(2021 Batch Onwards)

G 501 DC1.5 Reg. No. : | | | | | | | |

St Aloysius College (Autonomous), Mangaluru

B.Sc. Semester V – Degree Examination

November/December - 2023

PHYSICS – Paper V(a)

CLASSICAL MECHANICS AND QUANTUM MECHANICS

Time: 2½ hrs. **Max Marks: 60**

SECTION –A

Answer any FOUR of the following. **(4x2=8)**

1. a) Define a frame of reference in classical mechanics and explain why it is important in the analysis of physical phenomena.

   b) Why is the conservation of angular momentum important in understanding the behavior of objects in rotational motion?

   c) Explain the Hamiltonian formalism in classical mechanics.

   d) What is a black body? What is black body radiation?

   e) What is a wave packet? How is it formed?

   f) Define the terms wave function and probability density.

SECTION – B

Answer any ONE FULL QUESTION from each unit. **(4x10=40)**

UNIT-I

2.a) Explain how Atwood's machine can be used to study and analyze various physical phenomena, such as Newton's laws of motion and the principles of mechanical advantage. **(6)**

   b) Describe the experimental setup and procedure for measuring the acceleration due to gravity using a simple pendulum. **(4)**

3.a) Show, using Newton's law of motion, that the total linear momentum of a particle 'P' is conserved when the total net force acting on it is zero. **(6)**

   b) Derive the work-energy theorem for a particle under the influence of a conservative force. Explain the relationship between conservative forces and the work-energy theorem. **(4)**

UNIT-II

4.a) Explain the principle of least action and its connection to Hamilton's equations. Discuss how the action integral is minimized to obtain the equations of motion using Hamilton's Principle. **(6)**

   b) Discuss the role of the Poisson bracket in quantizing classical systems and transitioning to quantum mechanics. **(4)**

5.a) Derive Lagrange's Equation using Hamilton's Principle and arrive at the equation for action principle using Euler Theorem. **(6)**

   b) Discuss the advantages and limitations of using Hamilton's Principle as an alternative approach to analyzing the motion of mechanical systems. **(4)**

Contd...2

UNIT-III

6.a) Discuss the principle of Gamma ray microscope. Show that the results obtained are consistent with the uncertainty principle. (6)

b) What is a black body? Discuss Planck's theory of black body radiation. (4)

7.a) What is Photo electric effect? Discuss the observations that could not be explained using the concepts of classical effect. How did Einstein explain the results of Photoelectric effect? (6)

b) Describe G.P Thomson's experimentt. (4)

UNIT-IV

8.a) Discuss the postulates of Quantum mechanics. (6)

b) What is an operator in quantum mechanics? When do you say that an operator is Hermitian? (4)

9.a) Write Schrodinger's equation for a particle in an one dimensional box and arrive at the expression for Eigen values of energy. (6)

b) Define commutator bracket. Determine the commutator bracket of position and momentum. (4)

SECTION –C

Answer any <u>THREE</u> from the following. (3x4=12)

10. Two cars of masses 1000 kg and 1500 kg are initially at rest. They collide, and after the collision, the 1000 kg car moves to the right with a velocity of 15 m/s. What is the final velocity of the 1500 kg car to the left?

11. A block of mass 3 kg is placed on an inclined plane with an angle 20 degrees to the horizontal. The block is subject to a gravitational force ($g=9.8\ m/s^2$). The constraint is that the block remains in contact with the inclined plane.

    a. Write down the holonomic constraint equation that relates the position of the block on the incline.

    b. Calculate the Lagrangian for the system.

    c. Use the Euler-Lagrange equation to derive the equation of motion for the block.

12. Find the de Broglie wavelength of an object of mass 40 gram moving with a velocity 30 m/s and an electron with a velocity 10^7 m/s.

13. A particle limited to the x axis has the wave function $\Psi = ax$ between $x = 0$ ad $x = 1$; $\Psi = 0$ elsewhere.

    i) Find the probability that the particle can be found between $x = 0.45$ and $x = 0.55$.

    ii) Find the expectation value of the particles position.

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(2021 Batch Onwards)

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St Aloysius College (Autonomous), Mangaluru

B.Sc. Semester V – Degree Examination

November/December-2023

PHYSICS -Paper V(b)

ELEMENTS OF ATOMIC, MOLECULAR AND LASER PHYSICS

Time: 2½ hrs. **Max Marks: 60**

SECTION –A

Answer any FOUR of the following. **(4x2=8)**

1. a) Mention any two success of Bohr atom model.
   b) Name the two distinct features of vector atom model.
   c) Mention any two applications of rotational spectroscopy.
   d) Write the difference between ordinary light and Laser light.
   e) Can $^2P_{5/2}$ state exist? Give reason.
   f) State Bohr correspondence principle and give one example to justify it.

SECTION – B

Answer any ONE FULL QUESTION from each unit. **(4x10=40)**

UNIT-I

2.a) From Bohr's theory of hydrogen atom derive the expression for total energy of the electron. **(6)**

b) Starting with energy expressions for n=1 and n=∞ level draw neat labelled diagram showing the spectral series of hydrogen atom. **(4)**

3.a) Derive the expression to discuss the effect of nuclear motion on the atomic spectra. **(6)**

b) Explain Rutherford's atom model taking into account observations of his scattering experiment. **(4)**

UNIT-II

4.a) With neat figure of experimental set up describe the theory of Stern-Gerlach experiment. **(6)**

b) Explain L-S coupling and j-j coupling in multi-electron systems. **(4)**

5.a) What is a quantum number? Explain the quantum numbers n, ℓ, s, m_ℓ, m_s and m_j. **(6)**

b) With neat figure explain the fine structure of sodium D lines on the basis of vector atom model. **(4)**

UNIT-III

6.a) What is Raman effect? Explain Raman effect on the basis of quantum theory. **(6)**

b) Differentiate between fluorescence and phosphorescence. **(4)**

Contd...2

7.a) Obtain an expression for the rotational energy levels of a diatomic molecule and the frequency of rotational spectra. State the selection rules. **(6)**

b) Mention the different regions of molecular spectra. Also explain in brief applications of molecular spectra. **(4)**

UNIT-IV

8.a) What are Einstein's A and B coefficients? Derive the relation between Einstein's A and B coefficients. **(6)**

b) Explain the characteristics of laser light. **(4)**

9.a) With the help of neat energy level diagram, explain the construction and working of Helium- Neon laser. **(6)**

b) Explain spontaneous and stimulated emission of radiation. **(4)**

SECTION –C

Answer any <u>THREE</u> from the following. **(3x4=12)**

10. Calculate the radius of the second orbit and also the velocity of the electron in the second orbit of hydrogen atom.
Given m=9.1 $X10^{-31}$ kg, h=6.625 $X10^{-34}$ Js,
ε_0 =8.85 X 10^{-2} Fm^{-1}, e =1.6 $x10^{-19}$ C

11. The experimental value of Bohr magneton is 9.21 x 10^{-24} SI units.If Planck's constant h=6.63 $X10^{-34}$Js, calculate the value of e/m of electron.

12. The force constant of CO is 187Nm^{-1} . Find the frequency of vibration of CO molecule. Mass of C^{12} atom = 1.99 × 10^{-26} kg and O^{16} atom 2.66 × 10^{-26} kg.

13. A pulse from a laser with power 1mW lasts for 10 ns. If the number of photons emitted per second is 3.491 ×10^7, calculate the wavelength of the laser.

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(2021 Batch Onwards)

G 502 DC1.5 Reg. No.: | | | | | | | |

St Aloysius College (Autonomous)

Mangaluru

B.Sc. Semester V – Degree Examination

November/December -2023

CHEMISTRY – V(a)

INORGANIC AND PHYSICAL CHEMISTRY

Time: 2½ hrs. **Max Marks: 60**

Instructions: 1. Write the question number and subdivision clearly.
2. Write equations and diagrams wherever necessary.
3. Answer Part – A in first two pages of the answer book.

PART - A

Answer ALL the following questions in 1 to 2 sentences. **(1×8=8)**

1. a) What are *f*-block elements? Name the two series present in *f*-block.
   b) Give the hybridization of ClF_3 molecule.
   c) Write the structure of '*cis*' and '*trans*' diamminedibromoplatinum(II).
   d) What are hard acids? Give an example.
   e) Define activity and activity coefficients.
   f) What are electrode concentration cells? Give an example.
   g) Define half-life period.
   h) Write Schrodinger equation to hydrogen atom in spherical polar coordinates.

