

(2014 Batch Onwards)

G 501.6a

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St. Aloysius College (Autonomous)**Mangaluru****B.Sc. Semester VI– Degree Examination****May/June - 2023****PHYSICS – Paper VII****NUCLEAR PHYSICS AND ANALOG ELECTRONICS**

Time: 3 hrs.

Max Marks: 100

SECTION – A1. Answer any **TEN** of the following.

(10x2=20)

- What is activity of a radioactive substance? Mention its unit.
- Write the relation between impact parameter and scattering angle. What is the value of impact parameter for head on collision?
- What are pair production and pair annihilation?
- What is the structure of proton according to quark model?
- What is the significance of Q value of a nuclear reaction?
- What are radio isotopes? Give an example.
- Write any two drawbacks of LINAC.
- What is quenching in a G.M tube? Write any one of the quenching agent used.
- Draw the pin configuration of IC741.
- For the inverting amplifier given that $R_1=5k\Omega$ and $R_f=50k\Omega$. Assuming an ideal amplifier, calculate the output voltage for the input of 1V.
- What is an oscillator? Which type of feedback is used in an oscillator?
- Define 'lower cut-off frequency' and 'higher cut-off frequency' of an amplifier

SECTION – BAnswer **TWO** full questions from each unit:**UNIT – I**

- Describe with theory Dempster's mass spectrograph. Explain how isotopic abundances can be determined using mass spectrograph. (6)
 - What are cosmic ray showers? Explain with a neat figure. (4)
- With elements A, B and C forming a radioactive series (C being stable), derive an expression for the number of atoms of B if at start B was not present in the sample. (6)
 - Write four similarities between a liquid drop and a nucleus. (4)
- Explain the classification of fundamental particle with respect to mass and spin. (6)
 - Obtain an expression for the alpha particle disintegration energy. (4)

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UNIT – II

5. a) Explain the various types of nuclear reactions (6)
 b) Derive the expression for Q value of a nuclear reaction in terms of masses of the particles involved. (4)
6. a) Describe the construction and working of a cyclotron. Obtain the resonance condition of a cyclotron and mention the expression for the final energy of the output beam. (6)
 b) Describe the working of semiconductor detector. (4)
7. a) Obtain the four-factor formula for thermal reactors and discuss the condition for criticality. (6)
 b) With a neat labelled diagram, explain the construction and working of LINAC (4)

UNIT – III

8. a) Define h-parameter for two port network and arrive at the h-parameter equivalent for a transistor in CE mode. (6)
 b) Explain the need of a buffer amplifier. How is it realized using an OP-Amp. (4)
9. a) Draw the circuit diagram of a CE amplifier and explain the role of each component. (6)
 b) What is difference amplifier? Explain with a circuit, the working of OP-Amp difference amplifier. (4)
10. a) Explain how sustained oscillations are obtained with the help of positive feedback. Draw the circuit of RC phase shift oscillator using transistor and explain its working. (6)
 b) Draw the circuit of Wein bridge oscillator using OP-Amp and explain its working. (4)

SECTION – C**Answer any FOUR of the following:****(4x5=20)**

11. Calculate the time required for 10% of a sample of thorium to disintegrate. Half life of thorium is 1.4×10^{10} years.
12. Singly charged ions of mass 24 amu and 25 amu accelerated through a potential difference of 2000 volts enter a uniform magnetic field of 0.1tesla. what should be the distance between two slits arranged to collect these ions after they have travelled semi-circular paths?

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13. Find the threshold energy of nuclear reaction ${}_7\text{N}^{14}(n,\alpha){}_5\text{B}^{11}$.
 Given, mass of ${}_7\text{N}^{14}=14.003074\text{amu}$.
 Mass of ${}_5\text{B}^{11}=11.009305\text{amu}$.
 Mass of ${}_0\text{n}^1=1.008665\text{amu}$.
 Mass of α particle $=4.002603\text{amu}$.
14. In a cyclotron, dees with diameter 2m accelerate alpha particles to the energy of 100 MeV. Calculate the magnetic field strength and frequency of the oscillator used. Mass of alpha particle $=4$ amu
 ($1 \text{ amu}=1.67 \times 10^{-27}\text{kg}$) and charge of alpha particle $=2e$ ($e=1.6 \times 10^{-19} \text{ C}$)
15. For the subtractor circuit using an OP-Amp input voltage are $V_1=7\text{v}$ and $V_2=3\text{V}$ and $R_1=10\text{k}\Omega$ and $R_2=20\text{k}\Omega$ respectively. Calculate the output voltage.
16. In a small signal silicon n-p-n transistor amplifier has the following parameters. $h_{ie}=3.5\text{K}$, $h_{fe}=250$, $R_E=2\text{K}\Omega$, $R_L=5.6\text{K}\Omega$, $R_1=30\text{K}\Omega$, $R_2=18\text{K}\Omega$, $V_{CE}=5\text{V}$, $V_{CC}=12\text{V}$ and $I_C=2\text{mA}$. Find the input and output resistance, voltage and power gain.

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St Aloysius College (Autonomous), Mangaluru**B.Sc. Semester VI- Degree Examination****May/June - 2023****PHYSICS – Paper VIII****COMMUNICATION AND DIGITAL ELECTRONICS,
SPECIAL PROPERTIES OF MATERIALS****Time: 3 hrs.****Max Marks: 100****SECTION – A****Answer any TEN of the following.****(10x2=20)**

1. a) A carrier wave 100V & 1.2 MHz is modulated by a 50V, 1kHz sine wave signal. Find the modulation factor.
- b) What is modulation? State at least one reason for the need of modulation?
- c) What is meant by scanning? What is the number of lines scanned per field in interlaced scanning?
- d) Define the terms i) sensitivity ii) fidelity of an AM Receiver
- e) What is NOT gate? How is it represented?
- f) Name the gates which are called universal gates and why they are called so?
- g) What is a clock signal? How to represent it?
- h) Draw the symbol for NAND latch Flip-flop.
- i) Define critical field and critical current
- j) What is Meissner effect? State any one application of this effect.
- k) What are quantum dots? What is their special property?
- l) What are one dimensional Nano materials? Give an example.

SECTION – B**Answer TWO full questions from each unit:****UNIT – I**

2. a) Describe the working of Super-heterodyne AM radio receiver with block diagram. **(6)**
- b) Give a comparison between AM and FM. **(4)**
3. a) Draw the schematic diagram of a CRT and explain its working. **(6)**
- b) Explain the principle of interlaced scanning. **(4)**
4. a) What is amplitude modulation? Derive an expression for the instantaneous voltage of an amplitude modulated wave. **(6)**
- b) Explain how a diode detector can be used for detecting AM signal. **(4)**

UNIT – II

5. a) What is an AND gate? Explain its construction using diodes and show that its truth table can be realized using various inputs. **(6)**
- b) State and prove De-Morgan's second theorem. Represent it using logic gates. **(4)**

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6. a) What is half adder? Explain its truth table, Boolean equation and logic diagram. (6)
- b) Explain the construction of OR gate using NAND gates verify its truth table. (4)
7. a) Explain the working of a serial shift register. (6)
- b) What is a BCD to 7 segment decoder? Discuss qualitatively. (4)

UNIT - III

8. a) What is Super conductivity? Define critical temperature and discuss BCS theory of Superconductivity and explain the effect of magnetic field on superconductivity (6)
- b) Distinguish between type I and type II superconductors. (4)
9. a) Discuss the various types of Nano scale systems. Explain the structure of carbon Nano tube and discuss its properties. (6)
- b) Explain polarization in a)linear medium b)non linear medium (4)
- 10.a) Discuss the theory of second harmonic generation in nonlinear media and explain the experimental set up for the same. (6)
- b) Explain the properties and uses of carbon nanotubes. (4)

SECTION - C

Answer any **FOUR** of the following:

(4x5=20)

11. An AM wave is represented by expression, $E = 5 (1 + 0.8 \cos 10^4 t) \sin 220 \times 10^4 t$. What are the minimum and maximum amplitudes of the AM wave? What are the frequency components contained in the modulated wave and what is the amplitude of each component?
12. An AM wave consists of the following components:
 Carrier components = 5 V peak value
 Lower side band component = 2.5 V peak value
 Upper side band component = 2.5 V peak value
 If the AM wave drives a $2 \text{ k} \Omega$ resistor, find the power delivered to the resistor
 by (a) carrier wave (b) lower side band component and
 (c) upper side band component (d) What is total power delivered?
13. A sinusoidal carrier voltage of frequency 1 MHz and amplitude modulated by a sinusoidal signal of frequency 1 kHz with a modulation index of 50%. Calculate the frequency and amplitude of USB and LSB terms.
14. Simplify the logic expression $Y = \overline{AB} + \overline{ABC} + \overline{ABCD} + ABCD$.
15. Realize and simplify the Boolean expression $Y = \overline{ABC} + \overline{ABC} + ABC$
16. The superconducting transition temperature of lead is 7.26K. If the critical field at 0K is $64 \times 10^3 \text{ A/m}$. Calculate critical field at 5K

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St Aloysius College (Autonomous)**Mangaluru****B.Sc. Semester VI – Degree Examination****May/June - 2023****CHEMISTRY – PAPER VII****Time: 3 hrs.****Max Marks: 100****Instructions:** 1. Write the question number and subdivision clearly.

2. Write equations and diagrams wherever necessary.

3. Answer Part- A in the first two pages of the answer book.

PART - A**Answer any TEN of the following questions in 1 to 3 sentences.****(10×2=20)**

1. a) Symmetric stretching vibration of CO₂ is IR inactive. Give reason.
- b) State Hooke's law. Write the expression for it.
- c) N₂ is IR inactive but Raman active. Give reason.
- d) State nitrogen rule.
- e) What is an inert complex? Give one example.
- f) What are organolithium compounds? Give an example.
- g) Predict the stability of Fe(CO)₅ based on 18 electron rule.
- h) Define plane of symmetry.
- i) What are host compounds in supramolecular chemistry? Give example.
- j) Write two advantages of SEM over other microscopes.
- k) What are inorganic nano tubes?
- l) What is the acidity of alpha hydrogens?

