT-201-18

M.Code : 75872

Date of Examination : 13-06-2023

Time : 3 Hrs.

Max. Marks : 60

**INSTRUCTIONS TO CANDIDATES :**

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

**SECTION-A**

1. Write briefly :

- a) Define adiabatic process.
- b) Explain why no work is done when a gas expands against vacuum?
- c) Define phase.
- d) What is condensed system?
- e) What is transport number?
- f) What is overvoltage?
- g) Explain the term order.
- h) Define mole fraction.
- i) What is isotonic solution?
- j) What is osmosis?

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**SECTION-B**

2. What are colligative properties? What do you mean by molal elevation constant of a solvent?
3. Derive Nernst equation for measuring EMF of a cell. Calculate the degree of hydrolysis of 0.1N solution of sodium acetate (the ionic product of water is  $1.0 \times 10^{-14}$  and dissociation constant of acetic acid is  $1.8 \times 10^{-5}$ )
4. Calculate the entropy change when one mole of hydrogen is mixed with two moles of oxygen at room temperature, assuming that the gases behave ideally.
5. Derive the rate equation for first order reaction.
6. Explain carnot's cycle.

**SECTION-C**

7. Derive the relationship between elevation in boiling point and relative lowering of vapour pressure.
8. List three criteria for phase equilibrium of a multi component system and one component system.
9. What is conductivity water/, parallel reactions, opposing reactions and chain reactions?

**NOTE : Disclosure of identity by writing mobile number or making passing request on any page of Answer sheet will lead to UMC case against the Student.**

Roll No.

Total No. of Questions : 09 Total No. of Pages : 02

**B.Sc.(BT) (Sem.-2)  
INTRODUCTION TO MICROBIOLOGY**

Subject Code : BSBT-202-18

M.Code : 75873

Date of examination : 30-05-23

Time : 3 Hrs.

Max. Marks : 60

**INSTRUCTIONS TO CANDIDATES :**

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying TWO marks have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

**SECTION-A**

1. Write briefly :
  - a. Biogenesis
  - b. Microbial flora of healthy human
  - c. Gram Staining
  - d. Mesophiles and Extremophiles
  - e. Amoebic dysentery
  - f. Sterilization and Pasteurization
  - g. Generation time
  - h. Sporulation process in microbes
  - i. Aflatoxins
  - j. Role of Nitrogenase in nitrogen fixation.

**SECTION-B**

2. Describe the Koch postulates.
3. Explain the working principle of Scanning electron microscope.
4. Describe the salient features of viruses.
5. Explain the host defense mechanisms against pathogens with examples.
6. Describe the different phases of microbial growth with the help of diagram:

**SECTION-C**

7. Discuss the contributions of Antony Van Leeuwenhoek and Louis Pasteur in Microbiology.
8. What do you mean by true fungi? What are the unique features of slime molds that distinguish them from true fungi?
9. What are monoxenic, diauxic and synchronous growth? Describe different methods used for measurement of growth of microorganisms.



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July-2023

Roll No.

Total No. of Questions : 09

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B.Sc. (Bio Technology) (Sem-2)

**BIOSTATISTICS**

Subject Code : BSBT-203-18

M.Code : 75874

Date of Examination : 02-06-2023

Time : 3 Hrs.

Max. Marks : 60

**INSTRUCTIONS TO CANDIDATES :**

- SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
- SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
- SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

**SECTION-A**

**1. Write briefly :**

- What do you understand by Sample? Enlist the different methods of sampling.
- Give characteristics and properties of normal distribution curve.
- What are derivative curves?
- What are the differences between correlation and regression coefficients?
- Define Null Hypothesis and level of significance.
- Define randomization.
- What do you understand by Curve Smoothing? Give its purpose.
- What are the advantages of graphical representation of data?
- What do you understand by Precision? Enlist the methods used to measure precision of statistical tests?
- What do you mean by Matrices manipulations?

**SECTION-B**

**2. Evaluate the determinant :**

$$\begin{vmatrix} y^2 + z^2 & xy & xz \\ xy & z^2 + x^2 & yz \\ zx & yz & x^2 + y^2 \end{vmatrix}$$

3. Distinguish between Binomial and Poisson Distribution.

4. Explain Trapezoid rule of Numerical integration.

5. Find the means of X and Y variables and the coefficient of correlation between them from the following two regression equations :

$$4X - 5Y + 33 = 0$$

$$20X - 9Y - 107 = 0$$

**SECTION-C**

7. a) Calculate mean and standard deviation of following data.

Marks No. of Students	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
	2	4	8	12	16	6	8	4

b) Describe the methods of averages and least squares.

**8. Write notes on :**

- Fourier Transformation
  - Polynomial Interpolations
9. a) Write a detailed note on 'ANOVA'.  
b) Describe different types of 'Design of Experiments'.

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July-2023

B.Sc. (Bio Technology) (Sem-2)  
**BIOSTATISTICS**

Subject Code : BSBT-203-18

M.Code : 75874

Date of Examination : 02-06-2023

Time : 3 Hrs.

Max. Marks : 60

**INSTRUCTIONS TO CANDIDATES :**

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- SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

**SECTION-A**

1. Write briefly :

- What do you understand by Sample? Enlist the different methods of sampling.
- Give characteristics and properties of normal distribution curve.
- What are derivative curves?
- What are the differences between correlation and regression coefficients?
- Define Null Hypothesis and level of significance.
- Define randomization.
- What do you understand by Curve Smoothing? Give its purpose.
- What are the advantages of graphical representation of data?
- What do you understand by Precision? Enlist the methods used to measure precision of statistical tests?
- What do you mean by Matrices manipulations?

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**SECTION-B**

2. Evaluate the determinant :

$$\begin{vmatrix} y^2+z^2 & xy & xz \\ xy & z^2+x^2 & yz \\ zx & zy & x^2+y^2 \end{vmatrix}$$

- Distinguish between Binomial and Poisson Distribution.
- Explain Trapezoidal rule of Numerical integration.
- Find the means of X and Y variables and the coefficient of correlation between them from the following two regression equations :

$$4X - 5Y + 33 = 0$$

$$20X - 9Y - 107 = 0$$

6. Write a note on F and Z residuals.

**SECTION-C**

7. a) Calculate mean and standard deviation of following data.

Marks	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
No. of Students	2	4	8	12	16	6	8	4

- Describe the methods of averages and least squares.
- Write notes on :
  - Fourier Transformation
  - Polynomial Interpolations
- Write a detailed note on 'ANOVA'.
  - Describe different types of 'Design of Experiments'.

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July-2023



Roll No. [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ]

Total No. of Questions : 07

Total No. of Pages : 02

B.A. (JAMC)/ BBA (SIM)/ B.Com (Honours) / BHMCT/ B.Sc. (Bio Technology)/(Fashion Design)/(Medical Lab Sciences) / BTTM (Sem-2)

**ENVIRONMENTAL STUDIES**

Subject Code : EVS-102-18

M. Code : 75831

Date of Examination : 23-06-2023

Time : 3 Hrs.

Max. Marks : 60

**INSTRUCTIONS TO CANDIDATES :**

1. Attempt ALL questions in SECTION-A, Each question carry 2 marks
2. Attempt any FOUR questions from SECTION-B, Each question carry 10 marks.

**SECTION-A**

1. Answer briefly :

- a) Define Environment
- b) Explain consumers
- c) Food web
- d) Difference between renewable resources and non-renewable resources of energy
- e) Reasons for overexploitation of ground water
- f) Desertification
- g) Cyclones
- h) Reasons for rising sea levels
- i) Species diversity
- j) Red data book.

**SECTION-B**

2. Discuss the nature and scope of environmental studies in day to day life.
3. Explain the structure and functions of an ecosystem.
4. Briefly discuss the features and structure of an aquatic ecosystem.
5. Explain the following :
  - a) Earthquake
  - b) Noise pollution.
6. Discuss various problems associated with water resources and solutions to these problems.
7. "India is a mega diversity nation" explain the statement along with threats to biodiversity.



July-2023

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Roll No.

Total No. of Pages : 02

Total No. of Questions : 07

B. Com(Hons)/B.Sc.(BT/FD/MLS)/BA(JAMC)/BBA (SIM), BBA,  
BHMCT/BTTM (Sem.-2)

### ENVIRONMENTAL SCIENCE

Subject Code : EVS-102-18

M. Code : 75831

Date of Examination: 13-12-2022

Time : 3 Hrs.

Max. Marks : 60

#### INSTRUCTIONS TO CANDIDATES :

1. Attempt ALL questions in SECTION-A, Each question carry 2 marks
2. Attempt any FOUR questions from SECTION-B, Each question carry 10 marks.