PART – B

Answer any EIGHT of the following in 3 to 5 sentences. **(3×8=24)**

2. (i) Write the general characteristic properties of transition elements.
   (ii) Describe the causes and consequences of Lanthanide contraction.
   (iii) Calculate Effective atomic number of Zn in $[Zn(NH_3)_4]^{2+}$.
   (iv) What is ionization isomerism? Give an example.
   (v) Explain symbiosis with a suitable example.
   (vi) Show that the relative lowering of vapour pressure is equal to the mole fraction of the solute.
   (vii) Write a note on liquid junction potential.
   (viii) How do you determine pH of a solution using quinhydrone electrode?
   (ix) A bone taken from a garbage pile buried under a hill side had $^{14}C/^{12}C$ ratio 0.477 times the ratio in a living plant or animal. What was the date when the animal was buried? (Half-life of carbon-14 is 5730 years)
   (x) What is an operator? Write Laplacian and Hamiltonian operators.

Contd...2

PART - C

Answer any SEVEN of the following questions. **(4×7=28)**

3. Compare 4*d* and 5*d* series elements with 3*d* elements with respect to atomic radii, oxidation states and magnetic behavior.
4. Explain the geometry of XeF_6 molecule based on VSEPR theory.
5. On the basis of valence bond theory explain hybridization, geometrical shape and magnetic property of $[Fe(CN)_6]^{3-}$.
6. Explain the construction and working of calomel electrode.
7. Explain the factors affecting crystal field splitting.
8. Describe the Walker-Lumsden method of molecular mass determination of a solute.

9. Explain the potentiometric redox titration with one example.
10. Explain liquid drop model of nucleus. Discuss its limitations.
11. Write a note on significance of quantum numbers.

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St Aloysius College (Autonomous)

Mangaluru

B.Sc. Semester V – Degree Examination

November/December - 2023

CHEMISTRY – V(b)

ORGANIC CHEMISTRY AND SPECTROSCOPY

Time: 2½ hrs. **Max Marks: 60**

Instructions: 1. Write the question number and subdivision clearly.
2. Write equations and diagrams wherever necessary.
3. Answer Part – A in first two pages of the answer book.

PART - A

Answer ALL the following questions in 1 to 2 sentences. **(1×8=8)**

1. a) How do you convert furan into 2-acyl furan?
   b) Write the equation for nitration of oxazole.
   c) What are oligosaccharides?
   d) How do you convert an α-halogenated acid into α- aminoacid?
   e) What are hot bands in IR spectrum?
   f) H_2 does not give rotational spectra while HBr gives. Give reason.
   g) Write any two advantages of NMR spectroscopy.
   h) Define auxochrome.

PART – B

Answer any EIGHT of the following in 3 to 5 sentences. **(3×8=24)**

2. (i) Give a method to synthesize thiazole.
   (ii) Pyridine is less basic than piperidine. Give reason.
   (iii) Give the increasing order for aromaticity of pyrrole, furan and thiophene. Justify.
   (iv) How do you convert fructose into glucose?
   (v) Write the mechanism for the coupling of protected amino acids.
   (vi) The fundamental vibration frequency of HCl is 8. 67×10^{13}Hz.Calculate the force constant of H-Cl. (Reduced mass of HCl is 1.626×10^{-27} kg).
   (vii) What are the applications of Raman spectroscopy?
   (viii) Explain spin -spin coupling in CH_3-CH_2-Br.
   (ix) Give the proton NMR spectra with values of chemical shift and interpret the spectra in terms of position and splitting peaks of acetaldehyde.
   (x) Explain the following : a) Red shift b) Blue shift.

Contd...2

PART - C

Answer any SEVEN of the following questions. (4×7=28)

3. Describe the Feist -Benary synthesis of furan.
4. Give any two electrophilic substitution reactions of Quinoline.
5. Explain Killiani-Fischer synthesis with an example.
6. Explain the mechanism of mutarotation.
7. How is the structure of peptides chemically determined by end group analysis?
8. Explain the effect of anharmonicity in IR spectrum.
9. Show that successive lines are separated by 2B in pure rotational spectra.
10. Explain different electronic transitions that takes place when a molecule absorbs UV or visible radiation.

11. Explain the functioning of NMR spectrometer with a neat schematic sketch.

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(2021 batch onwards)

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St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester V – Degree Examination
November / December - 2023
MATHEMATICS – V(a)
Real Analysis - II and Complex Analysis

Time: 2½ hrs. **Max Marks: 60**

PART-A

Answer any SIX of the following: **(6 X 2 = 12)**

1. Let $f(x) = x, 0 \leq x \leq 1$ and let $P = \{0, \frac{1}{4}, \frac{2}{4}, \frac{3}{4}, 1\}$ be a partition of $[0, 1]$. Compute $L(P, f)$.
2. Define upper and lower integral of a function 'f' on the interval $[a, b]$.
3. Prove that $\beta(m, n) = \beta(n, m)$.
4. Using gamma function, evaluate $\int_0^\infty x^6 e^{-x}\, dx$.
5. If z_1 and z_2 are any complex numbers then prove that $|z_1 + z_2|^2 + |z_1 - z_2|^2 = 2\{|z_1|^2 + |z_2|^2\}$.
6. Show that $f(x, y) = 3x^2y - y^3$ is harmonic.
7. Apply the Cauchy –Goursat theorem to show that $\int_c f(z)dz = 0$ where $f(z) = e^{z^3}$ and the contour C is the unit circle $|z| = 1$ in either direction.

8. Evaluate the integral $I = \int_c f(z)dz$ where $f(z) = \frac{z+2}{z}$ and c is the semicircle $z = 2e^{i\theta}, \pi \leq \theta \leq 2\pi$.

PART- B

UNIT- I

Answer any TWO of the following: **(2x6=12)**

1. State and prove the condition for integrability for a bounded real-valued function f on $[a, b]$.
2. Show that the function $f(x) = 3x + 1$ is integrable on $[0, 1]$ by dividing $[0, 1]$ into n equal parts.
3. Define Riemann sum $S(P, f)$ of a function f. If functions f_1, f_2 and f, where $f = f_1 + f_2$, are bounded and integrable on $[a, b]$ then prove that $\int_a^b f\, dx = \int_a^b f_1\, dx + \int_a^b f_2\, dx$.

Contd...2

UNIT- II

Answer any TWO of the following: (2X6 =12)

1. Prove that

   i. $\beta(m,n) = \int_0^\infty \frac{y^{n-1}}{(1+y)^{n+m}}\, dy$

   ii. $\Gamma(n) = \int_0^1 \left[\log \frac{1}{y}\right]^{n-1} dy.$

2. i. Write the relation between Beta and Gamma function. Hence prove that $\Gamma\left(\frac{1}{2}\right) = \sqrt{\pi}$. (4)

   ii. Define Improper integral of type II. (2)

3. i. Show that $\int_0^1 x^{9/2}(1-x)^{-1/2}\, dx = \frac{63}{256}\,\pi$. (4)

   ii. Evaluate $\int_{-\infty}^{\infty} \frac{1}{1+x^2}\, dx$. (2)

UNIT- III

Answer any TWO of the following: (2X6 =12)

1. Show that $f(z) = \sin z$, where $z = x + iy$, is an entire function and find $f'(z)$.

2. Let the function $f(z) = u(x,y) + iv(x,y)$ be defined throughout some neighbourhood of a point $z = x_0 + iy_0$. Suppose that the first order partial derivatives of the function u and v with respect to x and y exist everywhere in that neighbourhood and that they are continuous at (x_0, y_0). If the partial derivatives satisfy C.R equations $u_x = v_y$ and $u_y = -v_x$ at (x_0, y_0) then prove that $f'(z_0)$ exist.

3. Show that the function $u(x,y) = y^3 - 3x^2y$ is harmonic and find their harmonic conjugate also state $f(z)$.

UNIT- IV

Answer any TWO of the following: (2X6 =12)

1. i. Show that if m and n are integers

   $$\int_0^{2\pi} e^{im\theta} e^{-in\theta}\, d\theta = \begin{cases} 0 & when\ m \neq n \\ 2\pi & when\ m = n \end{cases}$$ (4)

   ii. Prove that $\frac{d}{dt}[z_0\, w(t)] = z_0\, w'(t)$. (2)

2. Evaluate the integral $I = \int_c f(z)dz$ where $f(z) = \pi e^{\pi \bar{z}}$ and c is the boundary of the sequence with vertices at the points $0, 1, 1+i$ & i the orientation of c being in the counterclockwise direction.