PART - B**Answer any TEN of the following questions in 3 to 5 sentences.****(10×3=30)**

2. (i) What are functional group region and fingerprint regions? Explain.
- (ii) Calculate the wavenumber of C-H stretching in m⁻¹. Mass of carbon = 20 x 10⁻²⁷kg, mass of hydrogen = 1.6 x 10⁻²⁷kg and force constant of C-H bond = 5 x 10² kg/s².
- (iii) What are stoke's and antistoke's lines in Raman spectroscopy.
- (iv) What is (a) a base peak (b) molecular ion peak? Explain
- (v) How does size and charge of the metal ion affect the stability of the complex.
- (vi) Explain any two methods of preparation of organoaluminium compounds.
- (vii) Explain the bonding in metal carbonyls.

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- (viii) Define center of symmetry. Assign the point group for water and NH_3 molecules.
- (ix) What is the role of Van der Waals interactions during the formation of supramolecular structures?
- (x) Explain carbon nanocomposites and nanofibres with one example each.
- (xi) Give two reactions supporting keto form of ethyl acetoacetate.
- (xii) Explain functional group addition process in retrosynthesis.

PART - C**Answer any TEN of the following questions.****(10×5= 50)**

3. With a neat labelled diagram explain Raman spectrophotometer.
4. What are the different types of bands in IR spectrum? Explain.
5. Give the differences between IR and Raman spectroscopy.
6. Explain the differentiation between 2-pentanone and 3-pentanone by mass spectroscopy.
7. Explain the substitution reactions of square planar complexes by taking Pt(II) as example.
8. Explain spectrophotometric method for the determination of stability constant of metal complex.
9. Explain the mechanism of Fischer-Tropsch synthesis with an example.
10. What are Grignard reagents? Explain its application in synthesis of alcohols and aldehydes.
11. Explain with mechanism synthesis of ethyl acetoacetate.
12. Give the principle and working of SEM.
13. How do you synthesize (i) carboxylic acids and (ii) diketones from acetoacetic ester.
14. Explain the synthesis of a ketone and alkyl halide from alkyne.

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St Aloysius College (Autonomous)**Mangaluru****B.Sc. Semester VI – Degree Examination****May/June-2023****CHEMISTRY – PAPER VIII**

Time: 3 hrs.

Max Marks: 100

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

PART - A

Answer any **TEN** of the following questions in 1 to 3 sentences. (10×2=20)

1. a) What is cell constant?
 b) Mention two advantages of conductometric titrations.
 c) Define the terms activity and activity coefficient of an electrolyte.
 d) The ratios of ionic mobility of cation to anion of an electrolyte is 0.82. Calculate the transport number of the cation.
 e) What is green catalyst? Give examples.
 f) Give the green synthesis of paracetamol.
 g) Give the enzymatic synthesis of polyhydroxybutyrate.
 h) Mention any four advantages of bioplastics.
 i) What is chemical shift in NMR spectra?
 j) Write any two concepts of Witt's chromophore theory?
 k) Write the structure of atropine.
 l) What is isoprene rule?

PART - B

Answer any **TEN** of the following questions in 3 to 5 sentences. (10×3=30)

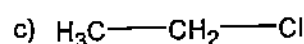
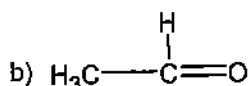
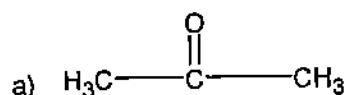
2. (i) What is Kohlrausch law?
 (ii) Explain asymmetric effect.
 (iii) Explain the principle of conductometric titration of strong acid against weak base.
 (iv) What is transport number? Give the relationship between transport number and mobility.

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- (v) Give the green synthesis of methyl acrylate.
- (vi) Discuss the blending of starch with synthetic and biopolymers for its use as bioplastics.
- (vii) Explain the regeneration process of cellulose.
- (viii) What are polymer composites? Give its components.
- (ix) Explain spin-spin coupling with an example.
- (x) Give the multiplicity of each hydrogen atoms present in the following compounds:



- (xi) What are terpenes? How are they classified?
- (xii) Give the isolation of alkaloids.

PART - C**Answer any TEN of the following questions.****(10×5= 50)**

- How is the solubility product of a sparingly soluble salt determined by conductometric measurement?
- Explain the construction and working of calomel electrode.
- How do you determine the pH of a solution using quinhydrone electrode?
- Explain potentiometric titration of ferrous sulphate with potassium dichromate.
- Explain green principle of catalytic reagents with examples. Discuss its advantages.
- Discuss the benefits and downsides of bioplastics on the environment.
- Explain oxidative and reductive doping with an example each.
- Explain the structure and properties of lignin.
- Explain the functioning of NMR spectrometer with a neat schematic sketch.
- Give the synthesis of alizarin dye.
- Discuss the colour change of phenolphthalein and methyl orange.
- Give the structural elucidation of nicotine.

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St Aloysius College (Autonomous)
Mangaluru

B.Sc. Semester VI – Degree Examination

MAY -2023

MATHEMATICS -Paper VII

PARTIAL DIFFERENTIAL EQUATIONS, FOURIER SERIES AND LINEAR ALGEBRA

Time: 3 Hours

Max Marks: 100

Note: Answer all parts.

PART A

Answer any TEN of the following:

(10×2½=25)

1. Check the condition of integrability for the equation
 $(y - z)(y + z - 2x)dx + (z - x)(z + x - 2y)dy + (x - y)(x + y - 2z)dz = 0.$
2. Solve $\frac{xdx}{y^3z} = \frac{dy}{x^2z} = \frac{dz}{y^3}.$
3. Solve $zydx = zxdy + y^2dz.$
4. If $f(x) = \begin{cases} 1, & 0 < x < 1 \\ -1, & 1 < x < 2 \end{cases}$, find the Fourier coefficient $a_0.$
5. State the Dirichlet condition for the existence of Fourier expansion.
6. Define the Fourier series of the function in complex form and write the formula for complex Fourier coefficient.
7. Determine whether the vectors $v_1 = (1, 0, 2), v_2 = (1, 1, 1)$ & $v_3 = (4, 5, 3)$ of R^3 are linearly independent.
8. Let $V = R^3$ and $v_1 = (1, 0, 2), v_2 = (0, 3, 1).$ Find a normal vector which is orthogonal to v_1 and $v_2.$
9. Prove that the sum of 2 subspaces is also a subspace.
10. Define (i) Idempotent matrix (ii) Nilpotent matrix.
11. Prove that image of a linear transformation is a subspace.
12. Prove that a linear transformation $T: V \rightarrow V'$ is a (1,1) mapping if and only if $\text{Ker } T = \{0\}.$
13. Find the rank of the matrix $\begin{bmatrix} 2 & 3 & 1 \\ 1 & \frac{3}{2} & \frac{1}{2} \\ 4 & 6 & 2 \end{bmatrix}$ using elementary column operations.
14. Show that the system of equations

$$x_1 - 2x_2 + x_3 = \frac{1}{2}$$

$$2x_1 - 5x_2 + 2x_3 = 1$$

$$x_1 + x_2 + x_3 = 1$$
 has no solution.
15. Prove that $T_r(AB) = T_r(BA).$

Contd...2

PART - B**UNIT - I****Answer any THREE of the following:****(3×5=15)**

1. Assuming the condition of integrability, solve
 $(2yz + zx - z^2)dx - zxdy - (x^2 + xy - xz)dz = 0$.
2. Solve $\frac{dx}{x(x+y)} = \frac{dy}{-y(x+y)} = \frac{dz}{-(x-y)(2x+2y+z)}$.
3. Solve $(y + z)dx + (z - x)dy - (x + y)dz = 0$ by the method of auxiliary equation.
4. Solve $(2x^2 + 2xy + 2xz^2 + 1)dx + dy + 2zdz = 0$ by inspection method.
5. Solve $yzdx - 2xzdy + (xy - zy^3)dz = 0$ by considering one of the variable as constant.

UNIT - II**Answer any TWO of the following:****(2×7½=15)**

1. Find the Fourier Series of $f(x) = x^2$ in $-\pi < x < \pi$ and deduce that
 $\frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} \dots = \frac{\pi^2}{12}$.
2. Find the half range sine and cosine series expansion of the function
 $f(x) = x, 0 < x < 2$.
3. Find the Fourier series for the function $f(x) = \begin{cases} -1, & -1 < x < 0 \\ 1, & 0 < x < 1. \end{cases}$
4. Find the half range sine and cosine series of $f(x) = \pi - x$ in the interval $[0, \pi]$.

UNIT - III**Answer any THREE of the following:****(3×5=15)**

1. If v_1, v_2, \dots, v_n is a basis of V and w_1, w_2, \dots, w_m are linearly independent in then prove that $m \leq n$.
2. State and prove Schwartz's inequality.
3. Define an inner product space. Prove that any orthonormal set in an inner product space V is linearly independent.
4. Let V be a finite dimensional vector space and W be a subspace of V , then prove that $\dim W \leq \dim V$ and $\dim \frac{V}{W} = \dim V - \dim W$.
5. If the vector space V is the internal direct sum of its subspaces U_1, U_2, \dots, U_n then prove that V is isomorphic to the external direct sum of U_1, U_2, \dots, U_n .

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UNIT - IV

Answer any **THREE** of the following:

(3×5=15)

1. If $A = m(T)$ with respect to the basis v_1, \dots, v_n and $B = m(T)$ with respect to the basis w_1, \dots, w_n . Then prove that there exists a non singular matrix 'C' such that $B = CAC^{-1}$.
2. Prove that dimension of the domain is equal to rank +nullity.
3. If $T: V \rightarrow W$ is a one -one linear transformation of V onto W then prove that it's inverse is linear.
4. Prove that a linear transformation T of a vector space V with finite basis $\alpha_1, \dots, \alpha_n$ is non-singular if and only if $T(\alpha_1), \dots, T(\alpha_n)$ are linearly independent in V .
5. Let V and V' be vector spaces of dimension m and n respectively. Then prove that dimension of $L(V, V')$ is mn .

UNIT - V

Answer any **THREE** of the following:

(3×5=15)

1. Let $A \in M_n(F)$ with $q(x) = a_0 + a_1 x + \dots + x^m$ as the minimum polynomial of A . Prove that A is non-singular if and only if $a_0 \neq 0$.
2. Find the rank of the matrix using the method of row reduction

$$\begin{bmatrix} 6 & -2 & -18 \\ -4 & 1 & 11 \\ -5 & 2 & 16 \end{bmatrix}$$
3. State and prove Cayley- Hamilton theorem.
4. Find the inverse of the matrix $\begin{bmatrix} 3 & -1 & 2 \\ 2 & 1 & 1 \\ 1 & -3 & 0 \end{bmatrix}$ using elementary row operations.
5. Prove that similar matrices have the same minimum polynomials.