#### SECTION-A

1. Answer briefly :

- (a) Nuclear energy
- (b) Overgrazing
- (c) Ecology
- (d) Thermo cline
- (e) What are Human Rights?
- (f) What is Value Education?
- (g) Define Food Chain.
- (h) "Fresh water is the biggest crisis facing the world today." Comment.
- (i) Write the uses of forest.
- (j) Types of diversity.

#### SECTION-B

2. What is meant by Natural Resources? Explain renewable and non-renewable resources.
3. What are the steps taken by our government for environmental protection?
4. Write short notes on:
  - (a) Ecological pyramids,
  - (b) Types and characteristics
5. "Ozone is a life saviour; if present in stratosphere; but is a pollutant; if present in troposphere." Justify.
6. "Environmental ethics effectively change the role of human from conqueror of the land to citizen and protector of environment." Comment.
7. Explain the types of pollution. Write the precautions to minimize the pollutions.



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Dec-2022

Bachelor of Science (Bio Technology)(Sem. - 2)  
**INTRODUCTION TO MICROBIOLOGY**

Subject Code: **BSBT-202-18**  
M Code: **75873**  
Date of Examination : **15-12-22**

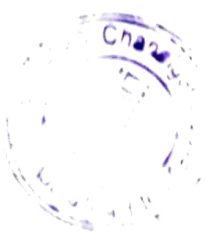
Max. Marks: **60**

**INSTRUCTIONS TO CANDIDATES:**  
SECTION-A is **COMPULSORY** consisting of **TEN** questions carrying **TWO** marks each.  
SECTION-B contains **FIVE** questions carrying **FIVE** marks each and students have to attempt any **FOUR** questions.  
SECTION-C contains **THREE** questions carrying **TEN** marks each and students have to attempt any **TWO** questions.

**SECTION A**

Write briefly:

- a) What is antibiotic?
- b) Give example any one Gram positive and Gram negative bacterium.
- c) What is synchronous growth?
- d) What is tyndallization? Who coined the term?
- e) What is the difference between an obligate and facultative aerobes?
- f) Define magnification of a microscope.
- g) What is disinfection? Give an example.
- h) Which sterilization technique will be used for:
  - i) Nutrient medium
  - ii) Hormones
- i) Give the name(s) of nitrogen fixing bacteria.
- j) What is the difference between non-specific and specific immune response?



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**SECTION-B**

- 1. Briefly describe about any one:
  - a) Electron microscopy
  - b) Fluorescent microscopy
- 2. What is sterilization? Give different methods of sterilization.
- 3. Discuss Koch's postulates.
- 4. Briefly discuss about normal microflora of the human body and its significance.
- 5. What are the different methods for bacterial classification?

**SECTION-C**

- 6. Discuss about the nutritional diversity of microorganisms.
- 7. Write a short note on any two:
  - a) Inflammation
  - b) Discovery of antibiotics
  - c) Cell wall structure
  - d) Fermentation
- 8. Discuss about the different microbes and the diseases related to them.

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Roll No.

Total No. of Pages: 02

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**B.Sc. (BT)** (Sem. - 2)  
**PHYSICAL CHEMISTRY**  
Subject Code: BSBT-201-18  
M Code: 75872  
Date of Examination : 20-12-2022

Time: 3 Hrs.

Max. Marks: 60

**INSTRUCTIONS TO CANDIDATES:**

- SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
- SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
- SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

**SECTION-A**

- Answer the following:
  - What is Activity and Activity Coefficient of a reaction?
  - Calculate the entropy of mixing when 15g of benzene is mixed with 15g of cyclohexane.
  - State and explain the degree of freedom for a linear and non-linear molecule.
  - Give the relation between free energy and enthalpy of a reaction.
  - Explain Henry's law.
  - What is the half-life of a complex reaction?
  - What is resistance and its units?
  - Explain parallel reaction with a suitable example.
  - Give the relationship between entropy and enthalpy of a reaction.
  - What are buffer solutions and why are they used?

**SECTION-B**

- Explain Hess's Law of heat summation.
- Explain conductometric titration between weak acid and strong base.
- State and derive the 2<sup>nd</sup> law of thermodynamics.
- What are consecutive and opposing reactions?
- Calculate the vapour pressure of the ideal and non-ideal solution.

**SECTION-C**

- Derive Gibb's Helmholtz Equation and Nernst Heat Theorem.
- What are the factors influencing the solubility of gas in liquids? What is osmotic pressure and its common features and application?
- What is the theory of strong electrolytes and calculate the rate equations for 1<sup>st</sup> and 3<sup>rd</sup> order reaction?

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*DEC-2022*

Roll No. \_\_\_\_\_

Total No. of Questions : 09

Total No. of Pages : 02

B.Sc. (Microbiology) (Sem.-2)

**BACTERIOLOGY**

Subject Code : BSMB201-19

M.Code : 79872

Date of Examination : 04-07-22

Time : 3 Hrs.

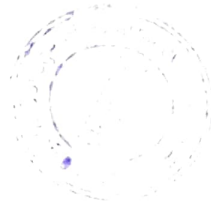
Max. Marks : 60

**INSTRUCTIONS TO CANDIDATES :**

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- SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
- SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

**SECTION-A**

- Write briefly :
  - Endoflagella
  - Confocal microscopy
  - Non-culturable bacteria
  - Pure culture isolation
  - Chemically defined media
  - Gram-negative cell walls
  - Sulfolobus
  - General characteristics of Archaeobacteria
  - Serial dilution
  - Osmotic pressure.



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**SECTION-B**

- Explain logarithmic representation of bacterial populations, phases of growth, calculation of generation time and specific growth rate
- Elaborate cultivation, maintenance and preservation stocking of pure cultures
- Describe effect of antibiotics and enzymes on the cell wall.
- Write a brief note on Fluorescence Microscope, Confocal microscopy, Scanning and Transmission Electron Microscope.
- Describe morphology, ecological significance and economic importance of Gram Positive Bacteria.

**SECTION-C**

- Discuss general characteristics and phylogenetic overview of genera belonging to Nanoarchaeota (Nanoarchaeum), Crenarchaeota (Sulfolobus, Thermoproteus) and Euryarchaeota.
- Write a note on culture media: chemically defined media, complex media, selective differential, indicator, enriched and enrichment media
- Describe composition and detailed structure of Gram-positive and Gram-negative cell walls, Archaeobacterial cell wall bacteria

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Roll No.

Total No. of Questions : 09

Total No. of Pages : 02

B.Sc. (Microbiology) (Sem.-2)

**MICROBIAL PHYSIOLOGY AND METABOLISM**

Subject Code : BSMB207-19

M.Code : 79878

Date of Examination : 12-07-22

Time : 3 Hrs.

Max. Marks : 60

**INSTRUCTIONS TO CANDIDATES :**

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
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3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

**SECTION-A**

1. Write briefly :

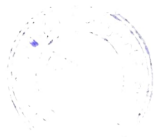
- a) Define sympot.
- b) What do you mean by iron bacteria?
- c) Write the significance of phosphoketolase pathway.
- d) What is mixed-acid fermentation?
- e) What are the basic characteristics of autotrophs?
- f) Enlist various inhibitors of electron transport chain.
- g) Define facilitated diffusion.
- h) What is the significance of glycolysis in microbes?
- i) Give a brief idea about microbial biofilms.
- j) Define batch cultures.

**SECTION-B**

2. Describe how microbial growth is affected by environment?
3. Differentiate between primary and secondary active transport
4. Discuss the various components of respiratory chain.
5. Describe the metabolism of starch by bacteria.
6. Write a short note on organs involved in microbial mobility along with their functions.

**SECTION-C**

7. Explain the complete process of TCA cycle in microbes including its location, significance and energetics.
8. Explain in detail about dissimilatory and assimilatory nitrate reduction
9. Describe the complete mechanism of lactic acid fermentation



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Roll No. \_\_\_\_\_  
Total No. of Questions : 09

Total No. of Pages : 02

B.Sc. (Microbiology) (Sem.-2)  
**MOLECULAR BIOLOGY**  
Subject Code : BSMB-205-19  
M.Code : 79876  
Date of Examination : 08-07-22

Time : 3 Hrs.

Max. Marks : 60

**INSTRUCTIONS TO CANDIDATES :**

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
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3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

**SECTION-A**

**I. Write briefly :**

- a) What is TATA box and its significance?
- b) What is replicative transposition?
- c) Describe the structure of 30 nm chromatid.
- d) What causes frameshift mutations in DNA?
- e) What is the role of releasing factor in transcription?
- f) Write different types of DNA with their functions.
- g) What do you mean by extra- embryonic membranes?
- h) What is repressor protein?
- i) How does erythromycin work as an antibiotic?
- j) What are the functions of RNA polymerase?

