

G 501.6a

(2014 Batch Onwards)

Reg. No. :

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St Aloysius College (Autonomous)
Mangaluru

B.Sc. Semester VI- Degree Examination
August / September 2021

PHYSICS – Paper - VII
NUCLEAR PHYSICS AND ANALOG ELECTRONICS

Max Marks: 100

Time: 3 hrs.

SECTION – A

(10×2=20)

1. Answer any **TEN** of the following.

- State the condition for secular equilibrium between the daughter and parent nuclei.
- What are mirror nuclei? Give an example.
- What is K-electron capture?
- What are magic numbers?
- What is pair production?
- What is the structure of neutron according to quark model?
- What is nuclear fusion? Give an example.
- Draw G.M characteristics.
- What are the drawbacks of betatron?
- What is a small signal amplifier?
- Explain the term bandwidth of an amplifier.
- Explain negative feedback.

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SECTION – B

Answer **TWO** full questions from each unit:

UNIT – I

- With elements A, B and C forming radioactive series (C being stable), derive an expression for the number of atoms of B if at the start, B was not present in the sample. (6)
 - State and explain Geiger-Nuttal law. What is its significance? (4)
- Which are the paradoxes of beta ray spectra? Explain these paradoxes on the basis of Pauli's neutrino hypothesis. (6)
 - Obtain an expression for the alpha particle disintegration energy. (4)
- Explain the characteristics of nuclear forces. Discuss the Yukawa's meson theory. (6)
 - Explain the formation of cosmic ray showers. (4)

UNIT – II

- Distinguish between endoergic and exoergic reaction. Deduce the expression for threshold energy in an endoergic reaction. (6)
 - Describe the working of a semiconductor detector. (4)

Contd...2

6. a) Obtain the four-factor formula for thermal reactors and discuss the condition for criticality. (6)
 b) With a neat diagram, explain the construction and working of LINAC. (4)
7. a) Describe the working of betatron. Derive the betatron condition. (6)
 b) Mention the basic properties of neutron. (4)

UNIT - III

8. a) Define h-parameter for a two port network and arrive at the h-parameter equivalent for a transistor in CE mode. (6)
 b) Draw the circuit of Wien bridge oscillator using op-amp and explain its working. (4)
9. a) Explain the frequency response of a CE amplifier. (6)
 b) What is an inverting amplifier? Obtain the expression for the voltage gain of inverting 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) What is adder circuit? Obtain the expression for the output of a 3 input inverting adder circuit. (4)

SECTION - C

(4x5=20)

Answer any **FOUR** of the following:

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. In Dempster's mass spectrograph an accelerating p.d of 1000 volt is required to bring Mg^{25} ions on the slit. What is the potential difference required to bring Mg^{24} ions on to the slit, the magnetic field being kept constant.
13. Find the threshold energy of the nuclear reaction ${}^{14}_7N(n, \alpha){}^{11}_5B$.
 Given: Mass of ${}^{14}_7N = 14.003074$ amu
 Mass of ${}^{11}_5B = 11.009305$ amu
 Mass of ${}^1_0n = 1.0086665$ amu
 Mass of α particle = 4.002603 amu
14. What is the power output of a ${}^{235}_{92}U$ reactor working at 25% efficiency if it takes 30 days to use 8kg of fuel?
 Each fission of ${}^{235}_{92}U$ produces 200 MeV of energy.
15. 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.
16. For the inverting amplifier, the input voltages are 3V, 5V and 7V and corresponding input resistances are $3k\Omega$, $5k\Omega$ and $7k\Omega$ respectively and feedback resistor is $5k\Omega$. Calculate the output voltage.

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**St Aloysius College (Autonomous)
Mangaluru**

**B.Sc. Semester VI- Degree Examination
August / September 2021**

**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.

(10×2=20)

- 1.a) What is modulation? State at least one reason for the need of modulation.
- b) What is SSB transmission? What is its advantage?
- c) What is meant by scanning? Mention the types.
- d) Which are the primary colours?
- e) Give the logic symbol and Boolean expression of AND operation.
- f) What is a half adder? Give its Boolean representation.
- g) What is a Flip-flop? Represent SR Flip-Flop with a block diagram.
- h) What is a serial shift register?
- i) What is Meissner effect? What is its application?
- j) What are quantum dots? Name the types of quantum dots.
- k) Write the expression for polarization vector in a linear dielectrics.
- l) What are high T_c super conductors?

SECTION – B

Answer **TWO** full questions from each unit:

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UNIT – I

2. a) Describe AM radio transmitter with a block diagram. (6)
- b) Define modulation index. Obtain a relation for the same in terms of V_{max} and V_{min} . (4)
3. a) Write the expression for amplitude modulated wave and obtain the expression for the total power in terms of the modulation index. (6)
- b) Explain how a diode detector can be used for detecting AM signal. (4)
4. a) Explain the working of a CRT. (6)
- b) Explain "Interlaced scanning" technique. (4)

UNIT – II

5. a) What is an OR 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 first theorem. Represent it using logic gates. (4)

Contd...2

6. a) What is a full-adder? Write its truth table, boolean equation and logic diagram. (6)
- b) Explain the construction of XOR gates using -
(i) basic gates and (ii) using only NAND gates. (4)
7. a) Explain the working of a JK flip-flop. (6)
- b) Explain the working of a Decade counter. (4)

UNIT - III

8. a) What is superconductivity? Explain the effect of external magnetic field on superconductivity. (6)
- b) Mention any four applications of superconductors. (4)
9. a) Explain the generation of second harmonic in non-linear media and discuss the phase matching condition. (6)
- b) Briefly explain the nano-scale system. (4)
- 10.a) Explain the structure of carbon nano-tube. Discuss its properties and applications. (6)
- b) Explain polarization in a nonlinear dielectric. (4)

SECTION - C

Answer any **FOUR** of the following:

(4x5=20)

11. An AM wave is represented by $E_m = 5(1 + 0.8\cos 10^4 t) \sin 220 \times 10^4 t$. 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. A sinusoidal carrier voltage of frequency 1MHz, amplitude 100V is amplitude modulated by sinusoidal voltage of frequency 5KHz producing 50% modulation. Calculate the frequency and amplitude of lower side band and upper side band terms. Also calculate the bandwidth.
13. An AM broadcast radio transmitter radiates radio waves at 20KW at modulation index 75%. Calculate the power of the carrier wave. Calculate the percentage of power saving if the carrier and one of the side band is suppressed.
14. Using Boolean identities show that
a) $(A + B)(A + C) = A + BC$
b) $CA + C\bar{A}B = CA + CB$
15. Draw a logic circuit which represents the expression $Y = \overline{(A + B)}.C$.
16. The transition temperature of mercury with average atomic mass of 200.59 is 4.153K. Determine the transition temperature of one of the isotopes ${}_{80}\text{Hg}^{204}$.

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B.Sc.- SEMESTER VI – Degree Examination
August / September 2021

CHEMISTRY – PAPER VII

Time: 3 hrs.

Max Marks: 100

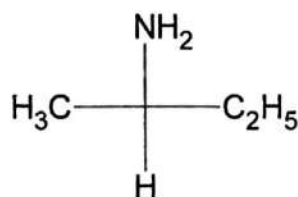
- Instructions:** 1. Write the question number and subdivision clearly.
2. Write equations and diagrams wherever necessary.
3. Answer Part-A in the first two pages of the answer book.

PART - A

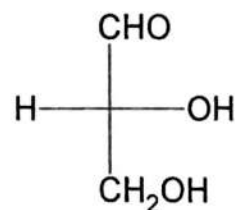
Answer any **TEN** of the following in 1 to 3 sentences. (2×10=20)

1. a) State Hooke's Law.
- b) What is zero point energy? Give the expression for it in a simple harmonic oscillator.
- c) Give the selection rule for Raman Spectroscopy.
- d) What is a metastable equilibrium? Explain.
- e) What is meant by trans-effect?
- f) Give one method for the synthesis of Grignard reagent.
- g) Give any two applications of organo-mercury compounds.
- h) What are mono-nuclear metal carbonyls? Give any two examples.
- i) What are enantiomers? Give an example.
- j) Give the synthesis of crotonic acid from diethyl malonate.
- k) Meso tartaric acid is optically inactive. Give reason.
- l) Assign R/S configuration to the following compounds:

i)



ii)



PART - B

Answer any **TEN** of the following in 2 to 5 sentences. (3×10=30)

2. (i) Calculate zero-point energy of hydrogen in J/mol if the fundamental frequency of hydrogen in wave number is $4.4 \times 10^5 \text{ m}^{-1}$ (Given $h = 6.626 \times 10^{-34} \text{ J s}$, $c = 3 \times 10^8 \text{ m s}^{-1}$, $N = 6.022 \times 10^{23}$).
- (ii) Write a short note on finger print region.
- (iii) Give any three differences between Raman and IR spectroscopy.
- (iv) Explain ice-salt freezing mixture.
- (v) Differentiate between thermodynamic and kinetic stability of metal complexes.

Contd...2

- (vi) Describe the structure of methyl lithium.
- (vii) How is $\text{Co}_2(\text{CO})_8$ synthesised?
- (viii) Explain the nature of bonding in metal carbonyls.
- (ix) Explain erythro and threo enantiomers with an example.
- (x) Discuss optical activity in lactic acid.
- (xi) Write a note on chair conformer of cyclohexane.
- (xii) Give the alkylation reaction of ethylacetoacetate.

Part - C

Answer any TEN of the following questions.