3. Evaluate $\int_c \frac{1}{z(z-1)} dz$ where C is the circle $|z| = 3$.

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G 503 DC3.5

(2021 batch onwards)

Reg. No:

St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester V – Degree Examination
November / December - 2023
MATHEMATICS – V (b)
Vector Calculus and Analytical Geometry

Time: $2\frac{1}{2}$ hrs. Max Marks: 60

PART-A

Answer any SIX of the following: (6 X 2 = 12)

1. Calculate the area of triangle whose vertices are points with rectangular cartesian coordinates $(1,2,3), (-2,1,-4), (3,4,-2)$.
2. Find divergence of $\vec{f} = x^2y\hat{\imath} + xz\hat{\jmath} + 2yz\hat{k}$ at $(-1, 1, 1)$.
3. State Gauss Divergence theorem .
4. Evaluate by Stoke's theorem $\oint_C e^x dx + 2ydy - dz$ where C is the curve $x^2 + y^2 = 4\,, z = 2$.
5. Find the equation of the plane passing through the points $(2, 1, 1)$ and $(3, 2, 2)$ and perpendicular to the plane $x + 2y - 5z = 3$.
6. Find the perpendicular distance of $P(1, 2, 1)$ from the line $\frac{x-6}{3} = \frac{y-7}{2} = \frac{z-7}{-2}$.
7. Find the equation of the sphere where AB is the diameter of sphere where $A\ (1, 2, 3)$ and $B\ (1, 2, 3)$.

8. Define regular graph with an example. Are all regular graphs said to be complete graphs or all complete graphs are regular graphs. Justify which statement is true with your answer.

PART- B

UNIT- I

Answer any TWO of the following: (2x6=12)

1. i. Deduce the geometrical interpretation of scalar triple product. (4)

   ii. If $\vec{a} = \hat{\imath} + \hat{\jmath} + \hat{k}$, $\vec{b} = 4\hat{\imath} + 3\hat{\jmath} + 4\hat{k}$, $\vec{c} = \hat{\imath} + \alpha\hat{\jmath} + \beta\hat{k}$ are coplanar and if magnitude of $\vec{c} = \sqrt{3}$, find α and β. (2)

2. Find unit tangent, unit normal and binormal vector for $\overrightarrow{r(t)} = t\hat{\imath} + t^2\hat{\jmath}$ at $t = 1$.

3. i. Find the curl of $\vec{F} = 2xy^3z^4\hat{\imath} + 3x^2y^2z^4\hat{\jmath} + 4x^2y^3z^3\hat{k}$. (2)

   ii. Find the equation of the tangent plane and normal line for $xyz = 4$ at the point $(1, 2, 2)$. (4)

Contd...2

UNIT- II

Answer any TWO of the following: **(2X6 =12)**

1. Evaluate the integral $\iint_C \vec{F}.\hat{n}\,ds$ for $\vec{F} = (x+y^2)\hat{\imath} - 2xy\hat{\jmath} + 2yz\hat{k}$ and S is the surface of the plane $2x + y + 2z = 6$ in the first octant.
2. Verify Green's theorem in the plane for $\oint_C (xy + x^2)dx + x^3 dy$ where C is the closed curve of the region bounded by $y = x$ and $y = x^2$.
3. Using Gauss Divergence Theorem, evaluate $\iint_C \vec{F}.\hat{n}\,ds$ where $\vec{F} = (x^2 - yz)\hat{\imath} + (y^2 - zx)\hat{\jmath} + (z^2 - xy)\hat{k}$ taken over the parallelepiped $0 \le x \le a, 0 \le y \le b, 0 \le z \le c$.

UNIT- III

Answer any TWO of the following: **(2X6 =12)**

1. i. Find the equation of the plane passing through the points $(2, 1, 0)$, $(3, -2, -2)$ and $(3, 1, 7)$. (4)

   ii. Find the equation of the bisectors of the angle between the plane $2x - y + 2z + 3 = 0$ and $3x - 2y + 6z + 8 = 0$. (2)

2. i. Find the distance between line and plane.

   $L_1: x(t) = 1 + t, y(t) = 3t, z(t) = 1 + 4t.$

   $P_1: x - 3y + 2z = 9.$ (3)

   ii. Find the shortest distance between point $(2, -1, 3)$ and the line with equation $x = 1 + 2t, y = 2 - t$ and $z = 3t$. (3)

3. i. Given $S_1 : (x+2)^2 + (y-1)^2 + (z+1)^2 = 25$ and $S_2 : (x-1)^2 + (y+2)^2 + (z-3)^2 = 16$. Check whether they are orthogonal to each other or not. (3)

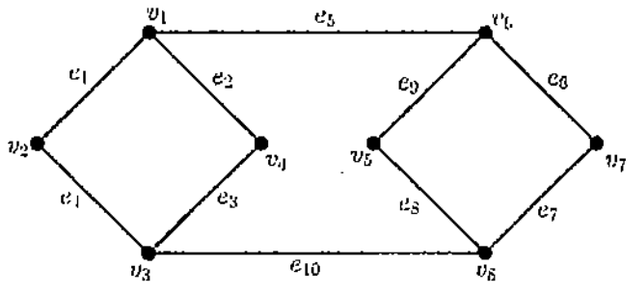
   ii. Given a sphere $2x^2 + 2y^2 + 2z^2 + 3y + 4z + 22 = 0$. Find the tangent plane at $(-1, -2, 3)$. (3)

Contd...3

UNIT- IV

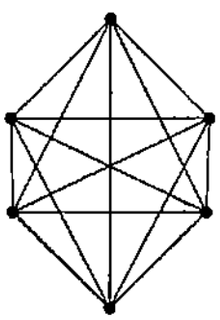
Answer any TWO of the following: **(2X6 =12)**

1. For the given graph, answer the following questions:



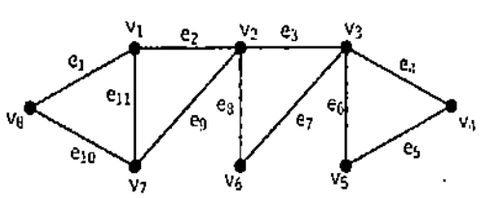
i. Find the eccentricity of each vertex. (3)
ii. Find the radius of the graph. (1)
iii. Find the diameter of the graph. (1)
iv. Find the center of the graph. (1)

2. For the given graph, answer the following questions:



i. Name this graph and its notation. (1)
ii. What is the order and size of this graph? (2)
iii. What is edge and connectivity for this graph? (2)
iv. What is the chromatic number for this graph? (1)

3. For the given graph, answer the following questions:



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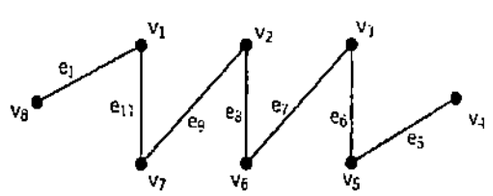

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i. Is the given graph G a Euler graph? Justify your answer. (2)
ii. Write all the chords and all the fundamental circuits for the given spanning tree T. (4)

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St Aloysius College (Autonomous)
Mangaluru

B.Sc. Semester V – Degree Examination
NOVEMBER /DECEMBER -2023
ELECTRONICS V(a)
ELECTRONIC COMMUNICATION SYSTEMS

Time: 2½ hrs. **Max Marks: 60**

SECTION – A

1. **Choose the correct answer from the choices given at the end of each question and Write the correct answer** **(1x6=6)**

i) In an optical fiber, the concept of Numerical aperture is applicable in describing the ability of _____

a) Light Collection b) Light Scattering

c) Light Dispersion d) Light Polarization

ii) Which one of the following is having the indirect band gap?

a) GaS b) GaAs c) GaN d) crystalline silicon

iii) The term 'responsivity' as applied to a photo-detector is the ratio of _____

a) Output current to input current

b) input power to output power

c) Output current to input optical power

d) output power to input power

iv) The process of converting analog sample in to discrete form is called _____

a) modulation b) sampling c) quantization d) multiplexing

v) GSM choose a combination of_____ as its method of multiple access technique.

a) FDMA & TDMA b) CDMA & FDMA

c) TDMA only d) TDMA & CDMA

vi) _____ domain is restricted to qualified organizations.

a) .net b) .org c).com d).edu

2. **Answer any SIX questions** **(1x6=6)**

i) The refractive indices of the core and the cladding of an optical fiber are 1.5 and 1.45 respectively. Calculate the numerical aperture.

ii) Define the term quantum efficiency w.r.to optical detectors.

iii) Write the electrical symbol of a photo transistor.

iv) Calculate the Nyquist sampling rate for a signal with highest frequency 5kHz.

v) What do you mean by "Quantization error"?