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**SECTION-B**

2. Give the nature and properties of genetic code
3. Discuss the role of ribosome in translation
4. What do you mean by siRNA and miRNA and its significance
5. What are histone and non-histone proteins and their role?
6. Illustrate the photoreactivation and excision repair mechanism.

**SECTION-C**

7. Explain the prokaryotic gene expression in relation to Lac operon
8. Explain the transcription in prokaryotes
9. Discuss the spontaneous and induced mutations. What are their applications in biotechnology?

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Roll No. \_\_\_\_\_

Total No. of Questions : 09

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B.Sc. (BT)  
**BIOSTATISTICS** (Sem.-2)  
Subject Code : BSBT-203-18  
M. Code : 75874  
Date of Examination : 08-07-22

Time : 3 Hrs.

Max. Marks : 60

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**SECTION-A**

- Write briefly :
  - Find mean of poison distribution.
  - What does standard deviation tell you?
  - Discuss fundamental applications of matrices manipulations.
  - If the probability of a defective item is 0.1. Find the mean and standard deviation for the distribution of defective items in a total of 400.
  - What are derivative curves?
  - Define numerical integration.
  - Define Null Hypothesis and Alternative Hypothesis.
  - What do you mean by tabulation of data?
  - Define arithmetic mean.
  - Write a note on Binomial distribution.

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**SECTION-B**

- If the probability of success is  $1/20$ , how many trials are necessary so that the probability of at least one success is just greater than  $1/2$ ?
- What are Experimental designs? Explain the basic principle of experimental design.
- Compare one way and two-way classification of ANOVA.
- Explain normal distribution and its chief characteristics.
- Evaluate  $\int_0^1 (1+x^2) dx$  using Simpson's  $1/3$  rule with step size 0.1. Compare with the exact value.

**SECTION-C**

- Write a note on :
  - Properties of determinants
  - Interpolation and Polynomial filling
- Solve the following Questions :
  - The mean and standard deviation of 20 items are found to be 15 and 10 respectively. If an additional observation 36 left out throughout is included, what would be the correct mean and correct standard deviation.
  - 5000 candidates appeared in a certain examination carrying a maximum of 100 marks. It was found that Marks were normally distributed with mean 39.5 and S.D. 12.5. Determine approximately the number of candidates who secured a first-class for which a minimum of 60 marks are necessary. The portion of the area of a normal curve at a deviation Z is :

Z	1.5	1.6	1.7	1.8
Area	0.93319	0.94520	0.95543	0.96407
- Obtain the two regression equations and calculate the coefficient of correlation from the following data :

X	91	97	103	121	67	124	51	73	101	57
Y	97	75	69	97	70	90	39	61	80	47

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*June-2022*

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**B.Sc.(BT) (2018 Batch) (Sem.-2)  
INTRODUCTION TO MICROBIOLOGY**

Subject Code : BSBT-202-18

M.Code : 75873

Date of Examination : 06-07-22

Time : 3 Hrs.

Max. Marks : 60

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**SECTION-A**

1. Write briefly :

- a) What is the difference between pathogens and natural microflora?
- b) What is the difference between gram-positive and gram-negative bacteria?
- c) Mention the names of any two dyes used to stain microbial cells to visualize under a light microscope.
- d) Mention the contribution of J.L.Lister.
- e) What are lithotrophs? Give its significance.
- f) Define the resolution of the microscope.
- g) What is the generation time of bacteria?
- h) What is synchronous growth in bacteria? How it can be achieved?
- i) What is the sterilizing agent? How does it differ from disinfectants?
- j) What are bacterial endospores? What factors stimulate the formation of endospores?

**SECTION-B**

2. What are heterologous proteins?
3. Which type of microscope will be used for visualizing the structure of the live bacterial cell and why?
4. What are the modern methods of bacterial classification?
5. What is symbiotic microbial interaction? Give its significance.
6. Which sterilization method would be best for the following :

- a) Nutrient medium
- b) Antibiotic solution
- c) Scalpel
- d) Petri plates
- e) Buffer solution

**SECTION-C**

7. Discuss different phases of the growth curve of a bacterial cell? What is the difference between a monoauxic and diauxic growth curve?
8. Discuss the contribution of any two Scientists to the field of microbiology

- a) Leewenhoeck
- b) Robert Koch
- c) Alexander Fleming
- d) Louis Pasteur

9. Discuss the different physical methods of sterilization with their mechanism of action.

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Roll No.

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B. Com(Hons)/B.Sc.(BT/FD/MLS)/BA(JAMC)/BBA/  
BBA(RD)/(SIM)/BHMCT/BTM (2018 Batch) (Sem.-2)

**ENVIRONMENTAL SCIENCE**

Subject Code : EVS-102-18

M.Code : 75831

Date of Examination : 04-07-22

Time : 3 Hrs.

Max. Marks : 60

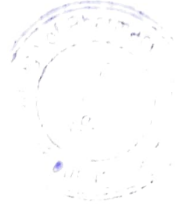
**INSTRUCTIONS TO CANDIDATES :**

1. Attempt ALL questions in SECTION-A, Each question carry 2 marks
2. Attempt any FOUR questions from SECTION-B, Each question carry 10 marks.

**SECTION-A**

Q1. Answer briefly :

- a) Nuclear energy
- b) Overgrazing
- c) Ecology
- d) Thermocline
- e) What are Human Rights?
- f) What is value education?
- g) Define Food Chain.
- h) "Fresh water is the biggest crisis facing the world today." Comment.
- i) Write the uses of forest?
- j) Environment Protection Act.



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**SECTION-B**

- Q2. What is meant by Water Resources? Explain Renewable and Non-renewable Water resources.
- Q3. What are the steps taken by our government for environmental protection?
- Q4. Write short notes on :
  - a) Ecological pyramids
  - b) Types and Characteristics layers of atmosphere
- Q5. "Ozone is a life saviour, if present in stratosphere; but is a pollutant, if present in troposphere." Justify.
- Q6. "Environmental ethics effectively change the role of human from conqueror of the land to citizen and protector of environment." Comment.
- Q7. Explain the types of pollution. Write the precautions to minimize the pollutions.

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Roll No.

Total No. of Pages : 02

Total No. of Questions : 09

**B.Sc. (Microbiology) (Sem.-2)  
FUNDAMENTALS OF BIOCHEMISTRY**

Subject Code : BSMB-203-19

M.Code : 79874

Date of Examination : 06-07-22

Time : 3 Hrs.

Max. Marks : 60

**INSTRUCTIONS TO CANDIDATES :**

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

**SECTION-A**

1. Write briefly :

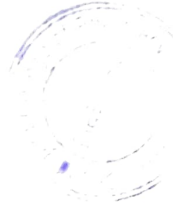
- a) Define Enantiomers.
- b) Draw the structure of Guanine and Uracil.
- c) Define essential and non-essential amino acids.
- d) Difference between enzymes and coenzymes.
- e) Give examples of reducing and nonreducing sugars.
- f) Explain phosphoglycerides.
- g) What is the effect of acid and alkali on DNA?
- h) Name the identification tests that are used for non-reducing sugars.
- i) Define lipid micelles.
- j) Explain flavin nucleotide.

**SECTION-B**

2. What are enzymes? Explain their category with examples.
3. How peptide bond is formed between two amino acids? Discuss the characterization of peptide bond
4. Classify carbohydrates and detail the properties of disaccharides
5. Write a short note on prostaglandins
6. Write a note on Coenzymes of Riboflavin and Nicotin

**SECTION-C**

7. Discuss in detail about the structures of mRNA, tRNA and rRNA and UV absorption by nucleic acid.
8. Give structural features and classification, notation, physical and optical properties of proteins.
9. Explain in detail about the Watson-Crick model of DNA and different forms of DNA



June-2022

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Roll No.

Total No. of Pages : 02

Total No. of Questions : 18

B.Sc. (BT) (2018 Batch) (Sem.-2)

**PHYSICAL CHEMISTRY**

Subject Code : BSBT-201-18

M.Code : 75872

Time : 3 Hrs.

Max. Marks : 60

**INSTRUCTIONS TO CANDIDATES :**

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

**SECTION-A**

**Write briefly :**

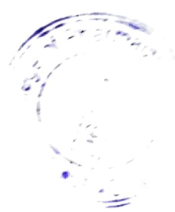
- Q1) State first law of thermodynamics.
- Q2) Calculate the enthalpy of Combustion of methane if enthalpy of formation of methane, carbon dioxide and water are  $-74.8$ ,  $-393.5$  and  $-286.2$  KJ respectively.
- Q3) Classify the electrolyte and give examples?
- Q4) Define Order of a Reaction. Explain with suitable examples.
- Q5) What is Binary Solution?
- Q6) What are intensive and extensive properties? Give examples.
- Q7) What are the units of specific conductance?
- Q8) Explain half life of complex reaction.
- Q9) Give the relationship between entropy and free energy of a reaction.
- Q10) Explain Raoult's law.