(5×10=50)

3. What is anharmonicity? Explain energy levels in an anharmonic oscillator; give the expression for its zero-point energy.
4. Discuss the types of molecular vibrations.
5. Discuss the applications of Raman spectroscopy.
6. Explain the phase diagram of water system.
7. Explain any one method to determine the stability constant of a complex.
8. Derive the relation between stepwise stability constants and overall stability constant.
9. Describe the structure of $\text{Al}_2(\text{CH}_3)_6$. Give any one method for the synthesis of organo-aluminium compounds.
10. How is IR spectroscopy useful in explaining the bonding in metal carbonyls?
11. Give the synthesis of ethylacetoacetate with mechanism.
12. Explain the biochemical and chemical methods to resolve a racemic mixture.
13. Explain conformational analysis in 1,2-dichloroethane.
14. How do you determine the configuration of geometric isomers by (a) Dipole moment method and (b) Chemical method.

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B.Sc.- SEMESTER VI – Degree Examination

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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 in 1 to 3 sentences. (2×10=20)

1. a) Mention the advantages of conductometric titrations.
- b) How does specific conductance of weak electrolyte varies with dilution.
- c) Calculate the potential difference between the hydrogen electrodes in the cell
$$\text{Pt, H}_2(1\text{atm})|\text{HCl}(0.085\text{M})||\text{HCl}(0.15\text{M})|\text{H}_2(1\text{atm}),\text{Pt}$$
- d) Write a note on liquid junction potential.
- e) Give the source and composition of acid rain.
- f) Give Ebele-Schlessler-Ross method for the preparation of RDX.
- g) What is octane number?
- h) How is atom economy calculated?
- i) Write the peak area ratio of triplet and doublet peaks.
- j) What is coupling constant in NMR spectroscopy?
- k) State isoprene rule.
- l) What are dyes? Give an example for azo dye.

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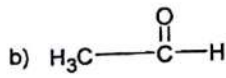
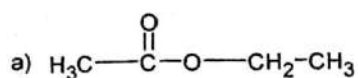
PART - B

Answer any **TEN** of the following in 2 to 5 sentences. (3×10=30)

2. (i) What are electrolyte concentration cells? Explain with one example.
- (ii) Give the principle of determination of solubility product of a sparingly soluble salt by conductometric method.
- (iii) Calculate the transport number of Li^+ and Br^- ions when a current flows through an infinitely dilute aqueous solution of LiBr at 25°C . Given the ionic mobilities of Li^+ and Br^- ions at infinite dilution are 4.01×10^{-8} and $8.09 \times 10^{-8} \text{ m}^2\text{V}^{-1}\text{s}^{-1}$ respectively.
- (iv) Give the principle of conductometric determination of weak acid against strong base.
- (v) Define BOD and explain its significance.
- (vi) Explain the effect of particulates on humans and environment.
- (vii) What is annealing of glass? Give its significance.

Contd...2

- (viii) Explain the need of use of catalytic reagents in green chemistry.
- (ix) What is nuclear shielding and deshielding in NMR spectroscopy?
- (x) Predict the multiplicity of each hydrogen atom in the following compounds.



- (xi) Explain the mechanism of colour change of methyl orange indicator in acidic and basic medium.
- (xii) How are alkaloids extracted from plants?

Part - C

Answer any **TEN** of the following questions

(5×10=50)

3. Explain Debye Huckel theory of strong electrolytes.
4. Outline the experimental determination of dissociation constant of a weak acid by conductometry.
5. Explain the determination of pH of a solution using quinhydrone electrode.
6. What is calomel electrode? Give the construction and working of calomel electrode.
7. What are soil pollutants? Explain any four major soil pollutants.
8. With a neat labelled diagram, explain the production of biogas. Give its composition.
9. Explain the classification of propellants with an example for each.
10. Explain any five principles of green chemistry.
11. Draw and explain the NMR spectrum of ethanol.
12. How does anisotropic effect and hydrogen bonding, affect the chemical shift value?
13. Describe the preparation of alizarin.
14. Explain the structural elucidation of nicotine.

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St Aloysius College (Autonomous)

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B.Sc. Semester VI - Degree Examination

August / September 2021

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 x 2 ½ = 25)

1. Check for the integrability condition

$$3x^2 dx + 3y^2 dy - (x^3 + y^3 + e^{2z}) dz = 0.$$

2. Solve : $(2x + y^2 + 2xz)dx + 2xydy + x^2 dz = 0.$

3. Solve : $\frac{dx}{z^2 y} = \frac{dy}{z^2 x} = \frac{dz}{xy}.$

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4. State the Dirichlet condition for the existence of Fourier expansion.
5. Write the Fourier series expansion of even function $f(x)$ and write the formula for a_0, a_n .
6. Find the half range sine expansion of the function $f(x) = x, 0 < x < \pi.$
7. If $\{v_1, v_2, \dots, v_n\}$ is an orthonormal set, then prove that v_1, v_2, \dots, v_n are linearly independent.
8. Define a subspace and prove that Kernel of a homomorphism is a subspace.
9. Prove that $(1, 0, 1), (1, 1, 1)$ and $(0, 0, 1)$ are linearly independent.
10. Prove that $T: R^2 \rightarrow R^3$ defined as $T(x, y) = (x + y, x - y, 2x)$ is a linear transformation.
11. Prove that Product of two linear transformation is a linear transformation.
12. If a linear transformation T is singular then prove that there exists $\xi \in V, \xi \neq 0$ such that $T(\xi) = 0.$
13. If $A \in Mn(F)$ has $q(x)$ as the minimum polynomial and $f(A) = 0$, then prove that $q(x) | f(x).$
14. Prove that $Tr(AB) = Tr(BA).$
15. Define row rank of a $m \times n$ matrix.

Contd..2

PART - B

UNIT - I

Answer any **THREE** of the following:

(3 x 5 = 15)

1. Solve : $(5x^3y + 9xy^2 + 2y + 2z^2)dx + (x^4 + 6x^2y + x)dy + 2xzdz = 0$.
2. Solve : $(2xy - yz)dx + (2yz - zx)dy - (x^2 - xy + yz)dz = 0$.
3. Solve : $(y^2 + yz)dx + (xz + z^2)dy + (y^2 - xy)dz = 0$ by the method of auxiliary equation.
4. Solve : $z^2dx + (z^2 - 2yz)dy + (2y^2 - yz - xz)dz = 0$.
5. Solve the simultaneous equations:

$$\frac{dx}{z(x+y)} = \frac{dy}{z(x-y)} = \frac{dz}{x^2 + y^2}$$

UNIT - II

Answer any **TWO** of the following:

(2 x 7 ½ = 15)

1. Obtain the Fourier series for $f(x) = e^{-ax}$, in the interval $-\pi < x < \pi$.
2. Obtain the half range cosine and sine series for $f(x) = \pi - x$ in $[0, \pi]$.
3. Find the Fourier series of

$$f(x) = \begin{cases} +1, & -\pi/2 < x < \pi/2 \\ -1, & \pi/2 < x < 3\pi/2 \end{cases} \text{ and } f(x+2\pi) = f(x).$$

4. Find the Fourier Series of $f(x) = x^2$ in $-\pi < x < \pi$ and deduce that

$$\frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \dots = \frac{\pi^2}{12}$$

UNIT - III

Answer any **THREE** of the following:

(3 x 5 = 15)

1. Let V be the internal direct sum of V_1, V_2, \dots, V_n . Then prove that V is isomorphic to their external sum of $V_1 \oplus V_2 \oplus \dots \oplus V_n$.
2. Prove that the vectors v_1, v_2, \dots, v_n in a vector space V are either linearly independent or some v_k is a linear combination of the preceding ones.
3. 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 V , then prove that $m \leq n$.
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. State and prove Schwartz's inequality.

Contd...3

UNIT - IV

Answer any **THREE** of the following:

(3 x 5 =15)

1. Prove that a linear transformation T of a vector space V with finite basis $\alpha_1, \alpha_2, \dots, \alpha_n$ is non-singular if and only if $T(\alpha_1), T(\alpha_2), \dots, T(\alpha_n)$ are linearly independent in V .
2. Prove that inverse of a linear transformation is linear.
3. Prove that dimension of the domain is equal to rank + nullity.
4. Let V and V' be vector spaces of dimension m and n respectively. Then prove that dimension of $L(V, V')$ is mn .
5. If $A = m(T)$ with respect to the basis v_1, v_2, \dots, v_n and $B = m(T)$ with respect to the basis w_1, w_2, \dots, w_n . Then prove that there exists a non-singular matrix 'C' such that $B = CAC^{-1}$.

UNIT - V

Answer any **THREE** of the following:

(3 x 5 =15)

1. Find the inverse of the matrix $\begin{bmatrix} 4 & 0 & 1 \\ 2 & 3 & 6 \\ 6 & -3 & -1 \end{bmatrix}$ using elementary row operations.
2. Let $A \in M_n(F)$ with $q(x) = a_0 + a_1x + \dots + a_{m-1}x^{m-1} + x^m$ to be the minimum polynomial of A . Prove that A is non-singular if and only if $a_0 \neq 0$.
3. Prove that similar matrices have the same minimum polynomials.
4. Show that 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 solutions.
5. State and prove Cayley- Hamilton theorem.

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B.Sc. Semester VI – Degree Examination
August / September 2021

MATHEMATICS – Paper VIII
Numerical Methods

Time: 3 Hours

Max. Marks: 100

Note: Answer all parts

PART – A

Answer any **TEN** of the following.