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**St Aloysius College (Autonomous)
Mangaluru**

**B.Sc. Semester VI – Degree Examination
May / June - 2023**

MATHEMATICS – Paper VIII

Mathematical Modeling

Time: 3 hrs.

Max Marks: 100

PART-A

Answer any **TEN** of the following:

(10 × 2½ = 25)

- A golf ball is dropped from a resting position and it falls for 5 seconds.
 - How far has it fallen?
 - What is its velocity after 5 seconds?
- If the time required to assemble the first plane is 1,00,000 man hours and progress rate is 90%, find the time required to produce the 100th plane.
- Suppose the current population is 1000000, birth rate is 0.025 and death rate is 0.01. What was the population last year?

4. Suppose $\overline{F(0)} = \begin{bmatrix} 20 \\ 40 \\ 80 \end{bmatrix}$, $m_0 = 1$, $m_1 = 1$, $m_2 = 2$, $p_0 = \frac{3}{4}$, $p_1 = \frac{3}{4}$.

Find $\overline{F(\Delta)}$.

- Find what fraction of women with $p = 0.1$ have a waiting time less than or equal to one-sixth of the mean waiting time for such women.
- Determine the optimum order size if $r = 40$, $s = 0.10$ \$ per item per day and $k = 100$ \$ per order.

- Suppose a set of measurement of the weight x of a speck of dust is fit

by uniform probability density function $y = \begin{cases} \frac{1}{20} & 3 \leq x \leq 12 \\ 0 & \text{otherwise} \end{cases}$.

If two measurements are taken, what is the probability that first falls between 3 and 5 and second falls between 5 and 7?

- If the equation $d = \frac{c}{p}$ describes the relationship between price and demand, find the value of c for the following data using method of least squares.

Price in dollars(p_i)	9	10	11
Demand (d_i)	1200	1000	975

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9. Define a Multiple Regression Coefficient.
10. Draw the curves representing $P(t) = r^t P(0)$.
11. Find the sensitivity of C in Eratosthenes model.
12. Give the algorithm for pivot transformation.
13. State travelling salesman problem.
14. Carry out the north west corner rule for the following table:

5	8	6	4	20
4	3	5	7	25
5	6	3	4	15
13	17	19	11	

15. Define path, Euler circuit and a valence of a graph.

PART- B**UNIT- I****Answer any THREE of the following:****(3×5=15)**

1. Explain the steps in building a mathematical model.
2. Construct Galileo's Gravitational model with the assumption that if a body falls from rest then its velocity is proportional to the time it has been falling. In particular for each second of the fall the object gains an extra 32 feet/second in velocity.
3. Build a model to explain manufacturing progress curve for the rate of 70%.
4. Using inverse square law, find the escape velocity the rocket.
5. Explain Malthusian exponential growth model.

UNIT- II**Answer any THREE of the following:****(3×5 =15)**

1. Construct the Leslie Model for population growth.
2. Construct the family planning model and find the expression for \bar{w} and S_m .
3. Explain Inventory Policy Model.
4. Explain the Controlled Source Seismology Model with errors.
5. The diameter of a disc is measured twice. The values obtained are 71 and 72 with an uncertainty of 0.5. Calculate which of the following curves with $\mu=71$ and $\sigma=1$ or $\mu=71.5$ and $\sigma=2$ has highest likelihood of yielding these measurements.

Contd...3

UNIT- III

Answer any **THREE** of the following:**(3×5 =15)**

1. Construct College Enrolment model.
2. If a straight line $y = m(x - \bar{x}) + c$ is a best fit for the data $(x_1, y_1), (x_2, y_2), \dots, (x_n, y_n)$. Find an expression for m and c .
3. For the sample of 5 employees, a personnel director has collected the following data on ownership of a company's stock "y" versus years with the firm "x".

x	6	12	14	6	9
y	300	408	560	252	288

Using the least square method, find the equation of the line.

4. C_{14} isotope of carbon under goes a radioactive decay and transforms into C_{12} . The following table gives the data for the fraction of the original amount of C_{14} left after various number of years elapsed. Find the best fit regression line.

x Thousands of years	f	$y = \log f$
5	0.54	- 0.62
6	0.47	- 0.76
7	0.42	- 0.87
8	0.37	- 0.99
9	0.33	- 1.1

5. Find R^2 for the regression equation $y = 0.40x - 1.48$ for the table:

x	28	68	178	248	298
y	0	1.2	4.7	9.3	10.5

UNIT- IV

Answer any **THREE** of the following:**(3×5 =15)**

1. Construct Aristarchus model and find its sensitivity.
2. Explain Malthus Dismal theorem.

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3. A refrigerated compartment is to be built in the shape of a box with a capacity of 8000 cubic feet. To save energy cost, find the dimensions that will minimize the amount of heat entering from outside. Heat flow into the box is given as 1 unit/sq. ft through the top, 3 units/sq. ft through the bottom and 2 units/sq. ft from the sides.
4. A nutrition director wishes to blend a soup to serve students. The director has two commercial products available: Onion soup costs 3 cents/ounce and chicken soup costs 2 cents/ounce. Each ounce of onion soup has 5 units of proteins and 10 units of iron. One ounce of chicken soup has 7 units of proteins and 4 units of iron. If director decides to serve a soup containing 35 units of protein and 40 units of iron, how many ounce of each soup should be mixed with a least costs using graphical method?
5. Solve by simplex method:

Maximize $p = 30x_1 + 50x_2$ subject to $x_1 \geq 0, x_2 \geq 0,$

$$2x_1 + x_2 \leq 8,$$

$$x_1 + 2x_2 \leq 10.$$

UNIT- V

Answer any **THREE** of the following:

(3×5 =15)

1. Find the optimal basic feasible solution for the table:

2	7	4	3	5
4	3	2	1	15
3	3	1	2	20
6	8	16	10	

2. Explain the algorithm of Stepping stone method.
3. Explain the Algorithm for construction of Euler's circuit.
4. Find the first five terms of the difference equation

$$x(t + 1) - x(t) = t^2 + t + 1, x(0) = -1.$$

5. Suppose 36% of the yeast cells split in 15 minutes where unit time is 2 hours, then derive the formula that connects $x(t + 1) - x(t)$ to $x(t)$.

(2007 batch onwards)

G 503.6b(ii)

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St Aloysius College (Autonomous)
Mangaluru

B.Sc. Semester VI – Degree Examination

May/June - 2023

MATHEMATICS -Paper VIII

Numerical Methods

Time: 3 Hours

Max Marks: 100

Note: Answer all parts.

PART A

Answer any **TEN** of the following:

(10x2½=25)

- Round off the numbers 1.234587, 20.053762 and 3.023541 correct to 3 decimal places.
- An approximate value of π is given by 3.1428571 and its true value is 3.1415926. Find the percentage error.
- What is the condition on $|\varphi'(x)|$ in the method of iteration given by $x_{n+1} = \varphi(x_n)$?
- If $y = 5^x$ and $h = 1$ find $\Delta^2(5^x)$.
- Write Newton's backward difference formula for the interpolating polynomial.
- What is the degree of the interpolating polynomial which interpolates a given function at 6 distinct points?
- Write a formula for $\frac{dy}{dx}$ at $x = x_n$ using Newton's backward differences.
- Write Simpson $\frac{3}{8}$ rule for $\int_{x_0}^{x_3} y dx$.
- Evaluate $\int_0^1 \cos x dx$ using Trapezoidal rule with $h = 0.5$.
- Find the rank of the matrix $\begin{bmatrix} 5 & -2 & 4 \\ -2 & 1 & 1 \\ 4 & 1 & 0 \end{bmatrix}$.
- Check if the matrix $A = \begin{bmatrix} 1 & 2 \\ 4 & -1 \end{bmatrix}$ is orthogonal.
- Find the column norm of the matrix $\begin{bmatrix} 3 & -1 & 4 \\ -6 & 3 & 1 \\ 6 & 7 & -10 \end{bmatrix}$.
- Given $y' = -y$ with $y(0) = 1$ compute $y(0.01)$ using Euler's method.
- Describe Taylor series method of solving first order linear differential equation.
- Write Adams – Bashforth predictor formula.

PART - B

UNIT - I

Answer any **THREE** of the following:

(3x5=15)

- Find a root of the equation $x^3 - x - 1 = 0$ correct to two decimal places using bisection method.
- Find the root of the equation $2x = \cos x + 3$, correct to 3 decimal places, using iteration method. Choose $x_0 = \frac{\pi}{2}$.
- Describe the method of false position to find the root of an equation.

Contd...2

G 503.6b(ii)

Page No.2

4. Using Newton-Raphson method, establish $x_{n+1} = \frac{1}{3}(2x_n + \frac{N}{x_n^2})$ to calculate $\sqrt[3]{N}$ and hence find $\sqrt[3]{12}$ correct to 4 decimal places.
5. Find a double root of the equation $x^3 - x^2 - x + 1 = 0$ choosing $x_0 = 0.8$.

UNIT - II

Answer any **THREE** of the following:

(3×5=15)

- Derive Newton's forward difference interpolation formula.
- The population of a town in decimal census was as given below. Estimate the population for the year 1925.

Year	1891	1901	1911	1921	1931
Population (in thousands)	46	66	81	93	101

- Find the missing term from the following table

x	0	1	2	3	4
y	1	3	9	—	81

- Certain corresponding values of x and $\log_{10} x$ are (300, 2.4771), (304, 2.4829), (305, 2.4843) and (307, 2.4871). Find $\log_{10} 301$.
- Using Lagrange's formula, express the function $\frac{3x^2+x+1}{(x-1)(x-2)(x-3)}$ as a sum of partial fractions.

UNIT - III

Answer any **THREE** of the following:

(3×5=15)

- Given the set of tabulated points (1, -3), (3, 9), (4, 30) and (6, 132). Obtain the value of y when $x = 2$ using Newton's divided difference formula.
- From the following table of values of x and y , obtain $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ for $x = 1.2$.

x	1.0	1.2	1.4	1.6	1.8	2.0	2.2
y	2.7183	3.3201	4.0552	4.9530	6.0496	7.3891	9.0250

- From the following table find x correct to 2 decimal places, for which y is maximum.

x	1.2	1.3	1.4	1.5	1.6
y	0.9320	0.9636	0.9855	0.9975	0.9996

- Derive trapezoidal rule to evaluate $\int_a^b f(x)dx$.