**SECTION-B**

- Q11) How can we calculate the transport number?
- Q12) Explain conductometric titration between strong acid and strong base.
- Q13) What are colligative properties and Azeotropes?
- Q14) What is the relationship between osmotic pressure and Relative lowering of vapour pressure?
- Q15) What is van't Hoff factor and explain its use?

**SECTION-C**

- Q16) Calculate the change in internal energy of an ideal gas in an isothermal reversible process.
- Q17) Derive the relationship between:
  - a. Depression in freezing point and lowering of vapour pressure
  - b. Elevation in boiling point and osmotic pressure.
- Q18) What is rate of reaction and the factors influencing the rate of reaction?



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DATE: 20/08/20

Roll No.

Total No. of Questions : 18

Total No. of Pages : 02

B.Sc. (BT) (2014 to 2017) (Sem.-2)  
**PHYSICAL CHEMISTRY**  
Subject Code : BSBT-106  
M. Code : 47012

Time : 3 Hrs.

Max. Marks : 60

**INSTRUCTIONS TO CANDIDATES :**

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

**SECTION-A**

Write briefly :

- Q1 Define Hess's law.
- Q2 What do you mean by threshold energy and activation energy?
- Q3 Calculate the entropy change in the evaporation of one mole of water at 373K. Given that heat of vaporization of water is 40680 J/mole.
- Q4 Mention two applications of Clausius - Clapeyron equation.
- Q5 What do you mean by solution and binary solution? Give example.
- Q6 Define Gibb's free energy and write Gibb's Helmholtz equation.
- Q7 Name the various factors affecting the rate of a reaction.
- Q8 What do you mean by depression in freezing point of a solution?
- Q9 Define Enthalpy of Ionization by giving examples.
- Q10 Write rate of equation for a first order reaction and equation for its half life.

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**SECTION-B**

- Q11 Show that for irreversible process  $\Delta S_{\text{system}} + \Delta S_{\text{surroundings}} > 0$ .
- Q12 Calculate the entropy change involved in the isothermal reversible expansion of 5 moles of an ideal gas from a volume of 10 litres to a volume of 100 litres at 300K.
- Q13 Differentiate between order and molecularity of a reaction.
- Q14 Explain osmotic pressure is a colligative property.
- Q15 Define and explain Raoult's law.

**SECTION-C**

- Q16 (a) State and explain Carnot's theorem. (7)  
(b) Distinguish between isothermal and adiabatic process. (3)
- Q17 (a) What do you mean by elevation in boiling point of a solution? Is it a colligative? If yes, explain, why? (5)  
(b) What do you mean by osmotic pressure? How its measurement is useful to determine the molecular mass of a non-volatile solute? (5)
- Q18 (a) What do you mean by second order reaction? Derive rate equation for a second order reaction. (5)  
(b) Discuss transition state theory of bimolecular processes. (5)



**NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.**

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Total No. of Pages : 02

Roll No. \_\_\_\_\_  
Total No. of Questions : 18

B.Sc. (BT) (2018 Batch) (Sem.-2)

**BIOSTATISTICS**

Subject Code : BSBT-203-18

M.Code : 75874

Max. Marks : 60

Time : 3 Hrs.

**INSTRUCTIONS TO CANDIDATES :**

- SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
- SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
- SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

**SECTION-A**

Write briefly :

- What do you understand by the term Sample?
- What do you understand by tabulation of data?
- Define Histogram.
- Define Arithmetic Mean.
- Properties of Regression co-efficients.
- Define Probability.
- What do you understand by Binomial Distribution?
- Probable error.
- What is Interpolation?
- Curve smoothing.

**SECTION-B**

- What is Correlation? What are various types of correlation?
- Calculate Spearmans Rank Correlation co-efficient from the following data :

X	15	20	28	12	40	60	20	80
Y	40	30	45	30	15	15	35	55

- What are Experimental Designs? Explain the basic principles of experimental designs.
- Write a note on Derivative Curves.
- Find a fourier series to represent  $y - y^2$  from  $x = -\pi$  to  $x = \pi$ .

**SECTION-C**

Obtain the two regression equations and calculate co-efficient of correlation from the following data :

X	91	97	103	121	67	124	51	73	111	57
Y	97	75	69	97	70	91	39	61	80	47

(a) The mean yield of two sets of plots and their variability are as given below. Examine whether the difference in the variability in yields is significant at 5% level of significance.

Variables	Set of 40 plots	Set of 60 plots
Mean per Plot	1258 lbs	1243 lbs
Standard deviation per plot	34	28

(b) Evaluate  $J = \int_0^1 e^{-x^2} dx$  by means of (2) with  $n = 10$ .

Q18. State the properties of determinants.

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Roll No.

Total No. of Pages : 02

Total No. of Questions : 18

B.Sc.(BT) (2014 to 2017) (Sem.-2)

**BIOCHEMISTRY**

Subject Code : BSBT-108

M.Code : 47013

Max. Marks : 60

Time : 3 Hrs.

**INSTRUCTION TO CANDIDATES :**

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

**SECTION-A**

Define :

1. Stereoisomerism
2. Liposomes
3. Glycosides
4. Purines
5. Glycolipids
6. Aromatic Amino Acids
7. Lipoproteins
8. Nucleosides
9. t-RNA
10. Peptide bond

**SECTION-B**

11. What are Glycoproteins? Discuss structure and function.
12. Discuss functions of Nucleic acids.
13. What is the composition and structural organization of biological membranes?
14. Write about conformations of DNA double Helix.
15. Write a note on biologically important peptides.

**SECTION-C**

16. Discuss properties of Monosaccharides.
17. Explain levels of structural organization of proteins.
18. Elaborate on Double Helical Model of DNA and forces responsible for it.



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Roll No.

Total No. of Pages : 02

Total No. of Questions : 18

B.Sc.(BT) (2014 to 2017) (Sem.-2)

**BIOCHEMISTRY**

Subject Code : BSBT-108

M.Code : 47013

Time : 3 Hrs.

Max. Marks : 60

**INSTRUCTION TO CANDIDATES :**

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

**SECTION-A**

**Define :**

1. Stereoisomerism
2. Liposomes
3. Glycosides
4. Purines
5. Glycolipids
6. Aromatic Amino Acids
7. Lipoproteins
8. Nucleosides
9. t-RNA
10. Peptide bond

**SECTION-B**

11. What are Glycoproteins? Discuss structure and function.
12. Discuss functions of Nucleic acids.
13. What is the composition and structural organization of biological membranes?
14. Write about conformations of DNA double Helix.
15. Write a note on biologically important peptides.

**SECTION-C**

16. Discuss properties of Monosaccharides.
17. Explain levels of structural organization of proteins.
18. Elaborate on Double Helical Model of DNA and forces responsible for it.



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Roll No.

Total No. of Questions : 18

Total No. of Pages : 02

B.Sc.(BT) (2014 to 2017) (Sem.-2)  
**GENETICS**

Subject Code : BSBT-110  
M. Code : 47014

Time : 3 Hrs.

Max. Marks : 60

**INSTRUCTION TO CANDIDATES :**

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

**SECTION-A**

Answer briefly :

1. What is the polycistronic RNA?
2. What is a silent mutation?
3. What can you predict about the biochemical nature of Leucine auxotroph of *E.coli*?
4. Which enzyme is defective in albinism?
5. Give the difference between mRNA formed in eukaryote and prokaryote.
6. What is splicing? Where does it occur?
7. Which type of proteins/enzyme are encoded by chloroplast genetic system?
8. What is heterochromatin?
9. What is sex limited inheritance?
10. Who has proposed one gene one enzyme hypothesis?

**SECTION-B**

11. How is sex determination done in *Drosophila*?
12. Discuss Hardy Weinberg rule by citing an example. What are the limitations?
13. Explain replica plating method for isolation of auxotrophs.
14. Briefly describe the genetics involve in development of metastatic tumour.
15. Discuss about the significance of comparative genomics.

**SECTION-C**

16. Explain any two :
  - a) Barr bodies
  - b) Maternal inheritance
  - c) Human genome sequencing project
  - d) Triplet codons
17. Discuss about the lac operon system in *E.coli*
18. Discuss various types of numerical chromosomal variations occurring in eukaryotes and the diseases related to them?