(10×2½=25)

1. If E_a and E_b are the errors in a and b respectively, find the error in the product ab .
2. Round off the numbers 3.14159 and 1.6583 correct to four significant figures.
3. What is the condition on $|\phi'(x)|$ in the method of iteration given by $x_{n+1} = \phi(x_n)$?
4. Express $\Delta^3 y_0$ in terms of y_0, y_1, y_2, y_3 .
5. Write Newton's backward difference formula for the interpolating polynomial.
6. What is the degree of the interpolating polynomial which interpolates a given function at 6 distinct points?
7. Define the divided difference $[x_0, x_1, x_2]$.
8. Write Simpson $\frac{3}{8}$ rule for $\int_{x_0}^{x_3} y dx$.
9. Evaluate $\int_0^1 \cos x dx$ using Simpson's $\frac{1}{3}$ rule with $h=0.5$.
10. Find the rank of the matrix $\begin{bmatrix} 5 & -2 & 4 \\ -2 & 1 & 1 \\ 4 & 1 & 0 \end{bmatrix}$.
11. Show that $A = \begin{bmatrix} \cos \theta & -\sin \theta \\ \sin \theta & \cos \theta \end{bmatrix}$ is orthogonal.
12. Find the column norm of the matrix $\begin{bmatrix} 3 & -2 & 4 \\ -5 & 3 & 6 \\ 6 & 7 & -9 \end{bmatrix}$.
13. Given $y' = -y$ with $y(0)=1$ compute $y(0.01)$ using Euler's method.
14. Describe Taylor series method of solving first order linear differential equation.
15. Write Adams-Moulton corrector formula.

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

1. Find a root of the equation $x^3 - 2x - 5 = 0$ correct to 2 decimal places using bisection method.
2. Find the root of the equation $\cos x = 3x - 1$, correct to 3 decimal places using iteration method. Choose $x_0 = \frac{\pi}{3}$.
3. Describe the method of false position to find the root of an equation.
4. Find a root of the equation $x \sin x + \cos x = 0$ by Newton-Raphson method choosing $x_0 = \pi$ correct to 3 decimal places.
5. Using the generalized Newton's formula find the 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)**

1. Derive Newton's forward difference formula for interpolation.
2. Find the missing term in the following table.

x	0	1	2	3	4
y	1	3	9	?	81

3. The population of a town in decennial census was as given as below. Estimate the population for the year 1925.

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

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

Contd....3

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 values 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

- Derive Simpson's $\frac{1}{3}$ rule.
- From the following table, find x for which y is maximum. Hence find the value of y .

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

- Use Trapezoidal rule to evaluate $\int_0^1 \frac{1}{1+x} dx$ with $h = 0.125$ correct to three decimal places.

UNIT - IV

Answer any **THREE** of the following.

(3×5=15)

- Examine the consistency of the system of equations
 $2x - 3y + 5z = 1$, $3x + y - z = 2$, $x + 4y - 6z = 1$.
- Solve the following system of equations using matrix inversion method.
 $3x + y + 2z = 3$, $2x - 3y - z = -3$, $x + 2y + z = 4$.
- Explain Gauss elimination method to solve a system of linear equations.
- Solve the following system of equations using Jacobi's method
 $83x + 11y - 4z = 95$, $7x + 52y + 13z = 104$, $3x + 8y + 29z = 71$.
- Solve the following system of equations by Gauss-Seidal method
 $10x_1 - 2x_2 - x_3 - x_4 = 3$
 $-2x_1 + 10x_2 - x_3 - x_4 = 15$
 $-x_1 - x_2 + 10x_3 - 2x_4 = 27$
 $-x_1 - x_2 - 2x_3 + 10x_4 = -9$

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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 4 decimals by Taylor series method.
- Using Picard's method, find the second approximation $y^{(2)}$ to solve the differential equation $y' = x + y^2$ subject to the condition $y = 1$ when $x = 0$.
- 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 -Bashforth method.
- Derive Runge-Kutta 2nd order formula.
- Using modified Euler's method, determine $y(0.02)$, $y(0.04)$ for the differential equation $y' = x^2 + 1$ given $y(0) = 1$.

G 503.6b(v)

(2007 batch onwards)

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St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester VI – Degree Examination
August / September 2021
MATHEMATICS – Paper VIII
MATHEMATICAL MODELING

Time: 3 Hours

Max. Marks: 100

Note: Answer all parts

PART – A

Answer any **TEN** of the following.

(10×2½=25)

1. If x is the distance travelled by a falling body dropped from rest then show that $\frac{dx}{dt} = 8\sqrt{x}$.
2. Prove that rain drops are too small to pull the earth.
3. The first Boeing 707 requires about 1,50,000 working hours of labour. If the progress rate is 80%, then what is the number of hours required for the 32nd plane?
4. What was the population last year according to Malthusian model if the current population is 10,00,000, birth rate = 0.025 and death rate = 0.01?
5. If $\overrightarrow{F(0)} = \begin{bmatrix} 800 \\ 1000 \\ 1200 \end{bmatrix}$ and $m_0 = \frac{1}{2}$, $m_1 = 1$, $m_2 = 0$, $P_0 = \frac{3}{4}$, $P_1 = \frac{1}{2}$, find $\overrightarrow{F(\Delta)}$.
6. Define median waiting time and find median time for $p = 0.1$.
7. If carrying cost and daily sales are doubled, then find the change in optimal order.
8. Define system error and random error.
9. Suppose a set of measurement of the weight x of a speck of dust is fit by uniform probability density function

$$y = \begin{cases} \frac{1}{12} & 0 \leq x \leq 12 \\ 0 & \text{otherwise} \end{cases}$$

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If two measurements are taken, what is the probability that first falls between 1 and 2, the second falls between 2 and 3?

10. Write the formula for multiple regression coefficient.
11. Draw the three types of exponential curves.
12. Give the algorithm for pivot transformation.
13. State travelling salesman problem.
14. Find the first three terms of solution of the difference equation $x(t+1) - x(t) = \frac{1}{x(t)}$, $x(0) = 1$.
15. Carry out the north west corner rule for the following table.

4	8	8	56
16	24	16	82
8	16	24	77
72	102	41	

Contd..2

PART - B

UNIT - I

Answer any **THREE** questions.

(3×5=15)

1. Explain the steps of building a mathematical model.
2. Build a model to explain manufacturing progress curve for the rate of 90%.
3. Using inverse square law, prove that the raindrops are too close to change their acceleration as they fall to the earth.
4. State Stoke's Law and derive equation for terminal velocity. Find the terminal velocity of the raindrop having diameter $D = 0.00020$ feet.
5. Explain the growth of the population with the help of a model.

UNIT - II

Answer any **THREE** questions.

(3×5=15)

1. Construct the Leslie model for population growth.
2. Explain the family planning model and find an expression for \bar{w} and s_m .
3. Explain the inventory policy model.
4. Construct Controlled Source Seismology model.
5. The diameter of a circular disc measured twice, the values obtained are 71 and 72 with an uncertainty of 0.5. Which of the normal curves
a) $\mu = 71, \sigma = 1$ or b) $\mu = 71.5, \sigma = 2$
has the highest likelihood of getting these measurements?

UNIT - III

Answer any **THREE** questions.

(3×5=15)

1. 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 .
2. Construct the College Enrollment model.
3. The following data is concerned with growth of a plant. Fit a least squares line and use it to predict the height at 4.5 months and at 5 years.

Months after grafting	1	2	3	4	5	6
Height in inches	0.8	2.4	4	5.1	7.3	9.4

4. C_{14} isotope of carbon under goes a radio active decay and transforms into C_{12} . Find the best fitting straight line for the following data, which gives the fraction f of original amount of C_{14} left, after various number of years elapsed.

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 $z = 6.35x + 4.59y - 368$ from the table.

x	34	32	31	29	34	34	38
y	68	70	71	68	68	76	73.5
z	160	160	150	120	175	190	205

Unit -IV

Answer any **THREE** questions.

(3×5=15)

- Construct Aristarchus model and find its sensitivity.
- Construct Eratosthenes model.
- A refrigerated compartment is to be built in the shape of a box with the capacity 8000 cubic feet. To save energy cost, find the dimension that will minimize the amount of heat entering from outside. The heat flows into the box at the rate of
 - 1 unit /square foot through the top.
 - 3 units/square foot through the bottom .
 - 2 units /square foot through the sides.
- Minimize $f(x_1, x_2) = 3x_1 + 2x_2$, $x_1, x_2 \geq 0$,
subject to $5x_1 + 7x_2 \geq 35$ and $10x_1 + 4x_2 \geq 40$.
- Using Simplex algorithm, solve
Maximize $P = 4x + y$
subject to $x + y \leq 50$
 $3x + y \leq 90$
 $x, y \geq 0$.

UNIT - V

Answer any **THREE** questions.

(3×5=15)

- Find the optimal B.F.S for the following transportation table.

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

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- Find the improvement index for each unused square in the following basic feasible solution:

	D ₁	D ₂	D ₃
S ₁	1 ○	2	5 ○
S ₂	2	3 ○	3 ○
S ₃	3 ○	4	1
S ₄	5 ○	1	2

- State the steps of Construction of Euler Circuit.
- Find the first five terms of the solution to the difference equation
 $x(t + 1) - x(t) = [x(t)]^2 + t$, $x(0) = 1$.
- Suppose 20% of the yeast population splits in 15 minutes interval where unit time designates 2 hours, what formula connects $x(t + 1) - x(t)$ to $x(t)$?

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St Aloysius College (Autonomous)

Mangaluru

B.Sc. Semester VI – Degree Examination

August / September 2021

ELECTRONICS – Paper VII

Biomedical Instruments, VLSI and Robotics

Time: 3 hrs.