Contd...3

G 503.6b(ii)

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5. A solid of revolution is formed by rotating about the x – axis, the area between the x – axis, the lines $x = 0$ and $x = 1$ and a curve through the points with the following coordinates.

x	0.00	0.25	0.50	0.75	1.00
y	1.0000	0.9896	0.9589	0.9089	0.8415

Estimate the volume of the solid formed using Simpson's rule.

UNIT - IV

Answer any **THREE** of the following:

(3×5=15)

- Examine the consistency of the system of equations
 $x - 4y + 5z = 8$, $3x + 7y - z = 3$, $x + 15y - 11z = -14$.
- Solve the following system of equations using matrix inversion method
 $3x + 2y + 4z = 7$, $2x + y + z = 7$, $x + 3y + 5z = 2$.
- Solve the following system of equations by Gauss-Elimination method
 $2x + 2y + 4z = 18$, $x + 3y + 2z = 13$, $3x + y + 3z = 14$.
- Describe Jacobi's method of solving a system of equations.
- Solve the systems of equations
 $83x + 11y - 4z = 95$
 $7x + 52y + 13z = 104$
 $3x + 8y + 29z = 71$

Gauss- Seidal method. Carryout 4 iterations.

UNIT - V

Answer any **THREE** of the following:

(3×5=15)

- Solve $y' = x - y^2$, $y(0) = 1$ and find $y(0.1)$ correct to four decimal places by Taylor series method.
- Describe Picard's method.
- Using modified Euler's method, determine $y(0.02)$, $y(0.04)$ for the differential equation $y' = x^2 + y$ given $y(0) = 1$.
- Given $\frac{dy}{dx} = y - x$, where $y(0) = 2$, find $y(0.1)$, when $h = 0.1$ correct to 4 decimal places, using Runge-Kutta 4th order formula.
- Given $\frac{dy}{dx} = 1 + y^2$, $y(0) = 0$, $y(0.2) = 0.2027$, $y(0.4) = 0.4228$, $y(0.6) = 0.6841$. Compute $y(0.8)$ by using Adams -Moulton corrector formula.

(2015 Batch onwards)

G 504.6a

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St Aloysius College (Autonomous)

Mangaluru

B.Sc. Semester VI – Degree Examination

May /June - 2023

ELECTRONICS – Paper VII
Biomedical Instruments, VLSI and Robotics

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

Time: 3 hrs.

Max Marks: 100

SECTION – A

1. Choose the correct answer from the choices given at the end of each question and write the correct answer. (12x1=12)
- _____ is not the functionality of Robots
 - Reprogrammability
 - Multifunctionality
 - efficient performance
 - responsibility
 - What causes the Piezoelectric effect?
 - Heat or dissimilar metals
 - Pressure on a crystal
 - amount of exposure
 - film-screen contact
 - Drives are known as _____
 - Actuators
 - controllers
 - sensors
 - Manipulators
 - In a Pseudo inverter, the Gate terminal of PMOS transistor is Connected to _____
 - +5V
 - 5V
 - 0V
 - source
 - Robotics is a _____
 - Combination of Mathematics and electronics
 - Combination of computer science and physics
 - Combination of Physics and electronics
 - Interdisciplinary subject
 - The minimum number of Transistors required to construct NAND gate using CMOS technology is _____
 - 4
 - 6
 - 3
 - 8
 - _____ Transducer converts pressure to electrical energy.
 - Piezoelectric
 - Thermoelectric
 - Microphone
 - LED
 - _____ is the part of biomedical instrumentation system.
 - Amplifiers
 - Transmitters
 - Demultiplexers
 - Modulators
 - FPGA is the acronym for _____
 - Field processor gate array
 - Force programmable gate array
 - Field programmable gate array
 - Force processor gate array

Contd...2

G 504.6a

Page No. 2

- x) Process of changing action potential to resting potential is known as ____
 a) unipolarization b) re-polarization c) depolarization d) polarization
- xi) **Pull down** network consists of _____ transistors
 a) NMOS b) CMOS c) PMOS d) BiCMOS
- xii) The maximum mobility of electrons is more than holes in _____
 a) CMOS b) NMOS c) BiCMOS d) GaAs

2. Answer any TEN questions**(10x1=10)**

- i) Draw the symbol of transmission gate.
- ii) Draw the symbols of NMOS and PMOS transistors
- iii) Which transistor successfully transmits zero state to the output?
- iv) Define Moore's Law.
- v) Write the full form of VLSI.
- vi) Define a sensor.
- vii) What is Dialysis?
- viii) Give one example for temperature sensor.
- ix) Define Sheet resistance
- x) What is the magnitude of Action Potential of a cell?
- xi) Give the full form of ECG.
- xii) What do you mean by a Pacemaker?
- xiii) Give one example for respiration sensor.

3. Answer any TEN questions.**(10x2=20)**

- i) Give an example and working of Resistive type transducer.
- ii) Explain the Law's of Robotics.
- iii) Give the circuit of two input OR Gate using CMOS.
- iv) Draw the circuit of BiCMOS inverter.
- v) Mention the differences between PLA and PAL
- vi) Draw the circuit diagram of saturated load inverter.
- vii) Mention any two advantages of FPGA.
- viii) Why power dissipation is minimum in CMOS Inverter?
- ix) What is the difference between Transducer and sensor?
- x) Explain a Capacitive Transducer.
- xi) How are Physiological signals generated?
- xii) Explain the working of Pass transistor.

Contd...3

G 504.6a

SECTION - B**(7X4=28)****Answer any SEVEN questions**

- i) What is EEG? What is the diagnosis made from EEG?
- ii) Explain an Defibrillator.
- iii) With a circuit diagram explain (i) Pseudo-NMOS inverter and
(ii) CMOS inverter.
- iv) Design XOR gate using VLSI design technique
- v) Construct CMOS circuit for the Boolean expression $Y=A+B$, explain its working using Truth table.
- vi) Draw the general schematic block diagram of Biomedical instrumentation system and explain each section.
- vii) With necessary diagram explain Linear Variable Displacement transformer(LVDT)
- viii) With a neat diagram explain different types of joints used in Robots.
- ix) Draw the minimum CMOS transistor network that implements the functionality of Boolean equation $F = \overline{[(A+B)C + D]}$
- x) Implement the following Boolean expressions in PLA.

$$Y_1(A, B, C) = \sum(0,3,4,7)$$

$$Y_2(A, B, C) = \sum(0,1,3,7)$$

SECTION - C**Answer any ONE THREE full questions****(10X3=30)**

- 5 a) With circuit diagram, explain an proximity sensor (IR sensor). (5)
- b) Draw the circuit using MOSFETs to obtain the following Boolean expression using VLSI design techniques. $Y = \overline{A}B + C\overline{D}$ (5)
- 6 a) Construct AND, OR, NAND, NOR, XOR and XNOR gates using Transmission gates. (5)
- b) Construct CMOS circuit for the Boolean expression $Y=A+B$ and explain its working. (5)
- 7 a) Write a note on Impedance Pneumography. (5)
- b) With the help of block diagram discuss the working of Heart-Lung Machine (5)
- 8 a) With circuit diagram explain a variable resistance(Potentiometer) transducer. Also explain its one application. (5)
- b) Design a Full adder CMOS circuit using VLSI technology (5)

(2015 batch onwards)

Reg. No:

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G 504.6b

St Aloysius College (Autonomous)
Mangaluru

B.Sc. Semester VI- Degree Examination
May /June -2023

ELECTRONICS - Paper VIII
8086 MICROPROCESSOR & C LANGUAGE

Max. Marks: 100

Time: 3 Hours

Note: This question paper has Three sections. Section - A, Section - B and Section - C. Answer all sections.

Section - A

1. Choose the correct answer from the choices given at the end of each question and write the correct answer (12×1=12)

- i) _____ is exit control loop in C.
a) while b) do-while c) for d) if
- ii) Remainder is stored in _____ register after 8-bit division in 8086 μP .
a) DL b) CL c) AH d) AL
- iii) Maximum mode system means _____
a) system with single processor b) system with no processor
c) system with Multi processor d) system with microcontroller
- iv) 8086 μP has _____ bit address and _____ bit data bus.
a) 20, 16 b) 16, 20 c) 16, 16 d) 20, 8
- v) The physical address of 8086 is -----bit.
a) 16 b) 8 c) 20 d) 4
- vi) There are ---- segments in code
a) 3 b) 4 c) 5 d) 6
- vii) _____ is not a string constant in C language
a) "ABC" b) "123" c) 123 d) "hi"
- viii) The continue within the loop statement in C language makes the program counter to ----
a) continue with the next value of the loop control variable
b) continue with the same value of the loop control variable
c) take outside the loop
d) beginning of the loop
- ix) The C statement $a+=b$ is equal to
a) $a=a+b$ b) $b=a+b$ c) $a=a+a$ d) $b=b+b$
- x) If $a[10] = \{100\}$; then value of $a[1]$ is _____
a) 100 b) 0 c) garbage value d) wrong statement
- xi) ----- is not a key word in C language.
a) int b) alpha c) void d) auto
- xii) The field specifier %s is used for----type data
(a) void (b) integer(c) real (d) string

Contd...2

G 504.6b

(10×1=10)

2. Answer any TEN of the following

- i) What data type is represented by the data specifier %c in C language?
- ii) List any two 16 bit data registers of 8086 microprocessor
- iii) Mention the control flags in 8086 Microprocessors
- iv) Define an array in C language.
- v) Mention any two hardware interrupts of 8086 μP .
- vi) Give one example for a valid variable name in C language
- vii) Write the C statement for equation $Z = a^2b^2 + a^2/2b + a^3 + 3c$.
- viii) What is the value of 34%-2 in C language?
- ix) How is a single character defined in C language?
- x) Give the syntax of declaration of one dimensional array in C language.
- xi) Express the decimal 456.000000007 in floating point form in C language.
- xii) Give one example for value returning directive in 8086 μP .

