

21CHEC101

Reg No :

CHOICE BASED CREDIT SYSTEM SEMESTER SCHEME

B.Sc. FIRST SEMESTER DEGREE EXAMINATION NOVEMBER/DECEMBER 2023

CHEMISTRY

Analytical and Organic Chemistry - I

Duration:3 Hours

Max Marks:60

PART - A

I. Answer any Six from the following

(2×6= 12 Marks)

1. What is meant by "Median" ?
2. Define Absolute error and Relative error.
3. Give any two indicators used for a strong acid- strong base titration.
4. Give the meaning of the terms: Titrand and equivalence point.
5. Explain with suitable example substitution reaction.
6. Explain homolytic fission.
7. Give two examples each for (i) activating groups (ii) deactivating groups.
8. Explain hydrogenation reaction of alkenes with suitable example.

PART - B

II. Answer any SIX of the following choosing at least one question from each unit:

(6×8= 48 Marks)

UNIT I

9. a. Explain the figures of merit of an analytical method.
b. A chemist prepared a buffer solution of pH 4.62. When an analyst made replicate measurements of pH of the solution by a pH meter. The following values were obtained 4.59 and 4.63. Calculate the absolute error and relative error percent. (4+4)
- 10 a. Calculate by the least square method the equation of the best straight line for the calibration curve from the given data:

Conc of Potassium ions (x1)	2	4	6	8	10
Intensity (y1)	15	30	45	60	70

- b. What are the precautions to be taken while handling toxic chemicals, concentrated/fuming acids and organic solvents? (4+4)

UNIT II

11. a. Explain the precipitation titration of silver nitrate using Volhard's method.
b. Write a note on post-precipitation. (4+4)
12. a. Explain the redox titration curve with an example.
b. Balance the following equation by ion electron method in acidic medium :
- $$\text{BaO}_2 + \text{Cl}^- \longrightarrow \text{Ba}^{2+} + \text{Cl}_2 \quad (4+4)$$

UNIT III

13. a. Explain the mechanism of free radical addition of HBr to propene.
b. Explain with suitable example (i) Wurtz reaction (ii) Wurtz Fittig reaction. (4+4)
14. a. State and explain Huckel's rule. How can this rule be employed to explain the aromaticity of organic compounds?
b. Discuss the mechanism of the addition of HBr to 1,3-butadiene. (3+5)

UNIT IV

15. a. Discuss the mechanism of Friedel Craft's alkylation of benzene.
b. Explain (i) ozonolysis reaction (ii) epoxidation reaction in alkenes with suitable examples. (4+4)
16. a. How is chlorobenzene converted to aminobenzene? Give the mechanism of this reaction.
b. What is hyperconjugation? What is its importance. (5+3)

21STAC101

Reg No :

CHOICE BASED CREDIT SYSTEM SEMESTER SCHEME

B.Sc. FIRST SEMESTER DEGREE EXAMINATION NOVEMBER/DECEMBER 2023

STATISTICS

Descriptive Statistics

Duration:2 Hours

Max Marks:60

Answer any THREE of the following :

(3×2= 06)

1. List any two methods of collecting primary data.
2. Write any two limitations of Statistics.
3. List all the measures of central tendency.
4. Distinguish between correlation and regression.
5. Define equally likely events. Give one example.

Answer any FOUR of the following in not more than a page each :

(4×6= 24)

6. Describe the construction of a frequency polygon and ogives. How median is located from ogives?
7. Find the mean and variance of first n natural numbers.
8. Show that SD is not less than MD from their mean.
9. Derive an expression for Spearman's rank correlation coefficient when there are no ties.
10. In case of bivariate data, how do you fit a curve of the type $Y=ax^b$?
11. Define Mathematical expectation. State and prove addition theorem of expectation.