Max Marks: 100

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. (12x1=12)

- i) _____ is related to the activity of Eyes
a) EEG b) ECG c) EMG d) EOG
- ii) _____ transducer converts sound energy into electrical energy.
a) Microphone b) Piezoelectric c) Photoelectric d) Thermoelectric
- iii) _____ are types of electrodes applied to the skin of the subject.
a) Needle electrodes b) Microelectrodes
c) Surface electrodes d) Limb electrodes
- iv) PLD is acronym for _____
a) Pre - Programmable Logic Device b) Programmable Logic Device
c) Programmable Logic Desk d) Pre Logic Device
- v) The lower limit of blood pressure is called _____
a) systolic pressure b) diastolic pressure
c) distolic pressure d) none of these
- vi) Stick diagrams are those which convey layer information through _____
a) shapes b) color c) layers d) thickness
- vii) The basic role of an electrode is to convert _____
a) light signal to ionic signal b) ionic signal to electrical signal
c) electrical signal to light signal d) light signal to electrical signal
- viii) In CMOS Inverter, PULL DOWN network consists of _____
a) NMOS b) PMOS c) CMOS d) n-channel JFET
- ix) The physiological systems which are dealing with the flow of blood and air is called _____
a) Biomechanical Signals b) Bioelectrical signals
c) Biomagnetic Signals d) Bioacoustic Signals
- x) Which of the following is a digital transducer?
a) Encoder b) Thermistor c) LVDT d) Piezoelectric crystal
- xi) A _____ is a device that sends electrical energy, or shock, to the heart to treat cardiac arrest.
a) echocardiogram b) heart-lung machine c) pacemaker d) defibrillator

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- xii) The Principle used in a Dialyzer of a Dialysis machine is _____
 a) Electrolysis b) Diffusion c) Fusion d) precipitation

2. Answer any TEN questions.

(10x1=10)

- i) State Moore's law.
- ii) What is the magnitude of Resting potential?
- iii) What do you mean by a dialyzer?
- iv) Define Systolic Pressure.
- v) Name the instrument used to measure Blood Pressure.
- vi) Draw the circuit of CMOS NOR gate.
- vii) Mention any one application of FPGA.
- viii) Mention two types of semicustom ASICs.
- ix) Write the full form of CLB.
- x) What is meant by PULL UP circuit?
- xi) What do you mean by Actuators?
- xii) Mention the advantage of GaAs in VLSI technology.

3. Answer any TEN questions.

(10x2=20)

- i) Draw the block diagram of Biomedical instrumentation.
- ii) Draw the circuit diagram of a BiCMOS Inverter circuit.
- iii) What is the difference between Transducer and Sensor?
- iv) Explain a Resistive Transducer.
- v) Mention any two specifications of Instrumentation System.
- vi) Explain the principle of measurement of Blood pressure.
- vii) Draw the circuit symbols of NMOS and PMOS transistors.
- viii) Explain how mechanical transmission takes place in a robot.
- ix) Give the circuit of two input AND gate using CMOS.
- x) With necessary diagram explain the classification of ASIC's.
- xi) Mention any two differences between PAL and PLA.
- xii) The total number of o/p square pulses of a line following robot are 380. Radius of disk=20cm. Total number of rectangular spacing on the disk=20. Calculate the total number of rotations the disk has made and the distance covered by the disk?.

SECTION - B

4. Answer any SEVEN questions.

(7x4=28)

- i) With a block diagram explain a basic pure tone AUDIOMETER.
- ii) Write a note on LVDT.
- iii) What is ECG? What is the diagnosis made from ECG?
- iv) With block diagram explain Impedance Pneumography.
- v) With neat circuit diagram explain the working of a Rotational encoder.
- vi) Design a XOR gate using VLSI technique.

- vii) With a circuit diagram explain
 (i) Saturated load Inverter and (ii) CMOS inverter.
- viii) Implement the following Boolean expressions in PLA.

$$Y_1(A, B, C) = \sum(2, 5, 6, 7)$$

$$Y_2(A, B, C) = \sum(0, 1, 6, 7)$$

- ix) Explain different types of joints used in Robotics.
 x) Explain Robotic Peripherals with an example.

SECTION - C

Answer any **THREE** full questions.

(10x3=30)

5. a) With necessary diagrams explain
 i) Polarization ii) depolarization iii) repolarization of a cell when it is stimulated? (5)
 b) With necessary diagrams explain a cardiac Defibrillator. (5)
6. a) With necessary diagrams explain the working principle of cardiac pacemaker. (5)
 b) Explain any five Physiological signals based on energy. (5)
7. a) Draw the circuit diagram, based on CMOS technology, using MOSFETs to obtain the following Boolean expression using VLSI design techniques. (5)
- $$Y = \overline{(A + BC)D + E}$$
- b) With a neat diagram explain the working of a Proximity sensor (IR SENSOR). (5)
8. a) Construct CMOS circuit for the evaluation of Boolean expression $Y = A.B$ and explain its working. (5)
 b) A particular layer of MOS circuit has a resistivity $\rho = 5 \text{ ohm.cm}$. A section of this layer is $40\mu\text{m}$ long and $5\mu\text{m}$ wide and has thickness of $2\mu\text{m}$. Calculate the resistance from one end of this section to others (along the length). What is the value of sheet resistance "R_s"? (5)

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G 504.6b

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St Aloysius College (Autonomous)
Mangaluru

B.Sc. Semester VI- Degree Examination
August / September 2021

ELECTRONICS - Paper VIII
8086 MICROPROCESSOR & C LANGUAGE

Time: 3 Hours

Max. Marks: 100

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) 8086 μP has _____ bit PSW register
a) 4 b) 16 c) 8 d) 20
- ii) _____ Instruction is used for table translation in 8086 μP .
a) XLAT b) STOSB c) MOVSB d) REP
- 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) _____ Interrupt in 8086 μP is non maskable.
a) INT 00h b) INT 01h c) INT 02h d) INT 03h
- v) In 8086 μP stack pointer is _____ bit
a) 20 b) 16 c) 8 d) 32
- vi) REP instruction repeats until
a) AX=0 b) BX =0 c) CX=0 d) CX \neq 0
- vii) _____ is not a string constant in C language
a) "ABC" b) "123" c) 123 d) "hi"
- viii) _____ is not a storage class in C.
a) intern b) array c) extern d) static
- 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 `inta[10] = {100};` then value of `a[9]` is _____
a) 100 b) 0 c) garbage value d) wrong statement
- xi) Which of the following is not a key word in C language.
a) int b) alpha c) void d) auto
- xii) _____ is invalid in C language
a) while (x=5) b) for (i=10; i<10; i--) c) a=b+c ; d) switch (k)

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2. Answer any TEN of the following (10×1=10)

- i) Give the instructions used to clear the direction flag in 8086 μP .
- ii) Mention the role of parity flag in 8086 μP .
- iii) Mention any two 8086 instructions to clear accumulator.
- iv) Mention any two hardware interrupts of 8086 μP .
- v) Which directive is used to define the procedure in 8086 μP ?
- vi) Give an example for IN instruction in 8086 μP ?
- vii) Write the C statement for equation $Z = a^2b^2 + a^2/2b + a^3 + 3c$.
- viii) Write the difference between `getch()` and `getchar()` functions.
- ix) How a single character is defined in C?

G 504.6b

- x) What is meant by actual parameter in C?
- xi) Define an array in C language.
- xii) Write the syntax of 'goto' statement in C.

3. Answer any TEN of the following**(10×2=20)**

- i) What is meant by pipeline architecture in 8086 μP ?
- ii) Explain 'loop' instruction in 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 a 8086 program to double an 8-bit number without using arithmetic instructions in 8086 μP .
- vi) Mention the role of AX register in 8086 μP .
- vii) Given a=2, b=20, C=5, d=30. Evaluate the following, C expressions.
 - a) (a>b) && (c<30) b) (a<b) || (d>c)
- viii) Mention the different methods to input a character from the keyboard in 'C'
- ix) Differentiate between RET and IRET instructions in 8086 μP .
- x) Explain increment operator of C language with an example.
- xi) Explain strcpy() function in 'C'.
- xii) Mention different storage classes available in 'C' language.

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

- i) With bit pattern explain PSW register of 8086 μP
- ii) Write an 8086 program to divide two eight bit numbers.
- iii) With syntax and example explain the following 8086 directives.
 - i) DW ii) SIZE
- iv) With example explain how a procedure is executed in 8086 μP .
- v) Write a note on interrupts of 8086 microprocessor.
- vi) Write a C program to compare two strings.
- vii) With an example explain the if---else statement in C language.
- viii) Write a note on arrays in C language.
- ix) With example explain any two logical operators used in 'C'.
- x) Write a 'C' program to find the area of a triangle by reading the three sides from the keyboard.