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Roll No.

Total No. of Questions : 18

**B.Sc. (BT) (2018 Batch) (Sem.-2)**  
**INTRODUCTION TO MICROBIOLOGY**  
Subject Code : BSBT-202-18  
M.Code : 75873

Time : 3 Hrs.

Max. Marks : 60

**INSTRUCTIONS TO CANDIDATES :**

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

**SECTION-A**

Write briefly :

- Q1 What is Staining? Give example of some stains.
- Q2 Give example any one Gram positive and Gram negative bacterium.
- Q3 What is the difference between monoauxic and diauxic growth curve?
- Q4 What is Generation Time of bacteria?
- Q5 What is the difference between obligate and facultative aerobes?
- Q6 What is Resolution? What are the factors on which it depends?
- Q7 What is Symbiosis? Give an example of microbial symbiotic association.
- Q8 Which Sterilization technique will be used for :

1) Glass petri plates

2) Hormones

Q9 What are Extremophiles?

Q10 What is the difference between non-specific and specific immune response?

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**SECTION-B**

Q11 Briefly describe about any one :

- a) Bright field microscopy
- b) Fluorescent microscopy

Q12 What is the difference between sterilization and disinfection? Give examples.

Q13 Explain the growth curve and its different phases.

Q14 What is Heterologous Protein? Give an example.

Q15 What is difference between Gram positive and negative bacteria?

**SECTION-C**

Q16 What is Sporulation? Outline the process of endospore formation and its germination.

Q17 Write short note on any two :

- a) Inflammation
  - b) Modern method of bacterial classification
  - c) Koch's postulates
  - d) Pasteurization
- Q18 Discuss about the different microbes and the diseases related to it.



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Roll No. \_\_\_\_\_

Total No. of Questions : 18

Total No. of Pages : 02

B.Sc. (BT) (2014 to 2017) (Sem.-2)

CELL BIOLOGY

Subject Code : BSBT-102

M.Code : 47011

Time : 3 Hrs.

Max. Marks : 60

**INSTRUCTION TO CANDIDATES :**

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

**SECTION-A**

Write briefly :

1. Give the names of any two dye used for visualising cell.
2. Which cell organelle is said to be the powerhouse of a cell and why?
3. What is microtomy? Why is it used?
4. What is freeze substitution?
5. What is the function of peroxisomes?
6. Cell is a basic unit of life. Why?
7. What is a cryoprotectant? Name any one?
8. What is cytokinesis? Which chemical is used to arrest cytokinesis?
9. How do cell interact with each other?
10. What is apoptosis?

**SECTION-B**

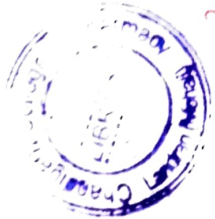
11. What is the difference between cell death and cell senescence
12. Discuss about the structure and function of muscle cell present in multicellular organism
13. Give a brief account of structure of chloroplast.
14. What is freeze drying? Give the steps involved in freeze drying
15. Discuss the procedure for fixing and staining of a cell.

**SECTION-C**

16. Write short notes on **any two** :

- a) Cytoskeletal structure
  - b) Nucleus
  - c) Cell locomotion
  - d) Cell differentiation
17. Explain ultrastructure of cell membrane
  18. Explain the different stages of cell cycle

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Roll No.

Total No. of Pages : 02

Total No. of Questions : 18

B.Sc. (BT) (2018 Batch) (Sem.-2)

**BIOSTATISTICS**

Subject Code : BSBT-203-18

M.Code : 75874

Time : 3 Hrs.

Max. Marks : 60

**INSTRUCTIONS TO CANDIDATES :**

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

**SECTION-A**

**Write briefly :**

- Q1. What do you understand by the term Sample?
- Q2. What do you understand by tabulation of data?
- Q3. Define Histogram.
- Q4. Define Arithmetic Mean.
- Q5. Properties of Regression co-efficients.
- Q6. Define Probability.
- Q7. What do you understand by Binomial Distribution?
- Q8. Probable error.
- Q9. What is Interpolation?
- Q10. Curve smoothening.



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### SECTION-B

11. What is Correlation? What are various types of correlation?
12. Calculate Spearmen Rank Correlation co-efficient from the following data :

<b>X</b>	15	20	28	12	40	60	20	80
<b>Y</b>	40	30	45	30	15	15	35	55

13. What are Experimental Designs? Explain the basic principles of experimental designs.
14. Write a note on Derivative Curves.
15. Find a fourier series to represent  $x - x^2$  from  $x = -\pi$  to  $x = \pi$ .

### SECTION-C

6. Obtain the two regression equations and calculate co-efficient of correlation from the following data :

<b>X</b>	91	97	103	121	67	124	51	73	111	57
<b>Y</b>	97	75	69	97	70	91	39	61	80	47

7. (a) The mean yield of two sets of plots and their variability are as given below. Examine whether the difference in the variability in yields is significant at 5% level of significance.

Variables	Set of 40 plots	Set of 60 plots
<b>Mean per Plot</b>	1258 lbs	1243 lbs
<b>Standard deviation per plot</b>	34	28

- (b) Evaluate  $J = \int_0^1 e^{-x^2} dx$  by means of (2) with  $n = 10$ .

State the properties of determinants.



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Roll No.

Total No. of Questions : 18

Total No. of Pages : 02

B.Sc. (BT) (2018 Batch) (Sem.-2)

**PHYSICAL CHEMISTRY**

Subject Code : BSBT-201-18

M.Code : 75872

Time : 3 Hrs.

Max. Marks : 60

**INSTRUCTIONS TO CANDIDATES :**

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

**SECTION-A**

**Write briefly :**

- 1) State first law of thermodynamics.
- 2) Calculate the enthalpy of Combustion of methane if enthalpy of formation of methane, carbon dioxide and water are  $-74.8$ ,  $-393.5$  and  $-286.2$  KJ respectively.
- 3) Classify the electrolyte and give examples?
- 4) Define Order of a Reaction. Explain with suitable examples.
- 5) What is Binary Solution?
- 5) What are intensive and extensive properties? Give examples.
- 7) What are the units of specific conductance?
- 3) Explain half life of complex reaction.
- 9) Give the relationship between entropy and free energy of a reaction.
- 0) Explain Raoult's law.



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### SECTION-B

How can we calculate the transport number?

Explain conductometric titration between strong acid and strong base.

What are colligative properties and Azeotropes?

What is the relationship between osmotic pressure and Relative lowering of vapour pressure?

What is van't Hoff factor and explain its use?

### SECTION-C

Calculate the change in internal energy of an ideal gas in an isothermal reversible process.

Derive the relationship between :

- a. Depression in freezing point and lowering of vapour pressure.
- b. Elevation in boiling point and osmotic pressure.

What is rate of reaction and the factors influencing the rate of reaction?



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Roll No. \_\_\_\_\_  
Total No. of Questions : 16

Total No. of Pages : 02

BCA (2014 to 2018)/B.Sc. (IT) (2015 & Onward)  
(Sem.-2)

**OOPS USING C++**  
Subject Code : BSBC/BSIT-203  
M.Code : 10052

Time : 3 Hrs.

Max. Marks : 60

**INSTRUCTIONS TO CANDIDATES :**

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains SIX questions carrying TEN marks each and students have to attempt any FOUR questions.

**SECTION-A**

Answer briefly :

1. What are unions?
2. Describe the use of constructors.
3. What are the advantages of Inheritance?
4. What is the use of Header files in C++?
5. What are the different types of Arrays in C++?
6. What is the use of Scope Resolution operator?
7. What is the significance of Operator overloading?
8. How are structures initialized? Explain with an example.
9. How can a protected member be made available for inheritance?
10. Describe the concept of objects and classes.

M-10052



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## SECTION-B

- a) How is C++ different from C language? What are the object oriented features of C++?
- b) What is the difference between Structure and Union? Give suitable examples to justify your answer.
- a) How are objects passed as function arguments? What is the difference between Pass by value and Pass by reference?
- b) Give suitable program to describe the idea behind Friend functions.
- a) Explain the concept of Inheritance. What are the uses of Inheritance? What are its different types?
- b) What do you mean by Constructor Overloading? Give suitable program to explain the concept.

Explain the concept of Polymorphism with the help of an example. What are the advantages of polymorphism?

Write brief notes on :

- a) Data hiding and Encapsulation
- b) Use of Pure Virtual Functions
- a) List the visibility modes used in defining derived classes in Inheritance.
- b) Write a program to illustrate Function overloading concept.

Roll No.