Answer any THREE of the following in not more than two page each :

(3×10= 30)

12. Obtain an expression for combined Geometric mean.
13. If X and Y are the two independent variables with mean 0 and variance 1. Find the value of I so that correlation coefficient between $X-IY$ and $X+Y$ is maximum.

14. Derive the regression equation of Y on X.
15. a) State and prove Bayes theorem of Probability. (6)
b) Give the classical definition of probability. What are its limitations? (4)
16. a) State and prove addition theorem of probability for any 2 events. (5)
b) Prove that conditional probability satisfies the axioms of probability. (5)

CHOICE BASED CREDIT SYSTEM SEMESTER SCHEME

B.Sc. FIRST SEMESTER DEGREE EXAMINATION NOVEMBER/DECEMBER 2023

MATHEMATICS

Number Theory - I, Algebra - I and Calculus - I

Duration:2 Hours

Max Marks:60

PART - A

I. Answer any 6 questions. Each question carries 2 marks: (2×6= 12 Marks)

- a. Show that the square of any odd integer is of the form $8k + 1$.
- b. State and prove Euclid's lemma.
- c. Define skew symmetric matrix. Give an example.
- d. Find the rank of the matrix $A = \begin{bmatrix} 1 & 2 & 3 & 4 \\ 2 & 4 & 6 & 8 \\ 3 & 6 & 9 & 12 \end{bmatrix}$ by using elementary transformations.
- e. Find the cartesian co-ordinates of the point whose polar co-ordinates are $(2, \frac{\pi}{3})$.
- f. Find the radius of curvature at any point of the curves
 (i) $s = c \tan \psi$
 (ii) $s = 4a \sin \frac{\psi}{3}$
- g. Find 'c' of Rolle's theorem for $f(x) = x^2 + 1$ in $[-1, 1]$.
- h. Find 'c' of Lagrange's mean value theorem for $f(x) = \log x$ in $[1, e]$.

PART - B

2. Answer any 2 questions. Each question carries 6 marks: (6×2= 12 Marks)

- a. Use the Euclidean Algorithm to obtain integers x and y satisfying $\gcd(24, 138) = 24x + 138y$.
- b. If $ca \equiv cb \pmod{n}$ then prove that $a \equiv b \pmod{\frac{n}{d}}$ where $d = \gcd(c, n)$.
- c. Solve the linear congruence $18x \equiv 30 \pmod{42}$.
- d. Solve the system of congruences $x \equiv 2 \pmod{3}$, $x \equiv 3 \pmod{5}$, $x \equiv 2 \pmod{7}$ using Chinese remainder theorem.

PART - C

3. Answer any 2 questions. Each question carries 6 marks: (6×2= 12 Marks)

a. Find the inverse of the matrix $A = \begin{bmatrix} 1 & 2 & 1 \\ 2 & -1 & 1 \\ 0 & 1 & 2 \end{bmatrix}$ using elementary transformations.

b. Show that the equations $x_1 - x_2 + x_3 = 2, 3x_1 - x_2 + 2x_3 = -6, 3x_1 + x_2 + x_3 = -18$ are consistent and find the solution .

c. By using elementary row operations , find solution or solutions if they exist , for the system : $x + y + 3z = 0, x - y + z = 0, x - 2y = 0, x - y + z = 0.$

d. Using the characteristic equation, $-x^3 + 5x^2 - 8x + 4 = 0$ of

$$A = \begin{bmatrix} 1 & 0 & -2 \\ 2 & 2 & 4 \\ 0 & 0 & 2 \end{bmatrix} \text{ find } A^{-1}.$$

PART - D

4. Answer any 2 questions. Each question carries 6 marks: (6×2= 12 Marks)

a. Find the angle of intersection of the cardiodes

$$r = a(1 + \cos \theta) , r = b(1 - \cos \theta) .$$

b. Show that the curvature at the point $(\frac{3a}{2}, \frac{3a}{2})$ on the Folium $x^3 + y^3 = 3axy$ is $\frac{-8\sqrt{2}}{3a}$.

c. Find the radius of curvature at any point on the curve $x = \frac{a \cos t}{t} , y = \frac{a \sin t}{t}$.

d. Trace the curve $r = a(1 - \cos \theta)$.