Section - C**Answer any THREE full questions:****(3×10=30(7×4=28))**

- 5. a) Explain General purpose registers and segment registers used in 8086 μP . (5)
- b) With example explain switch statement used in C language (5)
- 6. a) With necessary diagram explain the minimum mode architecture of 8086 μP . (5)
- b) With example explain if..elseif ladder in 'C'. (5)
- 7. a) Explain the interrupt I/O used in 8086 μP . (5)
- b) With example explain do- while loop in C. (5)
- 8. a) With example explain any two rotate instructions of 8086 microprocessor. (5)
- b) With example explain arithmetic operators available in C language. (5)

G 505.6a

(2015 -2018 Batch)

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St Aloysius College (Autonomous)

Mangaluru

B.Sc. Semester VI – Degree Examination

August / September 2021

COMPUTER SCIENCE - Paper VII

MICROPROCESSOR ARCHITECTURE AND PROGRAMMING

Time: 3 Hours

Max Marks: 100

PART –A

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

- a) Mention the addressing mode used in the instructions
i) DAA ii) ADD AX, BX iii) MOV BL, [SI] and iv) MOV BX, [SI+2]
- b) What is the role of CLD instruction during string manipulation?
- c) Explain NEG AX instruction with an example. What is its significance?
- d) Write the full form of instructions AAS and AAD.
- e) Distinguish between NEAR procedure and FAR procedure.
- f) What do you mean by stack? Which registers are used to point to the stack?
- g) Distinguish between END and ENDS directives.
- h) What is meant by an interrupt? Mention the interrupt type used as breakpoint interrupt.
- i) If (AX)= 2233 H and (BX)= 3378 H, what will be the contents of AX and BX after the execution of the instruction ADD AX, BX?
- j) Explain MUL AL instruction and its significance.
- k) Write any two software interrupt instructions.
- l) Write the properties of software interface interrupt int86.

PART –B

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

UNIT - I

2. a) Give the structure of 8086 flag register. Explain the conditional flags mentioning their significance. (8)
- b) With timing diagram, explain the memory read operation. How does it differ from I/O read operation? (6)
- c) Explain the significance of ALE, AD₀, INTR and HOLD pins of 8086 (6)
3. a) Explain register, immediate, implied and direct addressing modes of 8086. Give 2 examples in each case. (8)
- b) What are assembler directives? Explain any two data definition directives (6)
- c) Explain the different segment registers in brief. With an example, explain the method by which the 20-bit physical address of an instruction code is determined. (6)

Contd...2

UNIT - II

4. a) With syntax and examples, explain the rotate instructions of 8086. (8)
 b) With syntax and examples, explain the 8086 instructions used for multiplication. (6)
 c) What is DAA instruction? Explain how the DAA instruction works during the addition of packed BCD numbers. (6)
5. a) With syntax and an example each, explain MOV, XCHG, LEA and LDS instructions of 8086. (8)
 b) Explain the instructions REP MOVSB and REPE CMPSB with direction flag cleared. (6)
 c) Explain CBW and CWD instructions with an example for each. (6)

UNIT - III

6. a) What is meant by parameter passing? Explain any two methods of parameter passing to a procedure. (6)
 b) What is a macro? How to define a macro and also explain the method used in calling a macro. (6)
 c) Write an assembly language program to copy a string. (4)
 d) What is the use of global variable? Explain. (4)
7. a) What is a stack pointer? How is the stack handled during the execution of a procedure? (6)
 b) What is a nested macro? Explain with an example. (6)
 c) Write an assembly language program to find the length of a string. (4)
 d) Write the steps used in inter-conversion between ASCII and binary. (4)

UNIT - IV

8. a) What is an interrupt vector? Explain the interrupt vector table with the addresses mentioned for interrupt type 0, 1, 2 and N. (6)
 b) Differentiate between maskable and nonmaskable interrupts in 8086. (6)
 c) Explain INT 3 instruction with an example. (4)
 d) Explain IRET instruction used in 8086. Also explain how it differs from RET instruction. (4)
9. a) With suitable diagrams, explain the interrupt sequence. (6)
 b) Write a note on getinterrupt, int86x and intdos functions. (6)
 c) What is meant by inline assembly language programming? Explain. (4)
 d) What is the significance of PUSH PSW and POP PSW instructions during the execution of the interrupt? (4)

G 505.6b

(2015-2018 Batch)

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B.Sc. Semester VI – Degree Examination

August / September 2021

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)

- Enumerate background and text attributes of the <body> tag.
- Differentiate between WWW and internet
- What are style sheets?
- What happens when you request the web server to execute the PHP script?
- State the output of the following

```
<?php $x="U.P"; $xx="Lucknow"; echo $x. "<br>"; echo $xx. "<br>";  
echo "Capital of $x is " . $xx; ?>
```
- How to interrupt and skip loops?
- Name the functions you would use to
 - Shuffle the contents of an array
 - Combine two arrays into one.
- What is a timestamp?
- What is the difference between an argument and a return value?
- How to disable error reporting?
- What information does a Cookie Header contain?
- What tool is used to change the default password that gives access to the MySQL database server?

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PART –B

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

UNIT - I

- List the different kinds of lists. How can you create these lists?
Explain. (8)
 - Explain any six attributes of the body tag. (6)
 - Write a note on i) Web server ii) Web browser (6)
- Explain how to create different types of style sheets with examples. (8)
 - Name the tag used to display scrolling text. Explain any five attributes. (6)
 - Differentiate between <TR>, <TH> and <TD> tags. (6)

UNIT – II

- With syntax and example explain different categories of IF statement (8)
 - Explain the for loop and for-each loop with syntax and example. (6)
 - Explain how to write and run PHP script with the help of an example. (6)

Contd...2

5. a) i) With a HTML page to Read a string and write PHP script to find
1) the length of the string
2) reverse the string
3) count the no of words
ii) Explain how different data types can be stored in variables with the help of an example. (8)
- b) What are the two ways to define PHP constants? Explain. (6)
- c) Explain how to format strings using string functions. (6)

UNIT - III

6. a) Create a webpage for the user to enter his or her date of birth. Write PHP code to calculate his/her age. (8)
- b) With the help of an example explain how to display tabular data using multidimensional arrays in PHP. (6)
- c) Illustrate how a recursive function works with an example. (6)
7. a) How do you pass arrays to functions? Explain with the help of an example. (8)
- b) Explain with example the date() function with different formatting codes. (6)
- c) Define a function to calculate the area of a triangle by accepting two arguments and explicitly returning a value. (6)

UNIT - IV

8. a) How do you register a session variable? How do you access its value on a different page? Explain with the help of an example. (8)
- b) Write PHP code to retrieve a result set from the table 'artists' containing fields artist_id, artist_name and artist_country, and display the same using tabular format. (6)
- c) Explain six attributes of cookies. (6)
9. a) Explain the benefits of using an Exception model in PHP. Using a custom error handler, illustrate how PHP notices and warnings may be converted to exceptions. (8)
- b) What are the functions of the following SQL statements? Explain with syntax and example: i) INSERT ii) DELETE (6)
- c) Write a note on input sanitization. (6)

(2016 Batch Onwards)

G 506.6a

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St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester VI – Degree Examination
August / September 2021
STATISTICS - Paper VII
SAMPLING THEORY

Time: 3 Hours.

Max Marks: 100

Note: Answer all parts

PART – A

I. Answer any TWELVE of the following:

(2x12=24)

1. Define population and sample.
2. State any two advantages of SRSWOR.
3. Mention any two sources of errors in a sample survey.
4. Define SRSWOR.
5. Under SRSWR prove that $E(\bar{y}) = \bar{Y}$.
6. Prove that SRSWOR is more precise than SRSWR.
7. What is the need of stratification?
8. What is finite population correction?
9. State any two advantages of systematic sampling.
10. Write all possible systematic samples of size four from a population consists of twenty units $Y_1, Y_2, Y_3, \dots, Y_{20}$.
11. What is meant by Neyman's allocation?
12. With usual notation prove that $E(p) = P$.
13. Show that the probability of selecting a specified unit of the population at any given draw is equal to the probability of its being drawn at the first draw.
14. What is cluster sampling? Give practical situation where it is used?
15. Write down the expression for the standard error of $V(\bar{y})_{st}$.

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PART – B

II. Answer any SIX of the following.

(6x6=36)

16. What do you mean by non-sampling errors? Explain briefly the various sources of non – sampling errors.
17. Explain the method of drawing a random sample from a random number table.
18. Show that under SRSWOR $E(s^2) = S^2$
19. Derive an expression for variance of an unbiased estimator of population mean under stratified random sampling.
20. Derive an expression for the variance of the unbiased estimator of the population mean under stratified random sampling with optimum allocation.
21. Prove that in a stratified random sampling $V(\bar{y})_{st}$ with given cost function of the form $C = a + \sum_{i=1}^k C_i n_i$ is minimum if $n_i \propto \frac{N_i S_i}{\sqrt{C_i}}$.

Contd...2

G 506.6a

22. Show that systematic sample mean is an unbiased estimator of population mean. What is the variance of the sample mean?
23. What do you mean by cluster sampling? State its merits and demerits.
24. With usual notations prove that systematic sampling is more efficient than SRS if $S_{wsy}^2 > S^2$

PART - C**III. Answer any FOUR of the following.****(10x4=40)**

25. Explain the principal steps in a sample survey.
26. Obtain an expression for variance of sample mean under SRSWOR.
27. Under certain conditions to be stated with usual notations, show that $V(\bar{Y}_{opt}) \leq V(\bar{Y}_{prop}) \leq (V(\bar{Y}_{SRSWOR}))$.
28. With usual notations, prove that $V(\bar{y}_{sys}) = \frac{N-1}{N}S^2 - \frac{k(n-1)}{N}S_{wsy}^2$. Also compare $V(\bar{Y}_{sys})$ with $V(\bar{Y})_{SRSWOR}$.
29. a. Write a note on principles of sample survey. **(6)**
b. what are the limitation of sample survey. **(4)**
30. a. Prove that when there is a linear trend in the population $V(\bar{y})_{st} \leq V(\bar{y})_{sys} \leq V(\bar{y})_{SRS}$. **(7)**
b. What do you mean by cluster sampling? State its merits and demerits. **(3)**

(2016 Batch Onwards)

G 506.6b

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St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester VI – Degree Examination
August / September 2021
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 definitions of Operations Research.
2. State any two applications of operations research.
3. What are slack and surplus variables?
4. Show that AP is a special case of TP.
5. What is meant by dual of an LPP?
6. State any two advantages of artificial variable.
7. Define a loop.
8. Define pivot.
9. Write down the mathematical model of assignment problem.
10. What do you mean by the term pay off matrix in game theory?
11. What is saddle point?
12. Define pure strategy and mixed strategy in a game theory.
13. What do you mean by inventory control?
14. What do you mean by lead time in inventory problem?
15. Define inventory.