Total No. of Pages : 02

Total No. of Questions : 16

B.Sc. (IT) (2015 & Onwards) / BCA (2014 to 2018) (Sem.-2)

**MATHEMATICS-II**

Subject Code : BSBC / BSIT-202

M.Code : 10051

Max. Marks : 60

Time : 3 Hrs.

**INSTRUCTIONS TO CANDIDATES :**

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains SIX questions carrying TEN marks each and students have to attempt any FOUR questions.

**SECTION-A**

Answer the following :

1. If  $A = \begin{bmatrix} 2 & 3y \\ 4 & 5 \end{bmatrix}$   $B = \begin{bmatrix} 3 & 4 \\ 5 & 6 \end{bmatrix}$ , then find a matrix X such that  $3A - 2B + 4X = 0$ .

2. What positive value of x make the following pair of determinants equal?

$$\begin{vmatrix} 2x & 3 \\ 5 & x \end{vmatrix}, \begin{vmatrix} 16 & 3 \\ 5 & 2 \end{vmatrix}$$

3. Differentiate  $\log(x + \sqrt{x^2 + a^2})$  w.r.t. x.

4. If  $\sin y = x \cos(a + y)$ . Show that  $\frac{dy}{dx} = \frac{\cos^2(a + y)}{\cos a}$ .

5. Define Median and Standard deviation with example.

6. Calculate the mean deviation from median and coefficient of mean deviation.

20, 22, 25, 38, 40, 50, 65, 70, 75

7. Evaluate  $\int \frac{x^3 + 3x^2 + 2x + 1}{x - 1} dx$

8. Find  $\int \sin 3x \sin 2x dx$

9. Evaluate  $\int_{-\pi}^{\pi} \sin^3(x) \cos^2 x dx$

10. State Trapezoidal rule.



SECTION-B

For the matrix  $A = \begin{bmatrix} 1 & 2 & 3 \\ 3 & -2 & 1 \\ 4 & 2 & 1 \end{bmatrix}$ , show that  $A^3 - 23A - 40I = 0$ . Hence find  $A^{-1}$

Using matrices solve the following system of equations

$$2x - 3y + 4z = 4$$

$$3x + y - 2z = 9$$

$$2x + 3y - 5z = 7$$

a) Show that of all rectangles with a given perimeter the square has the largest area.

b) If  $y = a^{xy}$  prove that  $\frac{dy}{dx} = \frac{y^2 \log a}{1 - xy \log a}$

a) Find  $\int x^2 \cot^{-1} x dx$

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

a) Evaluate  $\int_0^6 \frac{1}{1+x^2} dx$  by using Simpson's  $\frac{1}{3}rd$  rule.

b) Find the median from the following data :

<b>Group :</b>	0-5	5-10	10-15	15-20	20-25	25-30	30-35
<b>Frequency :</b>	25	125	100	300	250	125	20

a) Find the Standard deviation and Mean of the marks obtained by 100 students in an examination.

<b>Marks :</b>	0-10	10-20	20-30	30-40	40-50
<b>No. of students :</b>	12	21	23	34	10

b) Write the formula for calculating Mode, Median in continuous series.



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No.

Total No. of Pages : 02

No. of Questions : 18

B.Sc. (BT) (2018 Batch) (Sem.-2)

## INTRODUCTION TO MICROBIOLOGY

Subject Code : BSBT-202-18

M.Code : 75873

: 3 Hrs.

Max. Marks : 60

### INSTRUCTIONS TO CANDIDATES :

SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.

SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.

SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

### SECTION-A

Answer briefly :

What is Staining? Give example of some stains.

Give example any one Gram positive and Gram negative bacterium.

What is the difference between monoauxic and diauxic growth curve?

What is Generation Time of bacteria?

What is the difference between obligate and facultative aerobes?

What is the difference between obligate and facultative anaerobes?

## SECTION-B

Briefly describe about any one :

- a) Bright field microscopy
- b) Fluorescent microscopy

What is the difference between sterilization and disinfection? Give examples.

Explain the growth curve and its different phases.

What is Heterologous Protein? Give an example.

What is difference between Gram positive and negative bacteria?

## SECTION-C

What is Sporulation? Outline the process of endospore formation and its germination.

Write short note on any two :

- a) Inflammation
  - b) Modern method of bacterial classification
  - c) Koch's postulates
  - d) Pasteurization
- Discuss about the different microbes and the diseases related to it.



2020

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Roll No. [ ]

Total No. of Pages : 02

Total No. of Questions : 09

B.Sc.(BT) (2014 to 2017) (Sem.-2)  
**GENETICS**

Subject Code : BSBT-110  
M.Code : 47014

Time : 3 Hrs.

Max. Marks : 60

**INSTRUCTION TO CANDIDATES :**

- SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
- SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
- SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

**SECTION-A**

1. Answer briefly :

- Define a gene.
- What is lethal mutation?
- What are autotrophs?
- Name any one genetic disease.
- What is polycistronic mRNA?
- What is splice variant?
- What is maternal inheritance? Where is it present?
- Give any two difference between the mRNA formed in prokaryotes and eukaryotes.
- What is sex linked inheritance?
- Who has proposed one gene one enzyme hypothesis?

**SECTION-B**

- What is dosage compensation?
- Explain Hardy Weinberg rule by citing an example.
- Diagrammatically explain replica plating method for isolation of auxotrophs?
- What is comparative genomics?
- How transcription of gene is regulated in prokaryotes?

**SECTION-C**

- Write short notes on any two :
  - Sex chromatin
  - Evolutionary genetics
  - Gene prediction
  - Triplet coding
- Discuss about the genetics underlying cancer.
- Discuss about the different types of chromosomal variation leading to mutation.



*Dec-2019*  
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Roll No. \_\_\_\_\_

Total No. of Pages : 02

Total No. of Questions : 09

B.Sc.(BT) (2014 to 2017) (Sem.-2)

**BIOCHEMISTRY-I**

Subject Code : BSBT-108

M.Code : 47013

Time : 3 Hrs.

Max. Marks : 60

**INSTRUCTION TO CANDIDATES :**

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

**SECTION-A**

Q1. Answer briefly :

- a) Define Monosaccharides. Give example and the structure.
- b) Write the name and molecular structure of a reducing disaccharide.
- c) Write the structures of cAMP and its role.
- d) Write the names of aromatic aminoacids.
- e) Write the structure and function of a c-20 fatty acid.
- f) What is apoprotein?
- g) Write the names of functional oligopeptides.
- h) Define Enzymes.
- i) Discuss peptide bond.
- j) Write the different types of bases present in RNA.

**SECTION-B**

- Q2. How many types of phospholipids are there? Classify and give structures.
- Q3. Describe Hybridization of DNA. Why it is important to us?
- Q4. Describe Mutarotation with an example.
- Q5. Describe and distinguish  $\alpha, \beta, \gamma$  DNA.
- Q6. Describe and distinguish the structure and function of starch and glycogen.

**SECTION-C**

- Q7. Discuss Watson and Crick model of DNA and draw the molecular structure of 5' ATTGC 3' and its complementary strand.
- Q8. Describe the different types of secondary structures present in proteins with the help of labeled diagrams. Give examples.
- Q9. Describe in detail various types of phospholipids and their structures and functions.



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Roll No. \_\_\_\_\_

Total No. of Questions : 09

B.Sc.(BT) (2014 to 2017) (Sem.-2)  
**PHYSICAL CHEMISTRY**  
 Subject Code : BSBT-106  
 M.Code : 47012

Max. Marks : 80

Time : 3 Hrs.

**INSTRUCTION TO CANDIDATES :**

- SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
- SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
- SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

**SECTION-A**

1. Write briefly :

- Define Zeroth law of thermodynamics. Give its important application.
- What is thermodynamic basis of Hess law?
- What is the basis of thermodynamic scale of temperature? Why is it more basic than that based on ideal gas?
- What is meant by triple point of water? Why is it different from normal melting point of ice?
- What is the difference between eutectic point and cryohydrate point?
- Why all the four phases cannot exist together in sulphur system?
- How can you justify that osmotic pressure is a colligative property?
- Which colligative property is used for finding the molecular masses of polymers and why?
- Briefly explain the effect of solvent on the rate of reaction.
- Derive the expression for decay constant of a radioactive substance.

**SECTION-B**

- Derive expressions for  $\Delta H$  and  $\Delta E$  for adiabatic reversible expansion of a real gas.
- What is Carnot cycle? How does it lead to the definition of entropy?
- Draw and explain a phase diagram for one component system comprising more than one solid phase.
- Write a detailed note on pseudo-order reactions.
- Derive thermodynamically the expression for relative lowering in vapour pressure.