Contd...2

vi) Expand the term PSTN.

vii) What is meant by handoff in mobile communication?

viii) Name the domain, which is restricted to education.

3. **Answer any SIX questions** **(2x6=12)**

i) Mention the advantages of solid-state relay as compared to mechanical relay.

ii) Differentiate between single mode and multimode fibers.

iii) Draw the circuit diagram of a PIN Photodiode detector.

iv) Mention the two steps involved in Pulse Code Modulation (PCM)?

v) Explain briefly Stimulated emission in LASER

vi) Give the uplink and downlink Frequency Band of GSM900.

vii) Define 'cell' w.r.to mobile communication system. Why hexagonal shape is universally adapted for a cell in the system.

viii) Briefly explain internet banking.

SECTION – B

4. **Answer any FOUR questions** **(4x4=16)**

i) Explain the construction and action a solar cell.

ii) Explain any four major requirements for an optical fiber source.

iii) A given silicon Avalanche photodiode has a quantum efficiency of 65% at a wavelength of 900nm. If 0.5μW of optical power produces a multiplied current of 10μA. Calculate the multiplication factor of the APD.

iv) With diagram explain the generation of PAM signal.

v) With necessary diagrams explain how outgoing calls made in GSM system.

vi) write a note on 'email' and 'www'.

SECTION – C

Answer any <u>TWO</u> full questions. **(10x2=20)**

5. a) With necessary diagrams. explain the classification of fibres based on their index profile **(5)**

b) With necessary diagrams Explain Direct and Indirect band gap Materials. **(5)**

6. a) With necessary diagram explain Carrier and optical confinement is achieved in LED. **(5)**

b) With necessary circuit diagram explain Pulse Width Modulation (PWM). **(5)**

7. a) Write a note on the mobile identities (i) IMEI (ii) SIM **(5)**

b) Explain a) Frequency reuse b) Cell splitting **(5)**

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St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester V – Degree Examination
November /December -2023
ELECTRONICS -V(b)
EMBEDDED SYSTEMS AND 8051 MICROCONTROLLER

Note: This question paper has three sections. Section A, Section B and Section c. Answer all the sections.

Time:2 ½ hrs. **Max Marks: 60**

SECTION – A

1. Choose the correct answer from the choices given at the end of each question and write the correct answer. (6x1=6)

i) The instruction MOV A, 40h in 8051 controller is an example for _____ type of addressing mode.

a) direct b) indirect c) register d) implicit

ii) In 8051 μC the instruction **JNZ, target** causes branching if _____

a) A=00H b) A≠00h c) R0=00H d) CF=1

iii) TF0 and TF1 are present in ------- register of 8051 MC.
a) PSW b) TCON c) PCON d) TMOD

iv) _____ Register of 8051 controller does not have the internal address.

a) A b) DPH c) PC d) PSW

v) 8085 μC has ____ bit stack pointer.

a) 20 b) 24 c) 32 d) 16

vi) _____ instruction is invalid in 8051 μC

a) MOV R_0, @R_7 b) MOVX A,@DPTR c) MOV R_7, 30h d) INC DPTR

2. Answer any <u>SIX</u> Questions. (6x1=6)

i) What is the difference between a counter and timer?

ii) How many I/O ports are available in 8051μC?

iii) What is meant by LIFO? Explain.

iv) Explain the register indirect addressing mode in 8051 μC

v) What Are the contents of A and Carry register after the excecution of following program in 8051 μC.

```
SET C
MOV R0, #99H
MOV A,#99H
ADDC A,R0
LCALL 0003H
```

vi) Explain MOVLW instruction of PIC18 μC.

vii) Give any two examples for embedded system.

viii) Mention any four features of PIC 18 family of microcontrollers.

Contd...2

3. Answer any SIX questions. **(6x2=12)**

i) Mention any two uses of timers in 8051 μC.

ii) With example explain direct addressing mode of 8085 μP.

iii) Mention any two instructions that will clear the content of accumulator in 8085 μP.

iv) Explain the DJNZ instruction of 8051 μC.

v) Mention any two differences between a microcontroller and microprocessor.

vi) Compare the properties of 8051 and PIC18 family microcontrollers.

vii) Name the interrupts of 8051 μC.

viii) List the SFRs involved in serial data communication.

SECTION – B

4. Answer any FOUR Questions. **(4x4=16)**

i) With syntax and example explain any two rotate instructions of μP.

ii) With an example explain the mechanism of operation of a subroutine in 8051 μC .

iii) Draw the labeled pin diagram of 8051 μC.

iv) Draw the bit pattern of TCON register of 8051 μC and explain the functions of various bits.

v) Find the C,Z and DC flag bits of PIC18 μC for the following program

```
MOVLW 38 H
ADDLW 2FH
END
```

vi) With example explain any two addressing modes of 8051 μC.

vii) With bit pattern explain the PSW of 8051 μC.

SECTION – C

Answer any TWO full questions. **(10x2=20)**

5. a) Explain the steps involved while executing a subroutine. **(6)**

b) With necessary bit pattern explain the PSW of PIC18 μC. **(4)**

6. a) With necessary diagram explain the organization of internal RAM 8051 μC. **(5)**

b) With an example explain how data is stored into and retrieved from the stack of 8051 μC. **(5)**

7. a) With syntax and example explain any two arithmetic instructions of 8051 μC. **(5)**

b) Write an 8051 μC program to store the largest of two bytes of data stored in external memory locations X and X+1. Store the result in memory location X+2. **(5)**

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St Aloysius College (Autonomous)

Mangaluru

B.Sc. Semester V – Degree Examination

November/December - 2023

COMPUTER SCIENCE – (a)

PROGRAMMING IN PYTHON

Time: 2 ½ Hours. **Max Marks: 60**

PART –A

1. **Answer any SIX of the following.** **(6x2=12)**

a) List any four categories of Operators in Python.

b) Differentiate scope and life time of a variable.

c) What is use of negative indexing? Give example.

d) What is list? How to create list

e) What is NumPy in Python? Give any two uses of NumPy.

f) Give syntax of constructor definition in Python.

g) What is Data Visualization?

h) What is matplotlib and pyplot

PART –B

Answer any ONE FULL question from each unit. **(4x12=48)**

UNIT - I

2. a) Explain different data types available in python. **(4)**

b) Explain while and for loop with syntax and example. **(4)**

c) Explain Exception handling in Python with try...except... finally block. **(4)**

3. a) Explain any five features of python. **(4)**

b) Explain any five type conversion functions with example **(4)**

c) Define function. Explain with syntax how to create and call user defined function. **(4)**

UNIT – II

4. a) What is slice operation? Explain with examples. **(4)**

b) Write any two difference between

a) List and tuple

b) List and dictionary **(4)**

c) With examples explain how to access and modify key:value pairs in dictionaries. **(4)**

5. a) Explain any four list methods with syntax an example. **(4)**

b) Write a note on following methods in dictionary

a) Keys() b) values() c)get(key) d) update **(4)**

c) How to create set in python explain any three set methods. **(4)**

Contd...2

UNIT – III

6. a) What is method overloading? Explain. (4)

   b) What is NumPy array? Explain any three NumPy array creation functions with example. (4)

   c) Write a note on pandas series. (4)

7. a) Explain with syntax and example creation of DataFrames in python. (5)

   b) Explain multiple inheritance with example. (5)

   c) Write a benefits of using super() function. (2)

UNIT – IV

8. a) Write a Python Program to create Line Graph showing number of students of a college in various Years. Consider 4 years data. (4)

   b) Explain MySQL module methods required to use SQL database. (4)

   c) Explain anatomy of Matplotlib. (4)

9. a) Explain any four SQL database operations with example. (4)

   b) Write a Python program to display Pie Chart showing percentage of employees in each department. Assume there are 4 departments namely Sales , Production , HR and Finance. (4)

   c) Write a short note on multiple subplots with examples. (4)

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St Aloysius College (Autonomous)

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B.Sc. Semester V – Degree Examination

November/December - 2023

COMPUTER SCIENCE – (b)

COMPUTER NETWORKS

Time: 2 ½ Hours. **Max Marks: 60**

PART –A

1. Answer any SIX of the following. **(6x2=12)**

a) What is Unicast?

b) What is network topology?

c) What is flow control?

d) Define burst error.

e) Define Routers.

f) What is flooding?

g) Define protocol.

h) Expand HTTP and DHCP.