PART – B

II. Answer any SIX of the following. (6x6=36)

16. Briefly explain various Phases of OR.
17. Explain the graphical method of solving an LPP.
18. Write down the dual of the following LPP

$$\text{Max } z = 5x_1 + 12x_2 + 4x_3$$

subject to

$$x_1 + 2x_2 + x_3 \leq 5$$

$$2x_1 - x_2 + 3x_3 \leq 2$$

$$x_1 \geq 0, x_2 \geq 0 \text{ and } x_3 \text{ is unrestricted in sign}$$

19. What do you mean by inventory control? What are the advantages of maintaining inventory in a firm?

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Contd...2

20. Briefly explain duality theory and its application.
21. Explain Charne's Big M method of solving LPP.
22. What is unbalanced transportation problem? How do you modify it to find the optimal solution?
23. Explain shortage cost and holding cost in an inventory theory.
24. How do you find IBFS to a transportation problem using Vogel's Appropriation method?

PART - C

- III. Answer any FOUR of the following.** **(10x4=40)**
25. i) State the simplex algorithm for solving LPP. **(6)**
ii) Briefly explain the nature of OR. **(4)**
 26. i) Show that transportation problem is a special case of LPP. **(5)**
ii) State and prove the necessary and sufficient condition for the existence of a feasible solution in a TP. **(5)**
 27. i) Derive the expression for the EOQ in case of uniform demand, instantaneous production where shortages are not allowed. **(6)**
ii) Derive the criteria for solving a Newspaper boy problem. **(4)**
 28. Briefly explain purchase inventory models with price breaks. Discuss the situation where there are two price breaks.
 29. Explain the graphical method of solving $2 \times n$ game.
 30. i) Explain the algebraic method of solving a zero sum two-person game with no saddle point. **(5)**
ii) Explain the Hungarian method of solving an assignment problem. **(5)**

G 507.6a

(2014 Batch Onwards)

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St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester VI- Degree Examination
August / September 2021
BOTANY – PAPER VII
PLANT PHYSIOLOGY

Max Marks: 100

Time: 3 Hours.

Note: i) Answer all the sections.

ii) Draw diagrams wherever necessary.

SECTION – A

(10X2=20)

I Answer any TEN of the following.

- 1) Write any two significances of osmosis.
- 2) Define water potential. What is the water potential of pure water?
- 3) What is meant by phloem loading and unloading?
- 4) Define field capacity. Mention its significance.
- 5) Write the structure and function of ATPase enzyme.
- 6) Write a note on photolysis of water.
- 7) What are green sulphur bacteria? Give two examples.
- 8) Write the reactions of alcoholic fermentation.
- 9) List any two physiological effects of kinetin in plants.
- 10) Comment on the movement observed in *Desmodium gyrans*.
- 11) Write any two causes of bud dormancy.
- 12) What are short day plants? Give two examples.

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SECTION – B

(6x5=30)

II Answer any SIX of the following.

- 1) Describe how cell acts as an osmotic system?
- 2) Explain the mechanism of passive absorption of water.
- 3) Write a note on aeroponics with its merits and demerits.
- 4) Explain absorption and action spectrum. Why leaves appear green in colour?
- 5) Explain the process of pyruvic acid oxidation to acetyl coA.
- 6) Give an account of photosynthetic pigments in higher plants.
- 7) List any five physiological roles of auxins in plants.
- 8) Explain the physiological and biochemical changes accompanying seed germination.
- 9) Write note on a) Growth measurement by Pfeffers auxanometer.
b) Phytochromes and their importance.

SECTION – C

(5x10=50)

III Answer any FIVE of the following.

- 1) Describe the starch sugar interconversion and proton exchange pump theory of transpiration.

Contd...2

- 2) Explain the roles and deficiency symptoms of any two minor elements in plants.
- 3) Write a note on a) Munch's mass flow hypothesis
b) Any five factors affecting transpiration.
- 4) Describe Calvin cycle. Write a note on its significance.
- 5) Write a note on a) Differences between Oxidative phosphorylation and Photophosphorylation
b) Photorespiration
- 6) Explain a) Respiratory Quotient
b) Net yield of ATP in Krebs cycle.
- 7) Explain the roles played by any two growth inhibitors in plants.
- 8) Write a note on Artificial methods to break seed dormancy.
- 9) Give an account of paratonic curvature growth movements.

(2014 Batch Onwards)

G 507.6b

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**St Aloysius College (Autonomous)
Mangaluru**

B.Sc. Semester VI– Degree Examination

August / September 2021

BOTANY – PAPER VIII

**Molecular Biology II, Biotechnology, Plant Propagation 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 Redifferentiation.
- 2) What is Meristem culture? Mention its significance.
- 3) What are Introns?
- 4) What is somatic gene therapy? Mention its significance.
- 5) Mention the scope of Pharmacognosy.
- 6) What is Phytochemical evaluation of crude drug? Mention its significance.
- 7) Mention any one method of detection of adulterants with an example.
- 8) Name the 5 elements of Siddha system of medicine.
- 9) Which is the site for Citric acid Pathway? How many ATP's are produced at the end of this pathway?
- 10) Give two examples for Resins and Alkaloids.
- 11) What are primary metabolites? Give example.
- 12) Mention any 4 therapeutic uses of Lipids.

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SECTION – B

II Answer any SIX of the following.

(6x5=30)

- 1) What is an Explant? Mention the different types of explants with their method of preparation.
- 2) Write a note on: i) Somaclonal variation
ii) Transgenic plants
- 3) Write a note on monoclonal antibodies.
- 4) Give a brief account of AYUSH.
- 5) Explain the principle and working of Soxhlet.
- 6) What are crude drugs? Explain its types.
- 7) Briefly describe the importance of mevalonic acid pathway.
- 8) Differentiate between i) Primary and secondary metabolites
ii) Phenolics and Flavonoids
- 9) Explain the properties of protein drugs and mention its therapeutic uses.

Contd...2

G 507.6b

SECTION - C

(5x10=50)

III Answer any FIVE of the following.

- 1) Explain the Lac Operon concept of gene regulation in prokaryotes.
- 2) Write a note on
 - i) Sterilization techniques
 - ii) Organogenesis
 - iii) Bioremediation
 - iv) Transposons
- 3) Explain the isolation and *In-vitro* culture of protoplast.
- 4) Explain different types of adulteration.
- 5) Describe the Organoleptic aspects of crude drug evaluation using suitable example.
- 6) Write a note on factors affecting cultivation of medicinal plants.
- 7) Describe the pentose pathway of carbohydrate metabolism? Add a note on its significance.
- 8) Name the enzymes involved in Shikimic acid pathway. Mention the starting material and end product of the pathway.
- 9) Give a brief account of
 - i) Steroids
 - ii) Tannins

(2014 batch onwards)

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St Aloysius College (Autonomous)

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B.Sc. Semester VI – Degree Examination

August / September 2021

ZOOLOGY – Paper VII

IMMUNOLOGY, MEDICAL ZOOLOGY, TOXICOLOGY, ECONOMIC ZOOLOGY

Time: 3 hrs.

Max Marks: 100

- Note: 1. Answer any **TEN** questions from Part A and **ONE** full question from each unit of Part B.
2. Draw diagrams wherever necessary.

PART – A

I. Answer any TEN of the following:

(10x2=20)

- What is genotoxicity? Give an example.
- Name any four subdivisions of toxicology.
- Explain elephantiasis.
- Name any 4 species of honey bees.
- Give the chemical composition of honey.
- What is capture fisheries. Mention the types.
- Name any two fish diseases and the causative organisms.
- What is vermitechology? Mention any two of its uses.
- What is a cocoon?
- What are the essential nutrients to be fed to broilers?
- What is an exotic breed? Give any two examples.
- What are milch breeds? Give any two examples.

PART – B

Select ONE full question from each Unit.

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UNIT - I

- II. a) Explain briefly the structure of Ig G. Enumerate the functions of IgG. **(10)**
b) Give an account of primary lymphoid organs in human. **(5)**
c) Explain the causative factors and mode of transmission of Arthritis. **(5)**

OR

- III. a) Write a note on Vaccines. **(10)**
b) Enumerate differences between T and B lymphocytes. **(5)**
c) Explain the mode of transmission and preventive measures of AIDS. **(5)**

Contd...2

UNIT - II

- IV. a) Explain parasitic helminthic diseases. (10)
 b) Comment on common bacterial diseases. (5)
 c) Give a brief account of mode of infection, transmission pathogenicity and control measures of *Trichomonas*. (5)

OR

- V. a) Give a brief account of life history, mode of infection, transmission pathogenicity and Control measures of *Taenia solium*. (10)
 b) Explain vectors of parasitic diseases. (5)
 c) Comment on common viral diseases. (5)

UNIT - III

- VI. a) Explain the impact of various pesticides pollution on human population. (10)
 b) Describe the techniques used in culturing the pearl. (5)
 c) Give an account of pests of silk worm, diseases and control measures. (5)

OR

- VII a) Give a brief account of different local breeds of cattle, buffaloes and goats. (10)
 b) Write a note on prawn culture. (5)
 c) Explain seed fish production. (5)

UNIT - IV

- VIII. a) Write about different species of honey bees and explain their characteristic features. (10)
 b) With reference to housing management explain intensive method in poultry. (5)
 c) Describe the ecological classification of earthworm. Add a note on vermiwash preparation. (5)

OR

- IX. a) Give a detailed account of different breeds of broilers layers and desi breeds. (10)
 b) Explain the process of preparation of vermicompost. Add a note on life cycle of earthworm. (5)
 c) Explain any two diseases of honey bees. (5)

(2014 batch onwards)

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St Aloysius College (Autonomous)
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B.Sc. Semester VI – Degree Examination

August / September 2021

ZOOLOGY – Paper VIII
ETHOLOGY, EVOLUTION AND PALAEOLOGY

Time: 3 hrs.