**SECTION-C**

- Discuss in detail the phase diagram for  $K_2H_2O$  system.
  - Calculate the activation energy of a reaction whose reaction rate at  $27^\circ C$  gets doubled for  $10^\circ C$  rise in temperature.
  - After 24 hours, only 0.125 g out of the initial quantity of 1 g of a radioactive isotope remains behind. What is its half-life period?
  - Write a detailed note on acid base catalysis.
- A solution contains 6 g of a solute dissolved in 250 ml of water gave an osmotic pressure of 4.5 atm at  $27^\circ C$ . Calculate the boiling point of the solution. The molar elevation constant of water is  $0.52 \text{ K Kg/mol}$ .
  - Write a detailed note on Nernst heat theorem.



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B.Sc.(BT) (2014 to 2017) (Sem.-2)

**GENERAL MICROBIOLOGY**

Subject Code : BSBT-104

M.Code : 47032

Time : 3 Hrs.

Max. Marks : 60

**INSTRUCTION TO CANDIDATES :**

- SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
- SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
- SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

**SECTION-A**

1) Answer briefly :

- What is contribution of Robert Koch to microbiology?
- Explain in brief the term "asynchronous growth".
- Write the products obtained by anaerobic fermentation of glucose.
- What is the importance of nitrogen fixing microbes?
- Define the term "chemostat".
- Write the distinguishing characteristic of gram +ve and Gram -ve bacteria.
- Differentiate between yeast and fungi?
- Name the organism causing Lock jaw disease.
- What do you understand by the term heterotrophs.
- Explain the word "diauxic growth" in microbes.

**SECTION-B**

- Explain the different types of sterilization agents used.
- Write the method used to determine the different phases growth in an organism.
- Differentiate between the bright field and dark field microscopy.
- Discuss the various chemical agents used as antimicrobials and sterilizing agents.
- Discuss growth curve. Write the equation to determine the growth rate of an organism.

**SECTION-C**

- Discuss in detail the molecular methods used for production of a heterologous protein in a bacteria.
- Describe the Nitrogen fixing microbes and their role in agriculture
- Explain the principle and working of electron microscope.
- Elaborate on the cell wall structure of Gram +ve and Gram -ve bacteria with diagrams.



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Total No. of Questions : 09

Total No. of Pages : 02

B.Sc. (BT) (2014 to 2017) (Sem.-2)  
CELL BIOLOGY  
Subject Code : BSBT-102

M.Code : 47014

Time : 3 Hrs.

Max. Marks : 60

**INSTRUCTION TO CANDIDATES :**

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

**SECTION-A**

Q1. Write briefly :

- a. Cell Theory
- b. Meiosis I
- c. Structure of muscle cell
- d. Nuclear membrane
- e. Peroxisome
- f. Role of Fibronectin
- g. Role of flagella in cell locomotion
- h. Freeze drying
- i. Nucleosome
- j. CDK-Cyclin

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**SECTION-B**

Q2. Discuss the broad classification of cells types within an organism

Q3. What is cell senescence and cell death?

Q4. Describe the ultra structure of cell membrane.

Q5. Give the chemical basis of staining in detail?

Q6. What is cytophotometric method?

**SECTION-C**

Q7. Discuss the structure and function of mitochondria in detail stating its role in generating energy.

Q8. What is cell locomotion and what are various ways by which a cell locomotes?

Q9. Discuss the various stages of cell cycle and their control.





8. Write notes on :
- a) Design of experiments (5)
  - b) Fourier transformation (5)
9. a) Ten individuals are chosen at random from a population and their heights are found to be in inches 63, 63, 66, 67, 68, 69, 70, 70, 71, 71. In the light of these data discuss the suggestion that the mean height in the universe is 66 inches. (4)
- b) In a cosmetic company, the sales manager make the performance report on three salesmen during the three seasons. Check that there is significant difference between salesman's performances and between seasons using 0.05 level of significance. (6)

Salesman	Season		
	Summer	Rainy	Winter
A	50	40	41
B	30	45	55
C	45	36	48

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Total No. of Questions : 09

B Sc (BT) (2018 Batch) (Sem.-2)  
**INTRODUCTION TO MICROBIOLOGY**  
 Subject Code : BSBT-202-18  
 M Code : 75873

- 2. Describe briefly principle of bright field and dark field microscopy
- 3. Describe the chemical structure of cell wall of bacteria
- 4. How microbes survive in extreme environments? Explain

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Total No. of Questions : 09

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B.Sc.(BT) (2018 Batch) (Sem.-2)  
**INTRODUCTION TO MICROBIOLOGY**

Subject Code : BSBT-202-18

M.Code : 75873

Time : 3 Hrs.

Max. Marks : 60

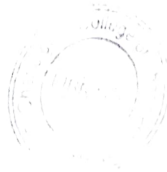
**INSTRUCTIONS TO CANDIDATES :**

1. SECTION-A is **COMPULSORY** consisting of **TEN** questions carrying **TWO** marks each.
2. SECTION-B contains **FIVE** questions carrying **FIVE** marks each and students have to attempt any **FOUR** questions.
3. SECTION-C contains **THREE** questions carrying **TEN** marks each and students have to attempt any **TWO** questions.

**SECTION-A**

I. Write briefly :

- a) A. Leeuwenhoek
- b) Koch postulates
- c) Molds
- d) Blue green algae
- e) Bacteriophage
- f) Generation time
- g) Diauxic growth
- h) Chemostat
- i) Biological nitrogen fixation
- j) Fermentation



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**SECTION-B**

2. Describe briefly principle of bright field and dark field microscopy
3. Describe the chemical structure of cell wall of bacteria
4. How microbes survive in extreme environments? Explain.
5. Describe briefly host defence mechanism against pathogens
6. Describe briefly types of microbial pathogens of humans and diseases caused by them

**SECTION-C**

7. What is sterilization? Describe the physical and chemical methods of sterilization. Also highlight advantages and disadvantages in each case
8. What are heterologous proteins? Describe the production of heterologous proteins in microbes with suitable examples.
9. Give a brief account of characteristics of bacteria, fungi and algae.

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Total No. of Pages : 02

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B.Sc. (BT) (2018 Batch) (Sem.-2)

**PHYSICAL CHEMISTRY**

Subject Code : BSBT-201-18

M.Code : 75872

Max. Marks : 60

Time : 3 Hrs.

**INSTRUCTIONS TO CANDIDATES :**

- SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
- SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
- SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

**SECTION-A**

1) Write briefly :

- What are extensive properties?
- What is the degree of freedom?
- Explain the specific conductance.
- What are state variables?
- What is lever rule?
- What is the effect of temperature on specific conductance?
- Define instantaneous rate of reaction.
- What is eutectic point?
- Explain the interdependent variables.
- What is the order?

**SECTION-B**

- What is the shortcoming of first law of thermodynamics and second law of thermodynamics?
- Explain the Raoult's law.
- Explain the parallel reactions.
- What is the Buffer solution?
- What is the Hess's law of heat of summation?

**SECTION-C**

- Derive the Gibb's Helmholtz equation.
- Derive the rate equation of second order reaction.
- Explain the phase diagram of KI system.



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B. Com(Hons)/B.Sc.(BT/FD/MLS)/BA.(JAMC)/BBA/BBBA(Business Economics/RD/SIM)/BHMCT/BTTM (2018 Batch) (Sem.-2)  
**ENVIRONMENTAL SCIENCE**

Subject Code : EVS-102-18

M.Code : 75831

Time : 3 Hrs.

Max. Marks : 60

**INSTRUCTIONS TO CANDIDATES :**

1. Attempt ALL questions in SECTION-A, Each question carry 2 marks
2. Attempt any FOUR questions from SECTION-B, Each question carry 10 marks.

**SECTION-A**

1. Explain :

- a. Endemic species.
- b. Cyclones.
- c. Ozone Depletion.
- d. Renewable resources.
- e. Water resources.
- f. Deforestation.
- g. Rain harvesting.
- h. Types of Biodiversity.
- i. Ecological Pyramids.
- j. Public Awareness.



**SECTION-B**

2. Explain in detail the water resources.
3. Describe features, structure and functions of Ecosystem.
4. Explain in detail Forest Conservation Act.
5. Explain in detail the scope and importance of Environment studies.
6. What are the different types of Pollution?
7. Explain various Global climate changes.

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Total No. of Pages : 02

Total No. of Questions : 09

B.Sc.(BT) (2013 to 2017) (Sem.-2)

**BIOCHEMISTRY**

Subject Code : BSBT-108

M.Code : 47013

Time : 3 Hrs.