(10×2=20)

3. Answer any TEN of the following

- i) Mention the functions of DX register in 8086 μP .
- ii) Explain 'DW' directive of 8086 μP .
- iii) Calculate physical addresses using the addresses [DS]=1500h [CS] =1300h [IP]=2000h and [BX]=78FEh
- iv) Write any two differences between Procedures and Macros.
- v) Write an 8086 program to divide two 8-bit numbers.
- vi) Mention the role of index register during string manipulation in 8086 μP .
- vii) Given a=2, b=20, C=5, d=40. Evaluate the following, C expressions.
 - a) (a>b) && (c<40)
 - b) (a<b) || (d>c)
- viii) Mention the different methods to input a character from the keyboard in 'C'
- ix) Write the syntax of shorthand assignment operator in C language.
- x) Mention the differences between gets() and scanf() function.
- xi) What is the output of the following program?

```
main()
{
    int x,n=5;
    if (n==5)
        x=n;
    printf("%d%d", n,x);
}
```

- xii) What is the output of the following program

```
Void main()
{
    int x=10, y=20;
    printf("%d\t%d", x++,--y);
}
```

Contd...3

G 504.6b

Section - B**(7×4=28)****4. Answer any SEVEN questions**

- i) With bit pattern explain PSW register of 8086 μP
- ii) Write a 8086 program to multiply two eight bit numbers.
- iii) With syntax and example any two arithmetic instructions of 8086 microprocessor.
- iv) With example explain how stack is used while calling the procedure in 8086 μP .
- v) Write syntax and example explain the do....while loop in C language.
- vi) Write a C program to check whether the input string is palindrome or not.
- vii) Write a C program to multiply two numbers read from key board.
- viii) Explain I/O read operation in 8086 μp .
- ix) With example explain the logical operators used in 'C'.
- x) Write a 'C' program to find the area of a circle by reading radius from the keyboard.

Section - C**(3×10=30)****Answer any THREE full questions**

5. a) Write note on various register of 8086 microprocessor (6)
- b) Write a 8086 program to multiply two 8-bit numbers. (4)
6. a) With syntax and flow chart explain the Switch statement in C language. (6)
- b) Write a note on increment and decrement operators in C language. (4)
7. a) Draw the architecture of 8086 microprocessor in minimum mode and explain. (6)
- b) With syntax and example explain any two Rotate instructions in C language. (4)
8. a) With example explain if-else if ladder in 'C' language. (6)
- b) Write a C language program to accept three numbers from keyboard and print the smallest of them. (4)

(2019 & 2020 Batch)

G 505.6a

Reg. No.:

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St Aloysius College (Autonomous)**Mangaluru****B.Sc. Semester VI – Degree Examination****May / June - 2023****COMPUTER SCIENCE – PAPER VII****DATA ANALYTICS****Time: 3 Hours.****Max Marks: 100****PART – A****(10x2=20)**

1. **Answer any TEN of the following.**
 - a) What do you mean by pattern recognition?
 - b) What are BI Tools? Name any two BI tools.
 - c) How to declare a vector in R? Give an example.
 - d) What is logistic regression?
 - e) What is Extract-Transform-Load (ETL) cycle?
 - f) What is predictive accuracy? Write the formula to calculate predictive accuracy.
 - g) What is a decision tree? Why are decision trees the most popular classification technique?
 - h) Define the concept of correlations in regression.
 - i) List out the benefits of using ANN.
 - j) What are the advantages and disadvantages of clustering in data mining?
 - k) Explain 3-step process in text mining.
 - l) List the characteristics of optimized websites.

PART – B**Answer any ONE FULL question from each unit.****(4x20=80)****UNIT - I**

2. a) With diagram explain DW architecture. **(8)**
- b) Differentiate database and data warehouse **(6)**
- c) Explain different types of charts in data visualization. **(6)**
3. a) Explain the schema architecture for data warehouse design? What are DW best practices? **(8)**
- b) What are the design considerations for data warehouse? Explain. **(6)**
- c) Explain the different data mining techniques. **(6)**

UNIT – II

4. a) Write an R program to merge two vectors and find the maximum and minimum element from the resultant vector. **(8)**
- b) How to define R functions? Explain with an example. **(6)**
- c) What are the different functions for reading and displaying data in R? Explain with examples. **(6)**
5. a) What are data frames in R? List and explain different functions used with data frames. **(8)**

Contd...2

G 505.6a

Page No. 2

- b) Explain for and while loop with the help of an example. (6)
- c) What is matrix in R? Explain with an example. (6)

UNIT – III

6. a) With diagram, explain General ANN model. (8)
- b) What is cluster analysis? Write the generic pseudocode for clustering. (6)
- c) List the steps required to build an ANN. (6)
7. a) Using the data below, create a regression model to predict the Test2 from the Test1 score.

Test1	Test2
59	56
52	63
44	55
51	50
42	66
42	48
41	58
45	36
27	13
63	50
54	81
44	56
50	64
47	50

- (8)
- b) What are the advantages and disadvantages of regression models? Explain. (6)
- c) Explain the steps in K-Means Algorithm for clustering. Also write the pseudocode for implementing K-Means Algorithm for clustering (6)

UNIT – IV

8. a) What are the three types of web mining? Explain in detail. (8)
- b) Compare and contrast Text Mining and Data Mining (6)
- c) Explain Text Mining Applications in different fields (6)
9. a) With diagram, explain Web Usage Mining architecture. (8)
- b) Explain the different algorithms used in Web Mining. (6)
- c) How web content mining is different from web structure mining. Explain with an example. (6)

(2019 & 2020 Batch)

G 505.6b

Reg. No.:

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St Aloysius College (Autonomous)
Mangaluru

B.Sc. Semester VI– Degree Examination

May / June - 2023..

COMPUTER SCIENCE -Paper VIII

WEB PROGRAMMING USING PHP

Time: 3 Hours.

Max Marks: 100

PART –A

1. Answer any TEN of the following. (10X2=20)
- Name any two web browsers.
 - What are the attributes used in <BODY> tag?
 - What are the rules for naming variables in PHP?
 - Which are the four components necessary to build a PHP application in your development environment?
 - What does the echo statement do?
 - List any two categories of PHP errors.
 - Explain any two PHP functions to test variable data types.
 - What is an associative array?
 - Name any two functions for error testing.
 - What is a cookie?
 - What are the three components of a function?
 - What is a session?

PART –B

Answer any ONE FULL question from each unit. (4x20=80)

UNIT - I

- Write a note on following HTML tags: <MARQUEE>, , <A>, (8)
 - Explain the structure of an HTML program with an example. (6)
 - Explain the following tags with attributes and example
 - <TABLE> (6)
 - <DIV>
- What is CSS? Explain the process of embedding and importing style sheets. (8)
 - Write a note on
 - Electronic Mail (6)
 - Web Server (6)
 - Explain any six text formatting tags. (6)

UNIT – II

- Explain the PHP functions to test the data type of a variable. (8)
 - List and explain the data types available in PHP. (6)
 - Explain the switch statement with the help of an example. (6)

Contd...2

G 505.6b

5. a) Write a note on
- i) Operator precedence (8)
 - ii) Handling form input (6)
- b) Explain interrupting and skipping loops with the help of an example. (6)
- c) Explain any six numeric functions to convert between number bases with examples. (6)

UNIT – III

6. a) Explain the following array functions with examples
- i) array-slice() iii) array-diff() (8)
 - ii) shuffle() iv) asort() (6)
- b) What are the two types of PHP arrays? How do they differ? (6)
- c) State the important advantages of packaging your code. (6)
7. a) Explain any four Date and Time functions in PHP. (8)
- b) What are the two types of PHP arrays? How do they differ? (6)
- c) How to set default argument values in functions? Explain with the help of an example (6)

UNIT – IV

8. a) Write a PHP code to record every visit made by a user to web page using a session. (8)
- b) Explain the various functions used to assist developers in the tasks of sanitizing input and output. (6)
- c) Describe the methods of PHP Exception class. (6)
9. a) Explain the PHP functions to create, register and erase sessions. (8)
- b) List some security features of cookies. (6)
- c) Write a note on custom exceptions. (6)

(2016 Batch Onwards)

G 506.6a

Reg. No.:

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St Aloysius College (Autonomous)
Mangaluru

B.Sc. Semester VI – Degree Examination
May/June - 2023

STATISTICS – PAPER VII
SAMPLING THEORY

Time: 3 hrs.

Max Marks: 100

Note: Answer all parts

PART – AAnswer any **TWELVE** of the following.

(2×12=24)

1. What is a sample survey?
2. Define standard error of an estimator.
3. Mention different types of errors in sampling.
4. Explain pilot survey.
5. Define SRSWR.
6. From a population containing 4 units Y_1, Y_2, Y_3 & Y_4 draw all possible SRSWOR samples of size 3.
7. Distinguish between estimate and estimator.
8. Briefly explain the need for stratification.
9. What is the estimator of population mean in case of stratified random sampling?
10. Explain optimum allocation.
11. It is proposed to select a systematic sample of size 4 from the population consisting of $N = 20$ units. Write down all possible samples.
12. What is the standard error of \bar{y}_{st} under proportional allocation?
13. State any two advantages of systematic sampling.
14. What do you mean by cluster sampling?
15. With usual notations show that $E(p) = P$.

PART – BAnswer any **SIX** of the following.

(6×6=36)

16. Explain probability sampling and judgement sampling.
17. Explain the principles of sampling.
18. Derive variance of unbiased estimator of population total in SRSWR. What is its estimator?
19. Show that sample mean is an unbiased estimator of population mean but sample total is a biased estimator of population total under SRSWOR.
20. What are the advantages of stratified sampling over simple random sampling?
21. With usual notations, prove that $S_{wsy}^2 > S^2$
22. Derive an expression for $V(\bar{y}_{st})$ under Neyman's allocation.

Contd...2

G 506.6a

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23. Derive an expression for $V(\bar{y}_{sys})$ in terms of intraclass correlation coefficient.
24. Explain systematic sampling with an example.