Max Marks: 100

- Note: 1. Answer any TEN questions from Part A and ONE full question from each unit of Part B.
2. Draw diagrams wherever necessary.

PART – A

I. Answer any **TEN** of the following:

(10x2=20)

- What is innate behaviour? Name any two types.
- What is communication? Give any example for visual communication.
- Define circadian rhythm. Give an example.
- Explain courtship behaviour in Baya bird.
- What is Polyandry? Give an example.
- What type of parental care is seen in *Tilapia*?
- Write a note on 'survival of the fittest'.
- What is gene flow?
- What is macroevolution? Give an example.
- Define isolation with an example.
- What are vestigial organs? Give two examples.
- Explain any two methods of preservation of fossils.

PART – B

Select **ONE** full question from each Unit.

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UNIT - I

- II. a) What is learnt behaviour? Give an account of different types of learnt behaviour. (10)
- b) Explain social behaviour in ants. (5)
- c) Write a note on antipredatory behaviour. (5)

OR

- III. a) Explain the components of communication. Write a note on its significance. (10)
- b) Write a note on territorial behaviour. (5)
- c) Write a note on i) taxes and ii) reflexes. (5)

Contd...2

UNIT - II

- IV. a) Explain nesting behaviour in birds and parental care in amphibia with suitable examples. (10)
- b) Write a note on reproductive strategies in connection with courtship behaviour. (5)
- c) Write a note on methods of studying bird migration. (5)

OR

- V. a) Explain courtship behaviour in birds. (10)
- b) Write a note on nesting behaviour in wasps. (5)
- c) Write a brief account on anadromous migration. (5)

UNIT - III

- VI. a) What is Hardy-Weinberg law? Explain behaviour of genes in natural population. (10)
- b) Write explanatory note on i) Genetic drift ii) Gene mutation. (5)
- c) Explain briefly the theory of abiogenesis. (5)

OR

- VII a) Give an account of evidences for organic evolution from comparative embryology. (10)
- b) Explain the postulates of Lamarckism with suitable examples. (5)
- c) Explain the evidences from metabolism for origin of life. (5)

UNIT - IV

- VIII a) Discuss the avian and reptilian characters of *Archaeopteryx*. (10)
- b) Give a brief account on evolution of man. (5)
- c) Explain the causative factors for extinction of species. (5)

OR

- IX. a) What is speciation? Explain sympatric and allopatric speciation with suitable examples. (10)
- b) Explain types of fossilization. (5)
- c) With reference to evolution of horse, explain (5)
- i) *Merichyppus* ii) *Equus*.

(2014 Batch Onwards)

G 509.6a

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**St Aloysius College (Autonomous)
Mangaluru**

B.Sc. Semester VI – Degree Examination

August / September 2021

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:** (2x10=20)

- Nonsense codon *
- Primer
- Base analogues
- F-prime cell
- Electroporation
- Shuttle vectors
- BLAST
- Bioterrorism
- Homopolymer tail
- Theta replication
- YAC
- NCBI

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PART – B

Answer 'a' or 'b' and 'c' is compulsory from each unit. (15x4=60)

UNIT -I

2. a) Write in detail on the enzymes involved in replication. (9)

OR

b) Discuss the characteristics of a genetic code.

c) Write on the Watson and Crick model of DNA. (6)

UNIT -II

3. a) Explain the different types of mutation. (9)

OR

b) Define Transformation and Explain its mechanism.

c) Comment on mutation as a tool in molecular genetics. (6)

UNIT -III

4. a) Explain the synthesis of Insulin by genetic engineering. (9)

Contd...2

OR

- b) Explain the Principle and working of Blotting techniques.
- c) Write a note on colony hybridization. (6)

UNIT - IV

- 5. a) Define Bioinformatics. Give a note on the different types of Databases. (9)

OR

- b) Explain the gene distribution in bacteria and archaea.
- c) Write a note on sequence analysis. (6)

PART - C

Answer any FOUR of the following.

(5x4=20)

- 6. a) Types of plasmids.
- b) Transposons.
- c) Conjugation.
- d) Metagenomics.
- e) Sequence Alignment.
- f) GM foods.

(2014 Batch Onwards)

G 509.6b

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**St Aloysius College (Autonomous)
Mangaluru**

**B.Sc. Semester VI – Degree Examination
August / September 2021**

**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:** (2x10=20)

- a_w of any two bacteria.
- Radappertization.
- Quick freezing.
- Taint.
- Aflatoxins.
- Gassy fermentation.
- Baffle.
- Malting.
- Working culture.
- Any four advantages of crude medium.
- SCP.
- RODAC.

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PART – B

Answer 'a' or 'b' and 'c' is compulsory from each unit. (15x4=60)

UNIT -I

2. a) Explain the methods of food preservation by low temperature. (9)

OR

b) What is canning? Describe the canning process.

c) Write a note on principles of food spoilage. (6)

UNIT -II

3. a) Give a detailed account of spoilage of fish. (9)

OR

b) What are the different types of Fruit and vegetable spoilages?

c) Write note on food borne infections. (6)

UNIT -III

4. a) Discuss the types of media used in fermentation industries. (9)

OR

Contd...2

- b) Explain the industrial production of wine.
- c) Write a note on screening and strain improvement for new Products. (6)

UNIT -IV

- 5. a) Give an account of SCP and its production. (9)

OR

- b) Describe industrial production of penicillin.
- c) Write a note on processing of Vinegar. (6)

PART - C

Answer any FOUR of the following.

(5x4=20)

- 6. a) Preservatives.
- b) Botulism.
- c) Milk borne infections.
- d) Methods of food examination.
- e) Bioreactor.
- f) Characters of anti foam agents.

G 510.6a

(2014 Batch onwards)

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**St Aloysius College (Autonomous)
Mangaluru**

**B.Sc. Semester VI – Degree Examination
August / September 2021**

BIOCHEMISTRY – Paper VII

MICROBIOLOGY, IMMUNOLOGY & ENDOCRINOLOGY

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)
- Write any two postulates of Robert Koch
 - Define bacterial growth curve with neat diagram
 - Define epitope with one example
 - What is IgE and write one function
 - Write any two functions of Thyroid hormone
 - What are secondary messengers and give one example
 - What are immunosuppressive agents and give one example
 - What are Helper T-cells? Mention its functions
 - Write any two difference between Innate and adaptive immunity
 - Define autoimmunity and write any two examples for autoimmune disease
 - What is immunogenicity?

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PART – B

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

- Write a short note on contributions of Alexander Fleming and Louis pasteur
- Describe any three types of chemical methods of sterilization
- Write a short note on a) Classification of viruses based on genetic material with examples b) list the factors affecting bacterial growth
- What are adjuvants, explain with example
- Give a short note on application of precipitation and agglutination reactions
- Explain principle and application of any two types of ELISA
- Write a structure of antibody and mention its types
- Comment on lytic cycle of T₄ bacteriophage

PART – C

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

- Give a detailed note on Types of transplants and process of graft rejection
- Describe general properties of stem cells and classification based on their descent and developmental potential

Contd...2

12. Explain hypersensitive-I reaction and add a note on its treatments
13. Explain Cellular and Humoral immunity with reference to T- lymphocytes and B -lymphocytes
14. Describe in detail about the a) differences between Gram negative and Positive bacteria b) Ultra structure of Bacteria
15. Explain in detail about the Pituitary hormones
16. What is the difference between steroid hormone and peptide hormone, explain the mechanism of actions.

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**St Aloysius College (Autonomous)
Mangaluru**

**B.Sc. Semester VI – Degree Examination
August / September 2021**

BIOCHEMISTRY – Paper VIII

CLINICAL AND MEMBRANE BIOCHEMISTRY

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)
- What is Atherosclerosis?
 - Differentiate between Plasma & Serum
 - What is SGOT & how is it useful in Liver Test?
 - Define Osmosis with an example
 - What is Phagocytosis? Give example
 - Write the types of Active transport system
 - Define half-life of radioactivity
 - What are uses of Radioactive elements in Medicine?
 - Define Cancer and carcinogens
 - What is Apoptosis?
 - What are Free Radicals? How are they detected?
 - What is Rad & Rem?