PART –B

Answer any ONE FULL question from each unit. **(4x12=48)**

UNIT - I

2. a) Explain the following categories of networks. i) LAN ii) MAN **(6)**

b) What are the applications of computer networks? **(6)**

3. a) Name and explain the layers in TCP/IP Protocol suite. **(6)**

b) Explain bus and star topologies with its advantages and disadvantages. **(6)**

UNIT – II

4. a) Explain different types of elementary data link protocol with diagrams **(6)**

b) Explain Twisted Pair, Coaxial Cable and Fiber Optics in detail. **(6)**

5. a) What is Switching? Differentiate between circuit switching and packet switching. **(6)**

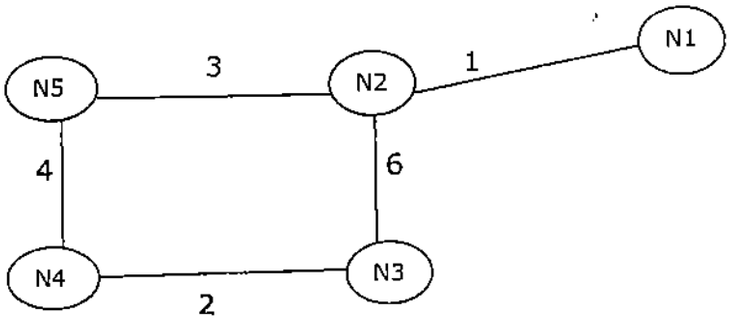
b) A 7 bit Hamming code is received as 1011011. Assume Even parity and state whether the received code is correct or wrong. If wrong locate the bit in error. **(6)**

UNIT – III

6. a) What are IP address classes and how do they determine the range of IP addresses within a network? **(6)**

Contd...2

b) Explain Distance Vector Routing algorithm for the given topology in detail.



(6)

7. a) List and explain the networking devices in detail. (6)

b) Write the significance of IPV6 (6)

UNIT – IV

8. a) What are the services provided by the Transport Layer? (6)

b) Is UDP is connection-oriented protocol? Explain about UDP protocol. (6)

9. a) Write a note on DNS, WWW and FTP. (6)

b) Differentiate TCP and UDP. (6)

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St Aloysius College (Autonomous)

Mangaluru

B.Sc. - Semester V

November/December - 2023

STATISTICS - V(a)

MATRIX ALGEBRA AND REGRESSION ANALYSIS

Time: $2\frac{1}{2}$ Hours. Max Marks: 60

Note: Answer all parts

PART – A

I. Answer any FIVE of the following: (2x5=10)

1. Define a matrix with an example.
2. What do you mean by idempotent and orthogonal matrices?
3. If the characteristic function of a matrix is $\lambda^2 - 4\lambda + 3$, find the Eigen values.
4. Define rank of a matrix with an example.
5. State any two properties of orthogonal matrix.
6. Define Simple Linear Regression and give one example.
7. Prove that the sum of the residuals in any regression model that contains an intercept (β_0) is always zero.

PART – B

II. Answer any FIVE of the following. (10x5=50)

8. a) Explain the types of matrices with an example. (5)
   b) Define adjoint and transpose of a matrix. (5)
9. a) Prove that the product of the two upper triangular matrices is an upper triangular matrix. (6)
   b) Define minor and cofactor matrix with an example. (4)
10. a) If the characteristic function of a matrix is $-(\lambda - 2)(\lambda^2 - 7\lambda - 8) = 0$, find the Eigen vector. (6)
    b) Find the quadratic for of the matrix with elements a_{ij}, (i, j=1,2). (4)
11. a) Explain the Echlon and Normal method of finding rank of a matrix. (6)
    b) If A= $\begin{bmatrix} 3 & 2 \\ 1 & -1 \end{bmatrix}$, find the quadratic form of A. (4)
12. a) State the properties of determinant of a matrix. (5)
    b) Explain hypothesis testing on the slope in simple linear regression. (5)
13. Derive the expression for the parameters of simple linear regression using least squares method.
14. Derive the expression for confidence intervals of regression coefficient and mean response.

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St Aloysius College (Autonomous)

Mangaluru

B.Sc. - Semester V

November/December - 2023

STATISTICS - V(b)

DESIGNS OF EXPERIMENT

Time: 2 1/2 Hours. **Max Marks: 60**

Note: Answer all parts

PART – A

I. Answer any FIVE of the following: **(2x5=10)**

1. Define Analysis of Variance.
2. Distinguish between treatments and blocks in a design of experiment.
3. How do you obtain efficiency of a design?
4. State any two demerits of CRD.
5. Give an expression for estimating one missing observation in case of LSD.
6. What are the advantages of factorial experiments?
7. Define partial confounding?

PART – B

II. Answer any FIVE of the following. **(10x5=50)**

8. a) Stating the model split the total variation under One way classified data and obtain its components. **(5)**

   b) Stating the model obtain expected sum of squares of error under two way Classified Data. **(5)**

9. a) Deduce least square estimators of the parameters of Two way model. **(5)**

   b) Stating the model and assumptions derive Expected sum of squares due to treatments under Completely Randomized Design. **(5)**

10. a) Explain the layout of the Latin Square Design. **(5)**

    b) Derive expressions for estimating two missing observation in case of L.S.D. **(5)**

11. a) Explain the principles of Design of Experiments. **(4)**

    b) Briefly explain the statistical analysis under Latin Square Design with ANOVA table. **(6)**

12. Describe the statistical analysis under 2^3 factorial experiment with ANOVA table. Also write the expression for main effects and interaction effects.

13. a) Define orthogonal contrast and mutually orthogonal contrast. Verify whether the second order interaction effect is orthogonal contrasts. **(4)**

    b) Explain the statistical analysis of the 2^2 factorial experiment ANOVA Table. **(6)**

14. What is Complete Confounding? Explain how the statistical Analysis can be carried out in case of Complete confounding.

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St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester V – Degree Examination
November/December - 2023
BOTANY – V(a)
PLANT TAXONOMY & RESOURCE BOTANY

Time: 2½ hrs. **Max Marks: 60**

SECTION –A

I. Answer any FIVE of the following. **(5X2=10)**

1. Why the artificial system of classification proposed by Karl Von Linnaeus is called the sexual system? What is the major limitation of this system?
2. Name any two Regional Herbaria.
3. Define spirocyclic flower. Name the family in which it is characteristically seen.
4. Name the type of fruits in the family Apiaceae and Brassicaceae.
5. What is resupination? Name the family in which it is characteristically seen.
6. Name any two types of inflorescences seen among the members of Moraceae.
7. Write the scientific name and family of the plant from which jute fibers are extracted.
8. Write the parts used and therapeutic uses of *Anamirta cocculus* and *Terminalia chebula*.

SECTION –B

II. Answer any SIX of the following. **(6x5=30)**

1. Give a brief account of cytotaxonomy and molecular taxonomy.
2. Write an explanatory note on the principles and rules of International code of nomenclature.
3. Differentiate between Papilionaceae and Caesalpiniaceae.
4. Explain the inflorescence in Asteraceae.
5. Give an account on spikelet of Poaceae.
6. Enlist five diagnostic features of Musaceae.
7. Write the scientific name and one use of the following:
   1) Pea 2) Sunflower 3) Hing 4) Rubbur 5) Tobacco
8. Write the family, scientific name, parts used, and uses of castor and groundnut.

SECTION –C

III. Answer any TWO of the following. **(2x10=20)**

1. Give a detailed account of Benthem and Hooker's classification. Add a note on its merits and demerits.
2. Explain the diagnostic features of the family Anacardiaceae, mentioning the botanical names of two economically important plants belonging to it.
3. Name any two sugar-yielding plants with their scientific names and explain the extraction of sugar from sugarcane.
4. Explain the diagnostic features of Arecaceae, mentioning the botanical names of two examples.