PART – C**Answer any FOUR of the following.****(10×4=40)**

25. a. Discuss briefly the main steps involved in a sample survey? **(5)**
 b. Explain lottery method of drawing a simple random sample. **(5)**
26. a. Obtain an expression for $V(\bar{y})$ under SRSWOR. **(5)**
 b. Under SRSWR show that sample mean square is an unbiased estimator of population variance. **(5)**
27. Prove that $V(\bar{y}_{st})_{opt} \leq V(\bar{y}_{st})_{prop} \leq V(\bar{y})_{SRS}$. **(10)**
28. Show that under stratified sampling with cost function of the form $C = a + \sum C_h n_h$, $V(\bar{y}_{st})$ is minimum for fixed cost if $n_h \propto \frac{N_h S_h}{\sqrt{C_h}}$. **(10)**
29. a. Prove that $V(\bar{y})_{sys} = \frac{N-1}{N} \cdot S^2 - \frac{(n-1)k}{N} \cdot S_{wsy}^2$ where S_{wsy}^2 is the mean square among units which lie within the same systematic sample. **(6)**
 b. Explain the advantages of systematic sampling over simple random sampling. **(4)**
30. When there is a linear trend in the population, show that $V(\bar{y}_{st}) \leq V(\bar{y})_{sys} \leq V(\bar{y})_{SRSWOR}$ **(10)**

(2016 Batch Onwards)

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St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester VI – Degree Examination
May/June - 2023
STATISTICS - Paper VIII
Operation Research

Time: 3 Hours.

Max Marks: 100

Note: Answer all parts

PART – A**I. Answer any TWELVE of the following:****(2x12=24)**

1. Give any two applications of operation research.
2. With reference to an LPP define.
 - i) Multiple solution
 - ii) Unbounded solution.
3. What are artificial variables?
4. With reference to a transportation problem define
 - i) feasible solution
 - ii) optimum solution
5. How do you solve maximise assignment problem?
6. Define transportation problem.
7. Give real life problem for assignment problem.
8. Write down the mathematical model for assignment problem.
9. What do you mean by the term pay off matrix?
10. Define zero sum game.
11. State any two characteristics of a game.
12. Given the simplex tableau, what is the criterion for the existence of unbounded solution?
13. State any two advantages of dual LPP.
14. What is economic order quantity?
15. Explain shortage cost in inventory.

PART – B**II. Answer any SIX of the following.****(6x6=36)**

16. Define operation research. Give any two models in operation research with an example each.
17. Find the basic solutions for the system of equations

$$3x_1 + 8x_2 + x_3 + 9x_4 = 8$$

$$2x_1 + x_2 + 7x_3 + 2x_4 = 4$$
18. What do you mean by inventory control? What are the advantages of maintaining inventory in a firm?
19. Explain the mathematical formulation of TP.

Contd...2

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20. Show that in an AP, Assignment remains unchanged when we subtract a constant from each element in a row.
21. Under game theory explain the concept of dominance method.
22. Explain briefly the various costs involved in the inventory problem.
23. How do you find an initial basic feasible solution to a transportation problem by north west corner rule?
24. Explain duality theory and its applications.

PART – C**III. Answer any FOUR of the following. (10×4=40)**

25. Derive an Economic lot size formula for the optimum production quantity and the minimum total cost per unit, where lead time is zero, demand is uniform, production is instantaneous and there are no shortages.
26. a) Explain the Big M method of solving an LPP. (6)
b) Explain the matrix minima method. (4)
27. Explain the MODI method of finding an optimum solution to a TP.
28. Briefly explain purchase inventory models with price breaks. Explain the situation when there are two price breaks.
29. a) State and prove the necessary and sufficient condition for the existence of feasible solution in a TP. (5)
b) Explain the algebraic method of solving a zero sum two-person game with no saddle point. (5)
30. Derive an expression for EOQ in the case of uniform demand instantaneous production where shortages are allowed.

(2020 Batch Onwards)

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St Aloysius College (Autonomous)
Mangaluru

B.Sc. Semester VI– Degree Examination

May/June -2023

BOTANY – PAPER VII

PLANT PHYSIOLOGY

Time: 3 Hours.

Max Marks: 100

Note: i) Answer all the sections.

ii) Draw diagrams wherever necessary.

SECTION – A

I Answer any TEN of the following.

(10X2=20)

- 1) Name any two kinds of transpiration
- 2) Write any two practical applications of plasmolysis.
- 3) List any four types of soil water.
- 4) Write any two merits of hydroponics.
- 5) Define photorespiration.
- 6) What are accessory pigments? Mention their significance.
- 7) What is Pasteur's effect?
- 8) Name any two factors affecting respiration in plants.
- 9) List any two methods of measuring linear growth of plants.
- 10) What is seismonastic movement? Give an example.
- 11) What are quiescent seeds? Give an example.
- 12) Write any two physiological effects of ethylene.

SECTION – B

II Answer any SIX of the following.

(6x5=30)

- 1) Define water potential. Explain the relation between osmotic potential and water potential in plant cells.
- 2) Explain the active absorption of water. List its merits and demerits.
- 3) Explain the structure of hydathode and the process of guttation.
- 4) Explain C₄ cycle.
- 5) Explain a) absorption spectrum b) Blackman's law of limiting factors.
- 6) Give the schematic representation of Krebs cycle.
- 7) Give an account of vernalization and its practical applications.
- 8) Define tactic movement. Explain its types.
- 9) List any five physiological roles of Cytokinins.

SECTION – C

III Answer any FIVE of the following.

(5x10=50)

- 1) Explain transpiration pull theory of ascent of sap. Add a note on its merits and demerits.
- 2) Explain the proton exchange pump theory of transpiration.

Contd...2

G 507.6a

- 3) Explain Munch hypothesis.
- 4) Describe the dark reaction of photosynthesis. Write its significance.
- 5) Define glycolysis. Explain its process with the mention of various enzymes.
- 6) Write note on
 - 1) Fermentation and its types
 - 2) Cyclic photophosphorylation
- 7)
 - 1) Explain with examples the different groups of plants based on photoperiodism.
 - 2) Physiological effects of Abscisic Acid.
- 8) Explain the roles played by Auxins in plants.
- 9) Describe any five types of tropic movements with suitable illustrations.

(2020 Batch Onwards)

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**St Aloysius College (Autonomous),
Mangaluru**

**B.Sc. Semester VI– Degree Examination
May/June -2023**

BOTANY – PAPER VIII

PLANT BIOTECHNOLOGY, PHYTOCHEMISTRY AND PHARMACOGNOSY

Time: 3 Hours.

Max Marks: 100

Note: i) Answer all the sections.

ii) Draw diagrams wherever necessary.

SECTION – A

I Answer any TEN of the following.

(10X2=20)

- 1) Define Organogenesis. Mention its types.
- 2) What is Biosafety? Mention its significance.
- 3) What is Gynogenesis?
- 4) Name the transgene and source in transgenic cotton.
- 5) Mention any one method of detection of adulterants with an example.
- 6) What is Phytochemical evaluation of crude drug? Mention its significance.
- 7) State the law of similars
- 8) Mention the importance of QPM in medicinal plant cultivation.
- 9) Which is the site for Citric acid Pathway? How many ATP's are produced at the end of this pathway?
- 10) Mention the secondary metabolites found in *Vinca* and *Digitalis*.
- 11) What are Secondary metabolites? Give example
- 12) Mention any 4 therapeutic uses of *Camellia sinensis*.

SECTION – B

II Answer any SIX of the following.

(6x5=30)

- 1) Explain the nutritional requirements to be met in tissue culture.
- 2) Write a note on a) Germplasm conservation b) Molecular farming
- 3) Explain the technique of meristem culture with applications.
- 4) Explain adulterant detection in *Saraca indica*.
- 5) Explain the methods of cultivation of medicinal plants.
- 6) What are crude drugs? Explain its types.
- 7) Briefly describe the Citric acid pathway.
- 8) Comment on i) Resins
ii) Phenolics
- 9) What are Carbohydrates? Explain its types. Write a note on its therapeutic uses

Contd...2

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SECTION - C

III Answer any FIVE of the following.**(5x10=50)**

- 1) Explain the concept of cell theory and Totipotency. Add a note on aseptic culture of *Datura* anther.
- 2) Write a note on
 - i) *psy* gene
 - ii) Autoclave
 - iii) Chimera
 - iv) Restriction enzymes
- 3) Explain the isolation and *In-vitro* culture of protoplast.
- 4) Describe the principle and working of Soxhlet.
- 5) Describe the Organoleptic aspects of crude drug evaluation using suitable example.
- 6) Write a note on
 - i) Siddha system of medicine
 - ii) Spectroscopy
- 7) Describe the pentose pathway of carbohydrate metabolism? Add a note on its significance.
- 8) Name the enzymes involved in Mevalonic acid pathway. Mention the starting material and end product of the pathway.
- 9) Mention the source, Physiochemical properties and Therapeutic properties of Steroids with a suitable example.

(2019 Batch Onwards)

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St Aloysius College (Autonomous), Mangaluru**B.Sc. Semester VI– Degree Examination****May/June - 2023****ZOOLOGY – PAPER VII****IMMUNOLOGY, MEDICAL ZOOLOGY, TOXICOLOGY AND ECONOMIC ZOOLOGY****Time: 3 Hours.****Max Marks: 100****Note: i) Answer any TEN questions from PART A and ONE FULL question from each unit of PART B.****ii) Draw diagrams wherever necessary.****PART – A****I Answer any TEN of the following.****(10X2=20)**

- Define natural- passive immunity. Give an example.
- Differentiate monocyte and macrophage cells.
- How HIV is transmitted? Mention two preventive measures.
- List any two symptoms of amoebiasis.
- Name the causative agents of typhoid and cholera.
- What is a vector? Name two insect vectors.
- Which kind of food is preferred for fries and fingerlings in culture?
- What is a food additive? Mention a health issues due to food additives.
- What is vermi-wash? Mention an application.
- Name two non-mulberry silk worms. Where they are found?
- What is the causative factor for dengue fever? Mention the stages in the fever.
- Name any two applications of bee wax.

PART – B**Select ONE full question from each unit.****(4x20=80)****Unit I**

- Explain different types of cells of innate immunity. **(10)**
 - Describe the structure of IgG. **(5)**
 - Discuss immunological memory. **(5)**

OR

- Explain the structure of HIV. How AIDS progresses in a patient? **(10)**
 - Write about myasthenia gravis. **(5)**
 - What are the III generation vaccines? Give example. **(5)**

Unit II

- Explain life cycle, pathogenicity, and preventive measures of filarial worm. **(10)**
 - What is measles? Write the causes and symptoms. **(5)**
 - Differentiate male and female *Ascaris*. How ascariasis can be prevented. **(5)**

OR

- Give a detailed account of life history of *Plasmodium vivax*. **(10)**
 - How giardiasis is caused? Distinguish the symptoms of giardiasis and amoebiasis. **(5)**
 - Write a note on H1N1. **(5)**

Contd...2

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Unit III

- VI** a) Explain the technique of pearl culture (10)
b) Write explanatory note on silkworm diseases. (5)
c) How seed fish are transported? Mention characteristics of good fish seed. (5)

OR

- VII** a) Write about biogas and manure. (10)
b) What is meant by LD50 and LC50? Write about their implications. (5)
c) Write explanatory note on bio magnification and bioaccumulation (5)

Unit IV

- VIII** a) Explain social organisation in honey bees. (10)
b) How housing management is done in poultry? (5)
c) Write about tools used in bee keeping. (5)

OR

- IX** a) Describe the morphology of earthworm. (10)
b) Write note on poultry diseases. (5)
c) Explain the method of preparation of vermicompost. (5)

(2019 Batch Onwards)

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St Aloysius College (Autonomous), Mangaluru**B.Sc. Semester VI– Degree Examination****May/June - 2023****ZOOLOGY – PAPER VIII****ETHOLOGY, EVOLUTION AND PALAEOLOGY**

Time: 3 Hours.