PART - E

5. Answer any 2 questions. Each question carries 6 marks: (6×2= 12 Marks)

a. Prove that if a function f is a continuous in $[a, b]$ and derivaible in (a, b) , then there exists at least one value of c in (a, b) such that $f'(c) = \frac{f(b)-f(a)}{b-a}$.

b. Determine the limits of the following:

$$\frac{1}{x} - \frac{1}{e^x-1} , x \rightarrow 0 .$$

c. Determine the limits of the following :

$$(x - 2)^{x-2} , x \rightarrow 2 .$$

d. Show that $\forall x \in R , e^x = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \dots + \frac{x^n}{n!} + \dots$

21MICC101

Reg No :

CHOICE BASED CREDIT SYSTEM SEMESTER SCHEME
B.Sc. FIRST SEMESTER DEGREE EXAMINATION NOVEMBER/DECEMBER 2023
MICROBIOLOGY
General Microbiology

Duration:2 Hours

Max Marks:60

SECTION - A

Answer the following strictly observing the internal choice provided:

4×5=20

UNIT 1

- 1) Write a note on the parts of Simple Microscope.

OR

- 2) Write the contributions of any two Indian Scientists to the field of Microbiology.

UNIT 2

- 3) Write a note on stab culture.

OR

- 4) Write a note on Endospore staining.

UNIT 3

- 5) Write a note on the types of Pili.

OR

- 6) Draw a neat labeled diagram of bacterial cell membrane.

UNIT 4

- 7) Write a short note on Eukaryotic ribosomes.

OR

- 8) Write a note on Golgi complex.

SECTION - B

Answer the following strictly observing the internal choice provided:

4×10=40

UNIT 1

- 9) Differentiate between Biogenesis and Abiogenesis. Add a note on the scientists who contributed to the same.

OR

- 10) Explain ancient theories on the origin of life on Earth.

UNIT 2

11) Explain the steps of cryopreservation.

OR

12) Define Disinfection. Explain the uses of chemical agents in sterilization.

UNIT 3

13) Describe the process of endospore formation and germination in Bacteria.

OR

14) Give a detailed account on inclusion granules.

UNIT 4

15) Explain sexual reproduction in fungi.

OR

16) Explain the structure and function of cell wall in eukaryotes.

21CSCC101

Reg No :

CHOICE BASED CREDIT SYSTEM SEMESTER SCHEME

B.Sc. FIRST SEMESTER DEGREE EXAMINATION NOVEMBER/DECEMBER 2023

COMPUTER SCIENCE

Computer Fundamentals and Programming in C

Duration:2 Hours

Max Marks:60

PART A

Answer any FIVE questions:

(5×2= 10)

- 1) Write any two characteristics of a computer.
- 2) How do you read a character in C? Give an example.
- 3) How do you print string variable in C? Give an example.
- 4) What is a pointer?
- 5) Write any four assignment operators in C.
- 6) How do you read elements in two dimensional array? Give an example.

PART B

Answer any FIVE questions :

(5×6= 30)

- 7) Write a note on a) Application software b) System software
- 8) Write a note on a) C Keywords b) C Tokens
- 9) Explain with syntax and example a) break b) goto
- 10) Explain the difference between array and structure.
11. What is a flowchart? Explain any five symbols of flowchart.
12. Explain for loop with syntax and example.

PART C

Answer any TWO questions :

(2×10= 20)

13. What is hexadecimal number system? Convert the following numbers to hexadecimal (i) $(234)_8$ (ii) $(1002)_{10}$ (iii) $(1101101)_2$

14. a) Write a note on i) Integer datatype ii) Floating point datatype
b) What is a variable? With an example, explain how to declare and initialize a variable.