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St Aloysius College (Autonomous)

Mangaluru

B.Sc. Semester V – Degree Examination

November/December - 2023

BOTANY –V(b)

GENETICS AND PLANT BREEDING

Time: 2½ hrs. **Max Marks: 60**

SECTION –A

I. Answer any FIVE of the following. **(5X2=10)**

1. Recessive back cross is test cross. Give reason.
2. State the Law of Segregation of Factors.
3. Differentiate between Paracentric and Pericentric inversions.
4. What is Triticale? Mention its significance.
5. Mention any two undesirable consequences in the field of plant breeding.
6. Define Air layering.
7. What is haploidy? Mention its significance with reference to crop improvement.
8. Define Monogenic inheritance. Give example.

SECTION –B

II. Answer any SIX of the following. **(6x5=30)**

1. What are Phenotypic F2 ratios obtained in
   i) Masking gene action ii) Incomplete dominance iii) Supplementary factors
   iv) Dihybrid cross v) Complementary factors
2. What is crossing over? Explain any one type. Add a note on its significance.
3. What is Frame Shift Mutation? Explain the events that lead to frame shift mutation.

4. What is Autopolyploidy? Explain.
5. Write a note on cross pollination.
6. What is Hybridization? Explain the steps involved in plant hybridization.
7. Explain the role of mutation in plant breeding.
8. Differentiate between Heterosis and Inbreeding Depression.

SECTION - C

III. Answer any TWO of the following. **(2x10=20)**

1. Explain Incomplete linkage with a plant example. Add a note on its significance.
2. Explain sex determination in *Melandrium album*.
3. What is Centers of Origin of crop plants? Explain.
4. Describe Polygenic inheritance with plant example.

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St Aloysius College (Autonomous), Mangaluru

B.Sc. Semester V - Degree Examination

November/December - 2023

Zoology - Paper V(a)

NON-CHORDATES AND ECONOMIC ZOOLOGY

Time: 2 ½ hrs **Max Marks: 60**

Note: 1. Answer any **ten** questions from Part-A, any **four** questions from Part- B and any **two** questions from Part-C.

2. Draw diagrams wherever necessary.

PART-A

I. Answer any TEN of the following. **(10X2=20)**

a) Name the locomotory organelles present in protozoans.

b) What are cnidoblast? Write their functions.

c) Write the types of coral reef.

d) What are flame cells? Where do you find them?

e) Write any two parasitic adaptations of round worms.

f) List any two classes of Phylum Annelida with an example for each.

g) Mention the coelomic cavity and its divisions present in hemichordates.

h) Write the annelidan affinities of Phylum Onychophora.

i) What is tube feet? Write its significance.

j) Name economically important species of honey bees.

k) Enlist any four common Dairy byproducts.

l) What are broilers and layers?

PART- B

II. Answer any FOUR of the following. **(4X5=20)**

a) Classify Phylum Protozoa up to classes giving suitable examples.

b) Enumerate the general characteristics of Phylum Ctenophora.

c) With reference to Annelids, explain metamerism.

d) Discuss the economic importance of molluscs.

e) Explain the life cycle of silkworm with neat labelled diagrams.

f) Write a note on application of earthworms in waste management.

Contd...2

PART- C

III. Answer any TWO of the following. **(2X10=20)**

a) Give a detailed account on asconoid & syconoid types of water canal system in sponges with suitable illustrations.

b) Explain the parasitic adaptations of Platyhelminthes.

c) Write the general characteristics of the phylum Arthropoda. Give two examples.

d) Describe the techniques of culturing shrimps and pearl.

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St Aloysius College (Autonomous), Mangaluru

B.Sc. Semester V - Degree Examination

November/December – 2023

ZOOLOGY –Paper V(b)

DIVERSITY OF CHORDATES AND COMPARITIVE ANATOMY

Time: 2 ½ hrs **Max Marks: 60**

Note: 1. Answer any **ten** questions from Part-A, any **four** questions from Part- B and any **two** questions from part-C.

2. Draw diagrams wherever necessary.

PART-A

I. Answer any TEN of the following. **(10X2=20)**

a) Name any two subphyla of Chordata with an example for each.

b) Define test or tunic in which phylum do you find it?

c) Write any four general characters of vertebrates.

d) Distinguish between Homocercal and Heterocercal fins.

e) Write any two distinctive feathers of Prototheria.

f) Mention the two Subclasses of Class Aves with an example for each.

g) Mention any two functions of derivatives of integument.

h) What are visceral arches? Mention their function.

i) Define dentition. Write the dental formula for the adult human

j) Write the role of aortic arches in vertebrates.

k) What is the succession of kidney in vertebrates?

l) Define autonomic nervous system. Mention its types.

PART- B

II. Answer any FOUR of the following. **(4X5=20)**

a) With the help of neat labelled diagram explain the externals of *Herdmania.*

b) Enumerate the general characters of Chondrichthyes with two examples.

c) Write a note on Non venomous snakes of India.

d) Briefly explain alimentary canal in vertebrate.

e) Elucidate the general concepts of comparative anatomy.

f) Comment on sense organs in vertebrates.

PART- C

III. Answer any TWO of the following. **(2X10=20)**

a) Enumerate the differences between *Petromyzon* and *Myxine.*

b) Write the distinctive characteristics of class Amphibia. Classify Amphibia up to orders giving three distinctive characters and one example for each order.

c) Give an account of axial skeleton in vertebrates.

d) Write a comparative account of brain in vertebrates.

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St Aloysius College (Autonomous)

Mangaluru

B.Sc. Semester V – Degree Examination

November/December - 2023

MICROBIOLOGY - V(a)

MOLECULAR BIOLOGY

Time: 2½ Hours. **Max Marks: 60**

Instructions: Answer all the three sections – A, B and C
Draw Diagrams wherever necessary.

SECTION– A

1. **Define/Answer any TEN of the following:** **(2x10=20)**

a) Bidirectional replication

b) Ligase

c) DNA polymerase III

d) RNA editing

e) Alternative splicing

f) Transcription factors

g) Genetic code

h) Role of IFs in the initiation of translation

i) Peptide bond formation

j) Attenuator control

k) cro gene

l) Hfr strains

SECTION- B

Answer any FOUR of the following **(5x4=20)**

2. Write a short note on Specialized transduction.
3. Give an account on base-excision repair.
4. Write brief note on Post-translational modifications of proteins.
5. Discuss tRNA structure.
6. Write short note on eukaryotic RNA polymerases.
7. Elaborate various modes of DNA replication.

SECTION- C

Answer any TWO of the following. **(10x2=20)**

8. Write in detail about Watson and Crick model of DNA.
9. Discuss in detail the molecular process of prokaryotic transcription.
10. Write in detail about translation in prokaryotes.
11. Explain in detail about bacterial conjugation.

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St Aloysius College (Autonomous)

Mangaluru

B.Sc. Semester V – Degree Examination

November/December - 2023

MICROBIOLOGY - V(b)

FOOD MICROBIOLOGY

Time: 2½ Hours. **Max Marks: 60**

Instructions: Answer all the three sections – A, B and C
Draw Diagrams wherever necessary.

SECTION – A

1. **Define/Answer any <u>TEN</u> of the following:** **(2x10=20)**
   a) Listeriosis
   b) Class II preservatives
   c) SPC
   d) GMP
   e) SCP
   f) Biopreservation
   g) Nutritive value of milk
   h) Codex Alimentarius
   i) Salmonellosis
   j) Food additives
   k) Tofu
   l) HACCP

SECTION- B

Answer any <u>FOUR</u> of the following **(5x4=20)**

2. Write briefly on Mycotoxins.
3. Write briefly on the Spoilage of Fish and Sea foods.
4. Write about the Phosphatase Test.
5. Write a short note on sources of food contamination.
6. Write briefly on the biochemical activities of microbes in milk.
7. Write a short note on Rapid Microbiological methods for quality testing of food.

SECTION- C

Answer any <u>TWO</u> of the following. **(10x2=20)**

8. Explain in detail about fermented foods.
9. Explain the Canning of food. Add a note on spoilage of canned foods.
10. Write in detail about Reductase tests.
11. Write in detail about the examination of Fecal contamination and MPN method.

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(2021 Batch onwards)

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St Aloysius College (Autonomous)

Mangaluru

B.Sc. Semester V – Degree Examination

November/December - 2023

BIOCHEMISTRY - V(a)

BIOCHEMISTRY OF MACROMOLECULES

Time: 2½ Hours **Max. Marks: 60**

Note: i) Answer all the questions

ii) Draw diagrams wherever necessary

PART – A

1. Answer any FIVE of the following. **(2×5=10)**

a) Why glycogen is highly branched compared to starch?

b) Define epimers.

c) What are zwitter ions?

d) Define iodine value.

e) How is dipeptide formed?

f) Write the reaction of alkali on DNA.

g) Write the structure of Adenine and thiamine.