Max Marks: 100

Note: i) Answer any TEN questions from PART A and ONE FULL question from each unit of PART B.

ii) Draw diagrams wherever necessary.

PART – A

I Answer any TEN of the following.

(10X2=20)

- What is learnt behaviour. Give an example.
- Define colony. Give an example.
- Write a note on honey bees communication.
- Describe polyandry.
- Give a note on parental care in *Rhacophorous*.
- Write a note on Catadromous.
- Explain the theory of abiogenesis.
- What are homologous organs? Give examples.
- Describe gene mutation.
- Write a note on geological time scale.
- Define macroevolution. Give an example.
- Enumerate any 4 characters of *Eohippus*.

PART – B

Select ONE full question from each unit

(4x20=80)**Unit I**

- II a)** Write an essay on social organization in insects. **(10)**
- b) Name the different types of communication with examples. **(5)**
- c) Write a note on a) Imprinting b) circadian rhythm. **(5)**

OR

- III a)** Give an account of development of instinctive and learning behaviours. Add a note on hormonal control of behaviour. **(10)**
- b) Give an account on antipredatory behaviour with examples. **(5)**
- c) Explain social behaviour in ants. **(5)**

Unit II

- IV a)** Give an account of "Parental care in fishes". **(10)**
- b) Write a note on monogamy and polygamy. **(5)**
- c) Write a note on various aspects of fish migration. **(5)**

OR

- V a)** Write an essay on bird migration. **(10)**
- b) Explain the nesting behaviour in wasps. **(5)**
- c) Write a note on courtship in spiders. **(5)**

Contd...2

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Unit III

- VI** a) Give an account of evidences for organic evolution from comparative embryology and paleontology. (10)
b) Explain analogous organs with an examples. (5)
c) Write an explanatory note on Darwinism. (5)

OR

- VII** a) Give an account of synthetic theory of organic evolution. (10)
b) Write a note on recapitulation theory. (5)
c) Write a note on postulates of Lamarckism. (5)

Unit IV

- VIII** a) Explain biological species concept and add a note its limitations. (10)
b) Write a note on interspecific competition. (5)
c) Enumerate the characters of modern man. (5)

OR

- IX** a) Explain the trends in the evolution of Man. (10)
b) Define extinction. Explain any two extinct species. (5)
c) Write an explanatory note on allopatric speciation. (5)

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St Aloysius College (Autonomous), Mangaluru

B.Sc. Semester VI – Degree Examination

May/June - 2023

MICROBIOLOGY – PAPER VII

Principles of Bacterial Genetics, Genetic Engineering and Bioinformatics

Time: 3 Hours.

Max Marks: 100

Instructions: Answer PART A AND B AND C

Draw Diagrams wherever necessary.

PART – A

1. **Define/Answer any TEN of the following:** (10x2=20)

- a) DNA ligase
- b) Supercoiling of DNA
- c) SSB
- d) Base analogues
- e) DNA glycosylases
- f) DNA repair
- g) Plasmids
- h) Nif Gene
- i) Northern blotting
- j) Protein sequences
- k) PDB
- l) ORF

PART – B

Answer 'a' or 'b' and 'c' is compulsory from each unit. (4x15=60)

UNIT -I

2. a) Give an account of the Watson-Crick model of DNA structure. (9)

OR

- b) With appropriate illustration, discuss Rolling Circle Replication.
- c) Discuss in detail prokaryotic gene regulation using *lac operon* as an example. (6)

UNIT -II

3. a) With suitable examples, describe various classes of Mutations. (9)

OR

- b) How was "DNA as a transforming element" proved?
- c) Mutation can be used as a tool in molecular genetics -Justify with a suitable example. (6)

UNIT -III

4. a) Discuss the principles of genetic engineering. (9)

OR

- b) Discuss the general characteristics of a typical plasmid.
- c) Discuss DNA finger printing technique. (6)

UNIT -IV

5. a) Discuss in detail about Human genome project. Add a note on its significance. (9)

OR

- b) Discuss BLAST.
- c) Elaborate on Gene content of prokaryotic Genomes. (6)

PART – C

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

6. a) Transposon
- b) Gene distribution in archaea
- c) FASTA
- d) Principle and application of Blue-white screening
- e) Nucleotide -excision repair
- f) Genetic code

(2019 Batch Onwards)

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St Aloysius College (Autonomous), Mangaluru**B.Sc. Semester VI – Degree Examination****May/June - 2023****MICROBIOLOGY – PAPER VIII****APPLIED MICROBIOLOGY****Time: 3 Hours.****Max Marks: 100****Instructions: Answer PART A AND B AND C****Draw Diagrams wherever necessary.****PART – A**

1. **Define/Answer any TEN of the following:** (10x2=20)
- Wood smoke
 - Freezing
 - Extrinsic factors in food spoilage
 - Hepatitis A and E
 - TA spoilage
 - RODAC
 - Microbial Inoculums
 - Raw material for Beer production
 - Foam control
 - Bakers yeast
 - Hydrocarbons
 - Semisynthetic penicillins

PART – B**Answer 'a' or 'b' and 'c' is compulsory from each unit.** (4x15=60)**UNIT -I**

2. a) Explain in detail about use of Chemical preservatives. (9)
- OR**
- b) Explain in detail about Preservation of food using High Temperature methods. (6)
- c) Write briefly on the sources of food contamination. (6)

UNIT -II

3. a) Explain in detail about food intoxication. (9)
- OR**
- b) Explain in detail about Pasteurization of milk. (6)
- c) Write a short note on the Direct Microscopic Count. (6)

UNIT -III

4. a) Explain about the industrial production of Wine. (9)
- OR**
- b) Explain in detail about components of a fermentor. (6)
- c) Write briefly on Isolation and screening of microbes. (6)

UNIT -IV

5. a) Explain in detail the Industrial production of Penicillin. (9)
- OR**
- b) Explain in detail the Industrial production of SCP. (6)
- c) Write briefly about production of vinegar by trickling generator method. (6)

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

- General principles underlying food spoilage
- Radiations used for food preservation
- Mycotoxins
- Salmonellosis
- Product Recovery
- Nutritional value of SCP

(2019 Batch onwards)

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**St Aloysius College (Autonomous)
Mangaluru**

B.Sc. Semester VI – Degree Examination

May/June - 2023

BIOCHEMISTRY – Paper VII

MICROBIOLOGY & IMMUNOLOGY

Time: 3 hrs.

Max Marks: 100

- Instructions:** 1. Write the number and subdivision clearly.
2. Write equation and diagrams whenever necessary
3. Answer Part –A in the two pages of the answer book.

PART – A

1. Answer any **TEN** of the following. (10×2=20)
- Why Antony Van Leuwenhoek is called as the Father of Microbiology?
 - Mention the stains used in acid-fast staining and endospore staining.
 - What do you mean by optimum temperature and pH of bacteria?
 - Write the postulates of Koch.
 - Write the difference between RNA and DNA virus.
 - What are bacteriophages?
 - What are adjuvants?
 - Why IgA is called secretory antibodies?
 - Give examples for immunosuppressive drugs.
 - What are auto antibodies?
 - Which type of hypersensitivity is called delayed-type? Why?
 - What is Antigenic shift? Give example.

PART – B

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

- By which staining method you can differentiate Gram +ve and -ve bacteria? Explain.
- Explain the Growth curve of Bacteria.
- What is the lytic life cycle? Explain.
- Explain the diagrammatic production of monoclonal antibodies.
- What is RIA? Explain its types.
- Explain complement activation by the classical pathway.
- Write a note on any two organ-specific Immune disorders.

PART – C

Answer any **FIVE** of the following: (5×10=50)

- Explain different methods of Sterilizations.
- Explain general characteristics and replication of HIV.
- With a neat labeled diagram explain the basic structure of antibody and antibody types.
- Explain different primary lymphoid organs.
- What is graft rejection? Explain its types.
- What is ELISA? Explain its types.

(2019 Batch onwards)

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**St Aloysius College (Autonomous)
Mangaluru**

B.Sc. Semester VI – Degree Examination

May/June - 2023

BIOCHEMISTRY – Paper VIII

CLINICAL AND MEMBRANE BIOCHEMISTRY

Max Marks: 100

Time: 3 Hours.

- Instructions:**
1. Write the number and subdivision clearly.
 2. Write equation and diagrams whenever necessary
 3. Answer Part –A in the two pages of the answer book.

PART – A

(10×2=20)

1. Answer any **TEN** of the following.
 - a) What are free radicals? How are they detected?
 - b) Define osmosis with an example.
 - c) Define the term half-life in radioactivity.
 - d) What is SGOT? How is it useful?
 - e) Define the term Becquerel.
 - f) What are Ionophores? Give example.
 - g) Differentiate between serum and plasma.
 - h) What is phagocytosis? Give example.
 - i) What is Atherosclerosis?
 - j) What are the uses of radioactive elements in medicine?
 - k) Write the types of the active transport system.
 - l) Define the term cancer. Mention its types.

PART – B

Answer any **SIX** of the following:

(6×5=30)

2. Give the general characteristics of tumor cells.
3. Explain the Fluid mosaic model with a neat labeled diagram
4. Write a note on Diabetes mellitus.
5. Write a note on types of radioactivity and their properties.
6. Write a note on Phenylketonuria.
7. Write a note on the clinical application of CPK.
8. Explain the working of the GM counter.