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PART – B

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

- Write a note on diabetes mellitus
- Write a note on Sickle cell anemia
- Explain in short Fluid mosaic model with a neat labeled diagram
- Write a note on mechanism of facilitated diffusion
- Which are the different types of Radioactivity? Write their properties
- Write a note on safety measures in handling Radioactive substances
- Give the characteristics of tumour cells
- Write a note on tumour suppressor gene

PART – C

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

- Write short note on a) Phenylketonuria b) Haemophilia (5+5)
- Explain the normal constituents of blood

Contd...2

12. Explain Na-K pump with a neat labelled diagram
13. Explain in detail scintillation counter
14. Write a note on Ionophores & functions of Plasma membrane
15. Explain GM counter and add a note of detection of Free radicals
16. Explain in detail the mechanism of carcinogenesis

G 511.6a

(2014 Batch Onwards)

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**St Aloysius College (Autonomous)
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**B.Sc. Semester VI – Degree Examination
August / September 2021
BIOTECHNOLOGY – PAPER VII
ENVIRONMENTAL BIOTECHNOLOGY**

Time: 3 Hours

Max. Marks: 100

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

PART - A

1. Answer any **TEN** of the following. (10×2=20)
- Differentiate between gaseous and sedimentary cycles.
 - Name any two infections caused by air borne allergens.
 - Define amensalism.
 - What is ammonification?
 - Give examples for any two protozoan water borne diseases.
 - Name any two microbes involved in leaching process
 - Name the causative agent and symptoms of cholera.
 - Name the monomers of lignin.
 - Differentiate between renewable and non-renewable resources.
 - Give names of any two plants used as biopesticides.
 - Mention two advantages of mycorrhizal association to plant.
 - Name any two plants used to extract biodiesel.

PART – B

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

- Describe any two viral air borne diseases.
- Briefly describe water pollution.
- Explain parasitism with suitable example.
- Mention four reasons responsible for recalcitrant nature of xenobiotic compounds.
- Describe any two types of in-situ bioremediation techniques.
- Explain the two mechanisms of leaching.
- Write short notes on phosphate solubilizing microorganisms.
- Explain the mode of action of viral bio pesticides.
- Describe the tests performed to differentiate between *Agrobacterium* and *Rhizobium*.

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PART – C

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

- Give an account on positive microbial interactions.
- Explain the techniques employed to trap air borne microbes.
- Describe any three methods employed in secondary treatment of waste water.
- Explain qualitative analysis of waste water.
- Explain mode of action of Bt toxin.
- Describe the steps involved in Biogas production.

G 511.6b

(2014 Batch Onwards)

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**St Aloysius College (Autonomous)
Mangaluru**

B.Sc. Semester VI – Degree Examination
August-September-2021

**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.
- Mention the advantages of bioprocess over chemical process.
 - What are colligend and collectors?
 - Mention the range of fermentations.
 - What are biosensors? Give an example.
 - Differentiate between SGOT and SGPT.
 - Name the organism used in the production of citric acid.
 - What are Baffles? Add a note on its significance.
 - Mention the enzymes used in textile industry.
 - Write the microbial flora present in meat and vegetables.
 - What is acidophilus milk?
 - Differentiate between probiotics and prebiotics.
 - Define water activity.

PART - B

(6×5=30)

- Answer any **SIX** of the following.
- Explain gel filtration chromatography.
 - Describe the growth curve of batch culture.
 - Explain various agents used in precipitation.
 - Discuss the industrial production of Vitamin B12.
 - Describe on isolation and strain improvement.
 - Discuss the application of enzymes in therapeutics.
 - Explain the mechanism of botulinum.
 - Discuss the Phosphatase test. Add a note on its significance.
 - Explain nutritional importance of mushrooms.

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PART - C

(5×10=50)

- Answer any **FIVE** of the following.
- Explain the media used for industrial fermentation.
 - Describe the Primary screening for organisms producing important metabolites.
 - Discuss the microbial production of citric acid.
 - Describe the techniques of immobilization.
 - Explain factors affecting food spoilage. Add a note on food preservation.
 - Give an account on Cultivation of mushrooms.

G 110.6a/512.6a

(2016 Batch onwards)

Reg. No.

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**St Aloysius College (Autonomous)
Mangaluru**

**B.A./B.Sc. Semester VI – Degree Examination
August / September 2021**

**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) What is the use of freezing objects?
- b) How to create glowing lens effect?
- c) How to create fire & fog?
- d) What is the difference between loop & ping pong?
- e) Name 3 atmospheric apparatus.
- f) Name any 2 rigid body shape types.
- g) How to copy the biped bone value to other bone?
- h) How to make objects transparent to fix biped?
- i) What is bomb detonation?
- j) How to blur the super spray?
- k) How to animate the ripple effect?
- l) What is the use Mass FX Cloth?

PART - B

Answer any **FOUR** of the following.

(4x5=20)

2. What is displace? Explain with one animation example.
3. How to use Auto Key mode?
4. Write a note on Video Post.
5. Explain 3D flag animation techniques.
6. How to create a lip animation?

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PART - C

Answer any **TWO** of the following:

(2x10=20)

7. Explain physique modifier in character animation.
8. Write a note on static, dynamic & kinematic rigid body.
9. How to create a flower pot cracker?

PART - D

Answer any **TWO** of the following:

(2x20=40)

10. Write a brief note on biped footstep animation.
11. Explain briefly about curve editor & dope sheet.
12. Explain all the forces of space warps.

(2016 Batch onwards)

G 110.6b/512.6b

Reg. No.

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**St Aloysius College (Autonomous)
Mangaluru**

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

August / September 2021

**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) Mention the qualities of a media designer.
- b) What is streaming in swf files?
- c) Define frame by frame animation.
- d) Expand PDF.
- e) What is an armature?
- f) Name any 2 filters and explain.
- g) Which was the first company to adopt Flash Lite technology?
- h) Briefly explain the animate timeline.
- i) Write the script to change the position of the symbol.
- j) Give example for linear media.
- k) Action script is based on which script?
- l) How frame label works in scripting?

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PART - B

Answer any FOUR of the following.

(4x5=20)

2. Write a note on Adobe AIR.
3. Describe the inverse kinematics.
4. What are input and dynamic text? Give example.
5. How to import video to animation project? Explain.
6. What is e learning? Explain

PART - C

Answer any TWO of the following:

(2x10=20)

7. Mention the reasons to use action script.
8. Describe the advantages of Animate CC.
9. What is the role of animation in advertisement industry?

PART - D

Answer any TWO of the following:

(2x20=40)

10. Explain the creation method and code of a quiz program
11. How to make a photo gallery using Action Script? Write in detail
12. Explain the below;
 - i) Doodle Animation
 - ii) Flash Websites

(2016 Batch Onwards)

Reg. No. :

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G 513.6a

**St Aloysius College (Autonomous)
Mangaluru**

B.Sc. - SEMESTER VI - Degree Examination

August / September 2021

ECONOMICS - PAPER VII

INDIAN ECONOMICS

Time: 3 hrs.

Max Marks: 100

PART - A

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

1. Write a note on occupational structure in India.
2. Write a note on poverty line.
3. Write a note on public distribution system.
4. Write a note on disinvestment.
5. Write a note on power sector reforms in India.
6. Write a note on inclusive growth.

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PART - B

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

7. Explain the features of Indian economy.
8. Explain the role of self-help groups in women empowerment.
9. Explain the institutional sources of agricultural credit.
10. Explain the features of Industrial Policy of 1991.
11. Explain the recent changes in banking services in India.
12. Explain the reforms in the education sector in India.

PART - C

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

13. Explain the causes for population growth in India. What are the effects of population growth on Indian economy?
14. Explain poverty alleviation and employment creation programmes in India.
15. Explain the impact of globalization on Indian agriculture.
16. Explain the achievements and failures of economic planning in India.

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St Aloysius College (Autonomous)
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B.Sc. - SEMESTER VI - Degree Examination
August / September 2021

ECONOMICS - PAPER VIII
ECONOMETRICS

Max Marks: 100

Time: 3 hrs.

PART - A

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

1. Prove that $\bar{Y} = \bar{\hat{Y}}$.
2. Prove that Var of $\mu_i = \sigma^2$.
3. Estimate the normal equations for the regression function $\hat{Y} = \hat{\beta}_0 + \hat{\beta}_1 X_1 + \hat{\beta}_2 X_2$
4. Write a note on Dummy Variable.
5. Write a note on partial chow test.
6. Write a note on simultaneous equation model.

PART - B

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

7. Prove that $\hat{\beta}_1 \sim N[0, Var(\hat{\beta}_1)]$
8. Briefly explain classical linear regression model.

9.

Y	X	\hat{Y}_i
40	100	42.33
50	200	48.22
50	300	54.11
70	400	60
65	500	65.89
65	600	71.78
80	700	77.67

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- a) Find out R , $E(R)$ and σ_R
 - b) Find out Z value and 95% confidence interval for R .
10. Briefly explain autoregression and distributed lag models.
 11. Briefly explain the consequences of Multicollinearity in the Regression Model.
 12. Explain indirect least square method.

PART - C

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

13. Prove that $(\hat{\beta}_2) = \frac{\sum W_i (\sum W_i X_i Y_i) - (\sum W_i X_i)(\sum W_i Y_i)}{(\sum W_i)(\sum W_i X_i^2) - (\sum W_i X_i)^2}$

14. Prove that

$$u_t = \sum_{r=0}^{\infty} P^r V_{t-r}$$

$$\sum (u_t) = 0$$

$$\text{Var}(u_t) = \sigma_v^2 \frac{1}{1-P^2} \text{ and } \text{Cov}(u_t u_{t-1}) = P\sigma_u^2$$

15.

Output	1	2	3	4	5	6
Total Cost	125	140	150	160	180	210

a) Estimate cost function.

b) Find out 't' values with 5% significance and test $H_0: \beta_1 = 0$ and $H_0: \beta_2 = 0$.

c) Find out R^2 and Adjusted R^2 .

16. Explain Kyock's dynamic econometric model.