PART – B

Answer any FOUR of the following. **(5X4=20)**

2. Write the oxidation and reduction reaction of monosaccharides.
3. Write a note on biological importance of Sugars and deoxy Sugars.
4. Illustrate on spingolipids.
5. Explain α helical structure of protein.
6. Write a note on Watson and Crick model of DNA.
7. Explain the reactions of amino group with ninhydrin and dansyl chloride.

PART – C

Answer any THREE of the following: **(10x3=30)**

8. With an example explain the classification of carbohydrates.
9. What are phospholipids? Write the different types and its biological importance.
10. Explain amino acid sequencing by Edman degradation method.
11. Explain mRNA and tRNA in detail.
12. Classify the types of amino acid based on its structure.

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St. Aloysius College (Autonomous)

Mangaluru

B.Sc. Semester V – Degree Examination

November/December - 2023

BIOCHEMISTRY – V(b)

HUMAN PHYSIOLOGY AND ENZYMOLOGY

Time: 2½ Hours **Max. Marks: 60**

Note: i) Answer all the questions

ii) Draw diagrams wherever necessary

PART – A

1. **Answer any FIVE of the following.** **(2×5=10)**

a) What are excitatory and inhibitory neurotransmitters?

b) What are the hormones secreted by heart and mention their function.

c) Enlist the factors affecting remodeling of bone.

d) Define Glomerulus Filtration Rate.

e) Mention the role of pancreas in digestion of food.

f) Define Turnover number and Km.

g) What is non-competitive inhibition? Give an example.

PART – B

Answer any FOUR of the following. **(5X4=20)**

2. What is a synapse? Explain the mechanism of nerve transmission along axon.

3. Write a note on Cardiac cycle.
4. Explain the role of kidney in maintaining acid-base balance.
5. Give an account on hormones secreted by Adrenal glands.
6. What are isoenzymes? Explain LDH as an example.
7. Explain Michaelis-Menten Equation for Steady State Approach.

PART - C

Answer any THREE of the following: **(10x3=30)**

8. Explain the biochemical events which happen during transport of gases. Add a note on storage functions of liver.
9. Write short note on: i) enzymes involved in digestion process
   ii) regulation of insulin and Glucagon
10. Explain the blood clotting mechanism in detail.
11. Elaborate on factors affecting enzyme catalyzed reaction. Add a note on theories of enzyme catalysis.
12. Explain in detail competitive and non-competitive inhibition that represent the LB plot.

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(2021 Batch onwards)

G 511 DC1.5

Reg. No. | | | | | | | |

St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester V – Degree Examination
November/December - 2023
BIOTECHNOLOGY – V(a)
Genetic Engineering

Time: 2½ Hours **Max. Marks: 60**

Note: i) Answer all the questions
ii) Draw diagrams wherever necessary

PART - A

1. **Answer any FIVE of the following:** **(5x2=10)**

a) What are neoschizomers? Give an example.

b) Mention two functions of RNase H.

c) What are linkers? Mention its uses.

d) Name the types of Next generation sequencing.

e) Mention the components of a PCR reaction.

f) What is in situ hybridization? Give an example.

g) Name two DNA sequence data bases.

h) Mention any two regulatory bodies for monitoring GE work in India.

PART – B

Answer any SIX of the following: **(6x5=30)**

2. Write short notes on binary vectors.
3. Explain the mode of action of DNA ligase.
4. Describe Sanger's sequencing technique.
5. Explain any two chemical methods of gene transfer.
6. Describe the DNA fingerprinting technique.
7. Explain the production of Hepatitis B vaccine.
8. Describe the ethical issues associated with GMO's.
9. Write short notes on FASTA.

PART – C

Answer any TWO of the following: **(2x10=20)**

10. Describe the steps in purification of genomic DNA.
11. Explain the technique of blue white screening.
12. Describe Western blotting technique.
13. Describe the production of tissue plasminogen activator using genetic engineering.

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(2021 Batch onwards)

G 511 DC3.5

Reg. No. | | | | | | | |

St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester V – Degree Examination
November/December - 2023
BIOTECHNOLOGY – V(b)
Plant and Animal Biotechnology

Time: 2½ Hours **Max. Marks: 60**

Note: i) Answer all the questions
ii) Draw diagrams wherever necessary

PART - A

1. **Answer any FIVE of the following:** **(5x2=10)**

a) Define cellular totipotency.

b) What are anti-browning agents? Give an example.

c) Write about the two significances of transgenic plants in agriculture..

d) Which specific gene was modified in the Flavr Savr tomato, and how did this modification affect the tomato's characteristics?

e) What are pluripotent stem cells? Give one example.

f) Comment any four applications of animal cell culture.

g) Define xenotransplantation.

h) Write any two applications of transgenic sheep.

PART – B

Answer any SIX of the following: **(6x5=30)**

2. Explain the role of auxins and cytokinins in plant tissue culture.
3. Explain how androgenesis contributes to the production of haploid plants.
4. Explain strategies for production of virus resistant transgenic plants.
5. Comment on production of transgenic plants for bacterial resistance.
6. Explain the process of trypsinization in animal cell culture.
7. What are stem cells? Comment on different types with examples.
8. Define tissue engineering. Elaborate on artificial skin production.
9. Describe the underlying principles of gene therapy in treating Cystic Fibrosis (CF).

PART – C

Answer any TWO of the following: **(2x10=20)**

10. Explain the general laboratory requirements for plant tissue culture.
11. Describe the production of pest-resistant transgenic plants with suitable examples.
12. Explain various methods to measure cell viability and cytotoxicity.
13. Elaborate on the application of somatic cell nuclear transfer in the process of cloning Dolly.

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(2021 Batch onwards)

G 110 DC1.5/G 512 DC1.5 Reg. No. | | | | | | | |

St Aloysius College (Autonomous)

Mangaluru

B.A./B.Sc. Semester V – Degree Examination

November/ December - 2023

COMPUTER ANIMATION –V (a)

3D TEXTURING, CAMERA AND LIGHTING

Time: 2½ hrs. Max Marks: 60

PART - A

Answer any FIVE of the following. (5x2=10)

1. a) Name 3 types of Camera's.
   b) What is the default color and intensity of Spot light?
   c) What is the use of Projector map?
   d) How to create the transparent object?
   e) What is the use of specular level and glossiness?
   f) Name any 4 lens effects.

PART - B

Answer any FOUR of the following. (4x5=20)

2. Explain the steps to create a Rubik cube.
3. Write a note on cameras & path constrain.
4. Explain any 5 different mappings.
5. What is the use of bump and gradient texture?
6. Write down the steps of creating horlicks bottle.

PART – C

Answer any THREE of the following: (3x10=30)

7. Explain different types of material shaders.
8. Explain briefly about Hair and Fur modifier.
9. Define lights & explain its uses and properties.
10. Write a note on UVW & unwrap UVW modifier.

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(2021 Batch onwards)

G ~~110-DC3.5~~/ G 512 DC3.5 Reg. No. | | | | | | | |

St Aloysius College (Autonomous)

Mangaluru

B.A./B.Sc. Semester V – Degree Examination

November/ December - 2023

COMPUTER ANIMATION –V (b)

WEB TECHNOLOGY

Time: 2½ hrs. **Max Marks: 60**

PART - A

Answer any FIVE of the following. **(5x2=10)**

1. a) Expand HTML.
   b) What is the use of HTML Tags?
   c) Explain PAN and WAN.
   d) Write basic HTML tag to create site.
   e) Define <H1> To <H6> tags.
   f) What is the difference between <b> and tag?

PART - B

Answer any FOUR of the following. **(4x5=20)**

2. How to create submit button with moving text?
3. Write a note on hyperlinks tags.
4. Explain the uses of <TD> and <TR>
5. Explain about safari.
6. Explain WYSIWYG authoring tools.

PART – C

Answer any THREE of the following: **(3x10=30)**

7. Write a note on web unique features.
8. Explain the steps to create frame tags with cities website.
9. Write down the steps to create place holder with date and time illustration.
10. Explain types of web hosting services.