15. Explain with syntax and example a) if statement b) if-else statement

21ZOOC101

Reg No :

CHOICE BASED CREDIT SYSTEM SEMESTER SCHEME
B.Sc. FIRST SEMESTER DEGREE EXAMINATION NOVEMBER/DECEMBER 2023
ZOOLOGY

Cytology, Genetics and Infectious Disease

Duration:2 Hours

Max Marks:60

SECTION - A

Answer the following strictly observing the internal choice provided:

4×5=20

UNIT 1

- 1) Differentiate between RER and SER.

OR

- 2) Draw a neat labelled diagram of the plasma membrane.

UNIT 2

- 3) Write a brief note on the functions of nucleolus.

OR

- 4) What are cell Interactions? Write its significance.

UNIT 3

- 5) Explain Environmental sex determination with an example.

OR

- 6) Define Test cross. Explain with dihybrid cross as an example.

UNIT 4

- 7) What is Trypanosomiasis? Add a note on the causative organism and the vectors transmitting the infection.

OR

- 8) Describe the structure of filarial worm.

SECTION - B

Answer the following strictly observing the internal choice provided:

4×10=40

UNIT 1

- 9) Give an account of the Electron transport system.

OR

- 10) With the help of a diagram, describe the structure of a microtubule.

UNIT 2

11) Explain the phenomenon of polymorphism in DNA.

OR

12) Give an account of regulation of cell cycle.

UNIT 3

13) Explain cytoplasmic inheritance with suitable example.

OR

14) Define Complementary genes. Explain with an example.

UNIT 4

15) Discuss the various syndromes in humans, known to result from numerical changes in chromosomes.

OR

16) Explain color blindness inheritance in humans.

CHOICE BASED CREDIT SYSTEM SEMESTER SCHEME

B.Sc. FIRST SEMESTER DEGREE EXAMINATION NOVEMBER/DECEMBER 2023

BOTANY

Microbial Diversity and Technology

Duration:2 Hours

Max Marks:60

I. Answer any Five of the following : (5×2= 10 Marks)

1. Mention any two applications of Dark field microscope.
2. What is differential staining? Give example.
3. Define lithotrophs and organotrophs.
4. Mention the working principle of Laminar Air flow chamber.
5. Classify viruses based on the type of hosts.
6. Draw a diagram of structural organization of virioids.
7. Write the causative organism and any two symptom of Late blight of potato.
8. Classify bacteria based on their shapes.

II. Answer any FOUR of the following : (4×5= 20 Marks)

9. Write a note on contributions of M. J. Thirumalachar and B. B. Mundkur.
10. Briefly explain growth in microbes.
11. Write a note on lyophilisation.
12. Mention the steps involved in parasexual cycle in Fungi.
13. Explain thallus organisation in *Puccinia*.
14. Write a note on contributions of Leeuwenhoek and Joseph Lister.
15. Define i) Indicator media ii) Transport media
16. Explain any two diseases caused by Prions.

III. Answer any THREE of the following : (3×10= 30 Marks)

17. Explain the process of transduction in bacteria.
18. In brief give an introduction of three domain system and five kingdom system of classification.
19. What are vaccine? Explain its types.
20. Write a note on (i) Cephalodium (ii) Apothecium

21PHYC101

Reg No :

CHOICE BASED CREDIT SYSTEM SEMESTER SCHEME
B.Sc. FIRST SEMESTER DEGREE EXAMINATION NOVEMBER/DECEMBER 2023
PHYSICS

Mechanics and Properties of Matter

Duration:2 Hours

Max Marks:60

PART - A

Answer any five questions, selecting minimum of one question from every unit: 5×9=45

UNIT I

- 1 a) Give any two applications of law of conservation of linear momentum.
b) Deduce relativistic expression connecting energy and momentum. Hence write down formulae for energy and momentum of a photon. (2+7)
- 2 a) If \vec{r} is a position vector of a particle, what will be its instantaneous acceleration?
b) What is meant by Galilean transformation and Galilean invariance? Show that length and acceleration are invariant to Galilean transformation, while velocity is not. (2+7)