PART – C

Answer any **FIVE** of the following:

(5×10=50)

9. Explain the working of the solid and liquid scintillation counters.
10. Explain the normal constituents of blood.
11. Write a note on tumor markers and their clinical significance.
12. Explain the abnormal constituents of urine.
13. Write a short note on a) Haemophilia b) Sickle cell anemia.
14. Write a note on serum lipid profile and its significance.

(2014-2020 batch)

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St Aloysius College (Autonomous), Mangaluru

B.Sc. Semester VI - Degree Examination

May/June-2023

BIOTECHNOLOGY-Paper VII

ENVIRONMENTAL BIOTECHNOLOGY

Max. Marks: 100

Time: 3 Hours

Note: i) Answer all the questions

ii) Draw diagrams wherever necessary

PART - A

(10×2=20)

1. Answer any TEN of the following.
 - a) What is green house effect?
 - b) Expand SARS and MERS
 - c) What is meant by ppm and ppb?
 - d) What is rhinitis? What causes it?
 - e) What are the significant organisms found in mangroves?
 - f) What is phytoremediation?
 - g) What is landfilling?
 - h) What are the major pollutants present in petroleum industry?
 - i) Firewood is energy source. Justify.
 - j) What is an energy garden? Give example
 - k) Name two phosphate solubilizing microorganisms.
 - l) What is the significance of endomycorrhiza?

PART - B

(6×5=30)

Answer any SIX of the following.

2. Explain parasitism with suitable example.
3. What are the causes of soil erosion? Explain in detail
4. Explain any two methods of in-door air sampling
5. Write short note on Amoebiasis
6. Explain direct and indirect leaching
7. What is primary treatment? Explain the types.
8. Explain the production of cyanobacterial biofertilizer.
9. Write short notes on fungal biopesticide
10. What is gasohol? How it is produced?

PART - C

(5×10=50)

Answer any FIVE of the following:

11. Give an account on tuberculosis, its mode of action, pathogenicity and treatment.
12. Explain the types of positive interactions among soil microbes.
13. Explain the qualitative analysis of water
14. Explain any 2 methods of secondary treatment of water
15. Explain the steps in biogas production
16. Explain baculoviruses as biopesticides

G 511.6b

(2014-2020 batch)

Reg. No. :

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St Aloysius College (Autonomous), Mangaluru**B.Sc. Semester VI - Degree Examination****May/June-2023****BIOTECHNOLOGY-Paper VIII****Bioprocess Technology****Max. Marks: 100****Time: 3 Hours****Note: i) Answer all the questions****ii) Draw diagrams wherever necessary****PART - A****(10×2=20)****1. Answer any TEN of the following.**

- a) Define stationary fermentation. What is fed Batch fermentation?
- b) What is upstream processing?
- c) What are baffles? Comment on their significance.
- d) What is seed tank culture?
- e) What is strain selection?
- f) What are abzymes? Give one example
- g) Give two examples for the enzymes used in dairy industries
- h) Write two important applications of protein immobilization
- i) Write test for pasteurized milk.
- j) What are aflatoxins?
- k) What is appertization?
- l) What is Blanching?

PART - B**(6×5=30)****Answer any SIX of the following.**

2. What is the difference between aerobic and anaerobic fermentation? Write the significance of anaerobic fermentation
3. Explain how fermentation equipment are sterilized
4. Describe chemical methods of cell lysis
5. Write about primary screening of organisms producing metabolites
6. Write a short note on biosensors
7. Explain the usage of enzymes in therapeutics with examples.
8. Describe about types of food spoilage
9. Explain the production of Idli
10. Describe pasteurization

PART - C**(5×10=50)****Answer any FIVE of the following:**

11. Explain growth kinetics in details.
12. Explain the role of gel filtration & HIC in downstream processing.
13. Explain the industrial production of Penicillin.
14. Write short notes on principle and applications of protein immobilization.
15. Give a detailed account on probiotics and prebiotics?
16. Explain the production of cheese and acidophilic milk

(2016 Batch onwards)

G 110-6a/512.6a

Reg. No.

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St Aloysius College (Autonomous)**Mangaluru****B.A./B.Sc. Semester VI – Degree Examination****May/June -2023****Computer Animation – Paper VII****3D RIGGING & ANIMATION****Time: 3 hrs.****Max Marks: 100****PART - A****Answer any TEN of the following.****(10x2=20)**

1. a) How to blur the super spray?
- b) What is the use of mass value?
- c) What is the bomb detonation?
- d) How to create fire effect?
- e) What is the use of kinematic rigid body?
- f) What is copy posture under biped?
- g) What is the use of emit stop and life value of particles?
- h) What is the default bounce value of deflector?
- i) Name the different body types of biped.
- j) Which option we should use to move the biped?
- k) What are the 3 types of footstep animation?
- l) What is the use of ALT+X?

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

2. Explain Mouse running animation techniques.
3. Write a note on Mass FX cloth.
4. How to create facial talking expression?
5. How to create footstep animation?
6. What is the use of Deflectors in 3D animation?

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

7. Write a note on static, dynamic & kinematic rigid body.
8. Write a Note on physique Modifier.
9. What is the use of video post? Explain with example

PART - D**Answer any TWO of the following:****(2x20=40)**

10. Explain the structure of biped.
11. Explain all the forces of space works with an example.
12. Write a brief note on figure mode.

(2016 Batch onwards)

G_110.6b/G 512.6b

Reg. No.

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**St Aloysius College (Autonomous)
Mangaluru**

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

May/June -2023

Computer Animation – Paper VIII

MEDIA AND INTERACTIVE ANIMATION

Time: 3 hrs.

Max Marks: 100

PART - A**Answer any TEN of the following.****(10x2=20)**

1. a) Which symbol is used to create color switch button for animation?
- b) What is stop motion animation?
- c) Mention the use of paint bucket tool and its shortcut key.
- d) How to write function programming in Action Script?
- e) Define flash interface.
- f) What is the use of adding Key Frame?
- g) What is 2 dimensional and 3 dimensional Animation?
- h) List out the use of scripting.
- i) What is vector based graphics?
- j) What is the use of lasso tool?
- k) Write down shortcut key for inserting frame and key frame.
- l) List out the use of onion skin tool in Animation.

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

2. How to create input and dynamic text boxes?
3. Explain mouse event script.
4. What are the qualities of interactive media designer?
5. What is e-learning? Explain Briefly.
6. Explain How to create play and stop buttons.

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

7. Create ball bouncing animation using action script.
8. What are the advantages of using flash?
9. Explain the benefits of e learning.

PART - D**Answer any TWO of the following:****(2x20=40)**

10. Explain the different types of animation in Flash.
11. Create scene navigation using action script.
12. Explain the important features of Flash.

(2019 Batch Onwards)

G 513.6a

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St Aloysius College (Autonomous)**Mangaluru****B.Sc. - Semester VI - Degree Examination****May/June - 2023****ECONOMICS - Paper - VII****INDIAN ECONOMICS**

Time: 3 hrs.

Max Marks: 100

PART - A

I. Answer any FOUR of the following questions in about 10 (4×5=20) sentences each.

1. Write a note on economic crisis of 1991 in India.
2. Briefly explain the causes of poverty.
3. Briefly explain land reforms in Indian agriculture.
4. What are the features of MSME?
5. Write a note on financial sector reforms.
6. Write a note on NEP?

PART - B

II. Answer any FOUR of the following questions in about 20 (4×10=40) sentences each.

7. Briefly explain sectoral changes since the inception of planning in India.
8. Explain the various types of unemployment.
9. Explain the causes of low productivity in Indian agriculture.
10. What is industrial finance? Explain the sources of industrial finance?
11. Describe the changing scenario of banking services in India.
12. Explain the role of SHGs in women empowerment.

PART - C

III. Answer any TWO of the following questions in about 50 to 60 (2×20=40) sentences each.

13. Critically analyse India's national population policy.
14. Explain various poverty alleviation schemes in India.
15. Explain the New Industrial Policy of 1991.
16. Explain the achievements and failures of economic planning in India.

(2019 Batch Onwards)

G 513.6b

Reg. No. :

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St Aloysius College (Autonomous)**Mangaluru****B.Sc. - Semester VI – Degree Examination****May/June - 2023****ECONOMICS – Paper - VIII****ECONOMETRICS**

Time: 3 hrs.

Max Marks: 100

Note: Econometrics Log table will be provided.

PART - A**I. Answer any FOUR of the following questions in about 10 sentences each. (4×5=20)**

1. Prove that $\hat{\beta}_2 = (N \sum x_i y_i - \sum x_i y_i) / (N \sum x_i^2 - (\sum x_i)^2)$
2. Prove that $E(\hat{\beta}_2) = \beta_2$
3. Write a note on dummy variable trape.
4. Prove that polynomial length of the lag can be converted to a specified lag model.
5. Briefly explain Nash equilibrium.
6. What are the various concepts of research?

PART – B**II. Answer any FOUR of the following questions in about 20 sentences each. (4×10=40)**

7. Prove that $\beta_1 \sim N [\beta_1, \sigma^2 \cdot \sum X^2 / n \sum x_i^2]$
8. Prove that $E(u_t \cdot u_{t-2}) = \rho^2 \sigma_u^2$
9. a) How dummy variable can be a best indicator for seasonal analysis? Explain.
b) Write the steps to find WLS using SPSS.
10. Explain the ad hoc estimation of distributed lag model.
11. Briefly explain the significance and limitation of game theory.
12. Briefly explain the types of research.

PART – C**III. Answer any TWO of the following questions in about 50 to 60 sentences each. (2×20=40)**

13. A) Find out regression function from the above table.
B) Test the following hypothesis $H_0: \beta_1 = 0$ and $H_0: \beta_2 = 0$
C) Find out the confidence interval of the true population parameter.
D) Find out R^2 and adjusted R^2 value.

Contd...2

Inflation (%)	Bonds (%)
4.4567	6
5.77	7
5.9787	8
7.3317	9
7.3182	10
6.5844	11
7.8182	12
7.8351	13
11.0223	14
10.6738	15
10.8361	16
13.615	17
13.531	18

Note: Keynes Liquidity Trap

14. Using above table test whether it violates any two assumptions of Classical Linear Regression Model.

Wage (Rs.)	Population (in thousand)
6	50
7	52
8	55
10	59
8	57
9	58
10	62
9	65
11	68
10	70

Note: Subsistence theory of Wage.

15. Briefly explain ILS and 2SLS method in regression.
 16. Explain the steps involved in research process.