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(2021 Batch Onwards)

G 513 DC1.5

Reg. No. : | | | | | | | |

St Aloysius College (Autonomous)

Mangaluru

B.Sc. - Semester V – Degree Examination

November/December - 2023

ECONOMICS – V(a)

PUBLIC ECONOMICS

Time: 2½ hrs. **Max Marks: 60**

PART - A

I Answer any FIVE of the following. **(2×5=10)**

1. Define public finance.
2. What are public goods?
3. Distinguish between impact and incidence of a tax.
4. Give the meaning of market failure.
5. Define public expenditure.
6. Distinguish between internal and external debt.
7. Give the meaning of zero-based budget.
8. What is primary deficit?

PART – B

II Answer any SIX of the following. **(5×6=30)**

9. Distinguish between public and private finance.
10. Briefly explain the causes of market failure.
11. Explain the factors affecting taxable capacity of a country.
12. Write a note on types of public expenditure.
13. Briefly explain Peacock- Wiseman hypotheses.
14. Write a note on sources of public borrowing.
15. Briefly explain the causes of rising public debt.
16. Explain the surplus, balanced and deficit budget with a diagram.
17. Write a note on the objectives of fiscal policy.

PART – C

III Answer any TWO of the following. **(10×2=20)**

18. Explain the scope and importance of public finance.
19. Explain the sources of public revenue.
20. Explain the methods of debt redemption.
21. Explain the advantages and disadvantages of deficit financing.

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(2021 Batch Onwards)

G 513 DC2.5

Reg. No. : | | | | | | | |

St Aloysius College (Autonomous)

Mangaluru

B.Sc. - SEMESTER V – Degree Examination

November/December - 2023

ECONOMICS – V(b)

DEVELOPMENT ECONOMICS

Time: 2½ Hours. **Max. Marks: 60**

PART- A

I. Answer any FIVE of the following: **(2×5=10)**

1. Define economic development.
2. What is poverty?
3. Write a note on, "Happiness Index".
4. What is Gini coefficient index?
5. What is HRD?
6. What is capital accumulation?
7. What is manpower planning?
8. What is Sustainable development?

PART- B

II. Answer any SIX of the following: **(5×6=30)**

9. Distinguish between economic growth and economic development.
10. Explain the concept of "PQLI".
11. State and explain Schumpeter's theory of economic growth.
12. Write a note on capital output ratio.
13. Explain the role of technology in economic development.
14. Explain the measures of economic development.
15. Explain Adam Smith's theory of economic development.
16. Explain Balanced Growth theory of economic development.
17. Write a note on, Karl Marx theory of economic development.

PART– C

III. Answer any TWO of the following: **(10×2=20)**

18. Critically evaluate David Ricardo's theory of economic development.
19. Explain Rostow's stages of economic development.
20. State and explain big push theory of economic growth.
21. Evaluate the goals and targets of sustainable development.

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(2021 Batch Onwards)

G 513 DC3.5 Reg. No. : | | | | | | | |

St Aloysius College (Autonomous)
Mangaluru

B.Sc. - Semester V – Degree Examination

November/December - 2023

ECONOMICS – V(c)

INTRODUCTION TO R SOFTWRAE

Time: 2½ hrs. Max Marks: 60

PART - A

I Answer any FIVE of the following. (2×5=10)

1. What is R?
2. Expand CRAN.
3. Which command is used in R to get the output?
4. How do you insert *data types* as numeric in R code?
5. State the syntax to delete 3rd row in the matrix.
6. State the syntax for accessing first and second row in the given 2x3 matrix.
7.
```
A = matrix(
c(1, 2, 3, 4, 5, 6, 7, 8, 9),
nrow = 2,
ncol = 2,
byrow = TRUE
)
print(A[1, 2])
```
write the output.
8. Which command is used in R to replace an element in the matrix?

PART – B

II Answer any SIX of the following. (5×6=30)

9. a) Assign the same value for 4 variables in one line and generate the output.
   b) Which function is used to return the square root of a number?
   c) Which operation is used to compare two values?
10. a) Create and write a syntax for 4x3 matrix, dimension, number of columns and rows.
    b) Execute the output.
11. a) Create matrix A (3x3) & matrix B (1x3).
    b) Combine the above matrix row and column wise.
12. a=10, b=120; write a valid syntax for if else statement in R.
13. Write a R syntax for while loop with break.
14. Team A consists of 2 players and Team B consists of 3 players.
    Write a code for nested loop and yield the output.

Contd...2

15. a) Distinguish between illegal and legal variables.
    b) What will be the output of the following R function?
    c) paste (Everybody, is , a, warrior)

    Write a R code to convert numeric to intenger.

16. a) Write the syntax used to find the total number of characters in a given vector.
    b) Write the syntax used to change the string variable to uppercase and lower case.

17. a) Syntax used to justify.
    b) Syntax used to justify right.
    c) my.var <- format(102.848793834, digits = 3) what is the output?

PART – C

III Answer any <u>TWO</u> of the following. **(10×2=20)**

18. a) Explain the following syntax;

    matrix (data, nrow, ncol, byrow, dimname)

    b) Briefly explain the data frame with a suitable example.

19. Describe the historical context of R programming.

20. a) Create and write the syntax matrix A & B of 4x4.
    b) Perform matrix addition.
    c) Write the output matrix A- B.

21. A) y = c(4,12,6,7,2,9,5)

    Execute the result for the following syntax

    1. order(y)
    2. y[order(y)]

    B) x <- c(8,2,4,1,-4,NA,46,8,9,5,3)

    1. order(x,na.last = TRUE)
    2. order(x,na.last=FALSE)

    order(x,decreasing=FALSE,na.last=FALSE)

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(2021 Batch onwards)

G 514 DC1.5

Reg. No. : | | | | | | | |

St Aloysius College (Autonomous)

Mangaluru

B.Sc. Semester V – Degree Examination

November/December – 2023

FOOD SCIENCE – V(a)

INTRODUCTIONS TO DAIRY & FERMENTATION TECHNOLOGY

Time: 2½ Hours **Max. Marks: 60**

Note: i) Answer all the questions

ii) Draw diagrams wherever necessary

PART – A

1. **Answer any FIVE of the following.** **(2×5=10)**

a) What is Fermentation?

b) Give a note on lactic acid fermentation.

c) Explain about Microbial Toxin.

d) Give a note on Prebiotics.

e) Name any five lactobacillus species.

f) Give a note on Reverse Osmosis.

g) Define Antioxidants.

PART – B

Answer any SIX of the following. **(5X6=30)**

2. Give a note on Microbial Growth Curve.
3. Give a note on Yeast.
4. Give a note on FSSAI.
5. Explain in briefly about Probiotics.
6. Write a short note on Gram Staining with example.
7. Explain about Endotoxin.
8. Explain in detail about Dairy Products. Butter, Yoghurt, Curd, Ghee.
9. Explain in detail about Prokaryotes and Eukaryotes.

PART – C

Answer any TWO of the following: **(10x2=20)**

10. Explain in detail about Down Stream Processing.
11. Write short notes on Wine & Beer Processing.
12. Explain in detail about Membrane Technology.

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(2021 Batch onwards)

G 514 DC3.5 Reg. No. : | | | | | | | |

St Aloysius College (Autonomous)

Mangaluru

B.Sc. Semester V – Degree Examination

November/December – 2023

FOOD SCIENCE – V(b)

SPICES AND PLANTATION CROP TECHNOLOGY

Time: 2½ Hours **Max. Marks: 60**

Note: i) Answer all the questions

ii) Draw diagrams wherever necessary

PART – A

1. Answer any FIVE of the following. **(2×5=10)**

a) Define HACCP.

b) Which are the varieties of turmeric?

c) What are Carotenoids?

d) List out the types Teas.

e) Give a note on bleached cardamom.

f) What is the difference between a) Masala b) Garam Masala?

g) Define FSSAI.

PART – B

Answer any SIX of the following. **(5X6=30)**

2. Write a Short note on Food Safety.
3. Explain in detail about Cocoa Processing.
4. Give a note on Coffee Processing.
5. Write a note on Antimicrobial Properties of Spices.
6. Explain the detailed about Ginger processing.
7. Write a short note on Food Pigments.
8. Explain in detail about recent advances in Arecanut processing.
9. Explain in detail about Role of Antioxidant in Human life.

PART – C

Answer any TWO of the following: **(10x2=20)**

10. Write a detailed note on Cardamom Processing.
11. Write a short note on Tea Processing
12. Write short notes on Clove Processing.

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