Max. Marks : 60

**INSTRUCTION TO CANDIDATES :**

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

**SECTION-A**

1. Answer briefly :

- a) Non protein amino acids
- b) Micelles
- c) Glycolipids
- d) Pyrimidines
- e) Disaccharide
- f) Acidic amino acids
- g) Sphingomyelins
- h) Nucleotide
- i) m-RNA
- j) Glycosidic bond



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**SECTION-B**

2. What are Glycerophospholipids? Discuss structure and function.
3. How are the Amino acids classified? Discuss.
4. What is Mutarotation? Explain giving example.
5. List forces Stabilizing DNA double Helix.
6. Write a note on Conformations of DNA.

**SECTION-C**

7. Discuss Classification and Properties of proteins.
8. Explain Methods for isolation and purification of Nucleic acids.
9. Elaborate on Structure and function of Carbohydrates.

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Total No. of Questions : 09

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**B.Sc.(BT) (2018 Batch) (Sem.-2)**  
**INTRODUCTION TO MICROBIOLOGY**  
Subject Code : BSBT-202-18  
M.Code : 75873

Time : 3 Hrs.

Max. Marks : 60

**INSTRUCTIONS TO CANDIDATES :**

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

**SECTION-A**

1. Write briefly :

- a) Bright field vs. dark field microscopy
- b) Robert Koch's postulates
- c) Pasteurization
- d) Bacteriophage
- e) Structure of endospore
- f) Generation time
- g) Diauxic growth
- h) Biological nitrogen fixation
- i) Symbiosis Vs. antibiosis
- j) Photosynthesis

**SECTION-B**

2. Describe the principle of electron microscope and fluorescent microscope
3. Describe the morphological characteristics of fungi.
4. Describe the survival of microbes in extreme environment.
5. What is fermentation? Describe the microbial production of heterologous proteins.
6. Describe briefly the contributions of A. Leeuwenhoek and J. Lister.

**SECTION-C**

7. Describe the structure and composition of cell wall of Gram positive and Gram negative bacteria.
8. What is sterilization? Describe the physical and chemical methods used for sterilization.
9. Describe the types of microbial pathogens and diseases caused by them. Also highlight the host defense mechanism against pathogens.



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Total No. of Questions : 09

B.Sc.(BT) (2013 to 2017) (Sem.-2)

**GENERAL MICROBIOLOGY**

Subject Code : BSBT-104

M.Code : 47032

Max. Marks : 60

Time : 3 Hrs.

**INSTRUCTION TO CANDIDATES :**

- SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
- SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
- SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

**SECTION-A**

**Q1. Answer briefly :**

- Enlist four pathogenic microbes and diseases caused by them.
- What do you mean by chemostat and turbidostat?
- Discuss the theory of biogenesis vs. abiogenesis.
- Name any four nitrogen fixing microbes used in agriculture.
- What is generation time? Give the mathematical equation to determine generation time.
- Differentiate between monoauxic and diauxic growth.
- Define the terms Resolving Power and Numerical Aperture.
- What are Antibiotics? When and by whom was the first antibiotic discovered?
- What are Virions and prions.
- Explain the terms: virions and prions.
- Define the term differential and enriched media used for microbial growth.



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- Explain the method of production of heterologous proteins in microbes.
- Discuss the detailed contribution of Louis Pasteur in the field of microbiology.
- What is meant by the term LD50? Enlist the various physical agents used to kill microbes.
- Enumerate the bacteria causing gastroenteritis. Describe the pathogenesis, laboratory diagnosis, treatment and prophylaxis of cholera.
- What is metabolism? Explain the various unique pathways of microbial metabolism.

**SECTION-C**

- Explain the instrumentation and working of phase contrast microscope.
- Explain the various types of positive and negative microbial interaction with suitable examples of each.
- Classify bacteria on the basis of their morphology. How does gram positive bacteria differ from gram negative bacteria?

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Total No. of Questions : 09

B.Sc. (BT) (2013 to 2017) (Sem.-2)

CELL BIOLOGY

Subject Code : BSBT-102

Paper ID : [F0232]

Time : 3 Hrs.

Max. Marks : 60

**INSTRUCTION TO CANDIDATES :**

- 1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
- 2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
- 3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

**SECTION-A**

**Q1. Answer briefly :**

- a) What is microtome?
- b) Give the name of two dye used for staining cells.
- c) What is the difference between nucleus and nucleolus?
- d) What is polysomes?
- e) Name different chemical mediators present in neuron cell.
- f) What is Apoptosis?
- g) What is function of peroxisomes?
- h) Why do we fix a cell before staining?
- i) Mention any two enzymes present in lysosome.
- j) What is the difference between chloroplast and amyloplast?

**SECTION-B**

- Q2. Give a brief account of the ultrastructure of cell membrane
- Q3. What is freeze drying method of cell fixation?
- Q4. In which compartment of mitochondria do the energy is produced and how?
- Q5. How do animal cell interact with each other?
- Q6. Diagrammatically explain the structure of chromatin.

**SECTION-C**

- Q7. Explain any two :
  - a) Cytophotometric method
  - b) Cell theory
  - c) Cell death
  - d) Microtubules
- Q8. Explain in detail the structure of muscle cell. What is the role of calcium ions in muscle cell?
- Q9. What is the role of golgi bodies in protein translocation?

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Total No. of Questions : 09

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B.Sc.(BT) (2013 to 2017) (Sem.-2)

**GENETICS**

Subject Code : BSBT-110

M.Code : 47014

Time : 3 Hrs.

Max. Marks : 60

**INSTRUCTION TO CANDIDATES :**

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

**SECTION-A**

1. Answer briefly :

- a) What is triplet codon?
- b) Difference between mRNA of prokaryotes and eukaryotes.
- c) What are barr bodies?
- d) What is an operon?
- e) What is euchromatin region in DNA?
- f) Give the name of any two X-linked inherited disease.
- g) What is the difference between prototrophs and auxotrophs?
- h) What is a splice variant?
- i) Give the diagram of secondary structure of tRNA.
- j) What is mutation? Give an example.



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**SECTION-B**

2. Write about human genome sequencing project. What was the outcome of this project?
3. Explain the steps involve in isolation of mutant in a biochemical pathway.
4. How DNA is organized in eukaryotic nucleus?
5. Explain the role of genes involve in development of diversity in immune system.
6. Explain XX-XY system of sex determination.

**SECTION-C**

7. Explain Hardy Weinberg rule.
8. Explain the initiation of transcription in prokaryotes?
9. Explain any two :
  - a) Chromosomal variation
  - b) Significance of comparative genomics
  - c) Replica plating technique
  - d) Chloroplast genetic system

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Total No. of Questions : 09

Total No. of Pages : 02

B.Sc. (BT) (2018 Batch) (Sem.-2)

**PHYSICAL CHEMISTRY**

Subject Code : BSBT-201-18

Paper ID : [75872]

Time : 3 Hrs.

Max. Marks : 60

**INSTRUCTIONS TO CANDIDATES :**

1. SECTION-A is **COMPULSORY** consisting of **TEN** questions carrying **TWO** marks each.
2. SECTION-B contains **FIVE** questions carrying **FIVE** marks each and students have to attempt any **FOUR** questions.
3. SECTION-C contains **THREE** questions carrying **TEN** marks each and students have to attempt any **TWO** questions.

**SECTION-A**

**1) Write briefly :**

- a) What are extensive and intensive properties?
- b) Difference between isothermal and adiabatic process.
- c) Define Raoult's law. What are Azeotropes?
- d) What is Eutectic Point?
- e) What happens to the concentrations of different reactants and products after equilibrium attained? Give reasons.
- f) Explain the third law of thermodynamics.
- g) What are ideal solutions?
- h) What is lever rule?
- i) What is Hess's law?
- j) What is  $C_p$ ?

**SECTION-B**

- 2) Distinguish between order of reaction and molecularity of reaction.
- 3) What are buffer solutions? Explain the types of buffer solutions.
- 4) What is specific conductance and molar conductance? Explain the effect of dilution on these conductances.
- 5) Explain and derive the expression for first law of thermodynamics
- 6) Explain the Phase, Component and Degree of freedom.

**SECTION-C**

- 7) a) What is mean by Molal elevation constant of a solvent? How is it related to latent heat vaporizations? What is its unit?  
b) Derive Clausius clapyron equation in the integrated form. What are applications?
- 8) a) Derive the expression for the First order reaction.  
b) Describe the Carnot's cycle. How does it lead to definition of second law of thermodynamics?
- 9) a) What is transport number? Describe briefly the principle of experimental determination of transference number by Hittorf's method.  
b) Write short note on the following  
i) Consecutive reactions  
ii) Side reaction or parallel reactions.



May - 2019

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Roll No. \_\_\_\_\_

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