UNIT II

- 3 a) Show that in a central motion the areal velocity is a constant.
b) What is a compound pendulum? Derive an expression for the period of a compound pendulum. (2+7)
- 4 a) Define moment of inertia and write the expression for moment of inertia of a disc about an axis perpendicular to its plane.
b) What are geostationary and geosynchronous satellites? Explain. (2+7)

UNIT III

- 5 a) Define Young's modulus and bulk modulus of elasticity.
b) Derive an expression for the rigidity modulus of a torsional pendulum. (2+7)
- 6 a) Obtain the theoretical and practical limits of Poisson's ratio.
b) Obtain an expression for the depression at the loaded end of a cantilever. (2+7)

UNIT IV

- 7 a) On what factors does the surface tension depend?
b) With relevant diagram explain in detail the molecular theory of surface tension. (2+7)
- 8 a) Explain interfacial tension between two liquids.
b) Give the theory of comparing the coefficient of viscosity of two given liquids using Ostwald's viscometer and hence arrive at the expression for the same. (2+7)

PART - B

Answer any three questions:

3×5= 15

- 9 (i) The length of the rod is found to be half of its length when it is at rest. Calculate the velocity with which it is moving. (ii) The mean life of π meson at rest is 2×10^{-8} s. Calculate the mean life of a meson moving with velocity $0.8c$.
- 10 A flywheel has a moment of inertia of 2 kg m^2 . It is rotating at a speed of 3 revolutions per second. Find the constant torque required to stop the wheel in 6 rotations. Calculate the work done by the braking torque.
- 11 A uniform rod of length 1 m is clamped horizontally at one end. A weight of 0.1 kg is attached at the free end. Calculate the depression at the end point of the rod. The diameter of the rod is 0.02 m. Given $q = 1 \times 10^{10} \text{ N/m}^2$.
- 12 A plate of metal 100 sq cm in area rests on a layer of castor oil 2 mm thick whose coefficient of viscosity is 15.5 poise. Calculate the horizontal force required to move the plate with a speed of 0.03 m/s.

22NHEC101

Reg No :

CHOICE BASED CREDIT SYSTEM SEMESTER SCHEME
B.Sc. FIRST SEMESTER DEGREE EXAMINATION NOVEMBER/DECEMBER 2023
NUTRITION AND HEALTH EDUCATION
Fundamentals of food and nutrition science

Duration:2 Hours

Max Marks:60

SECTION - A

Answer the following strictly observing the internal choice provided:

4×5=20

UNIT 1

- 1) Explain the scope of nutrition.

OR

- 2) How does the food affect a person's psychological status?

UNIT 2

- 3) Elaborate the functions and sources of calcium.

OR

- 4) Classify fats.

UNIT 3

- 5) Explain the nutritional importance of fats and oils and sugars.

OR

- 6) Explain the nutritional contribution of fish.

UNIT 4

- 7) Explain soaking and germination with their advantages.

OR

- 8) Write the difference between boiling and pressure cooking.

SECTION - B

Answer the following strictly observing the internal choice provided:

4×10=40

UNIT 1

- 9) Explain the various functions of food.

OR

- 10) Explain how food and nutrition affect health.

UNIT 2

- 11) Write the functions, sources and effects of deficiency of
- a) Vitamin E
 - b) Vitamin K.

OR

- 12) Explain the functions of thiamine and add a note on its deficiency.

UNIT 3

- 13) Elaborate on nutritional contribution of
- a) cereals and millets
 - b) pulses and legumes

OR

- 14) Explain the nutritional contribution of fruits and vegetables.

UNIT 4

- 15) Explain the process of parboiling of cereals with its merits.

OR

- 16) How can you preserve nutrients during cooking? Explain with examples.
