(2014 Batch Onwards)

G 501.6a

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

St Aloysius College (Autonomous)

Mangaluru

B.Sc. Semester VI– Degree Examination

July/August - 2022

PHYSICS – PAPER VII

NUCLEAR PHYSICS AND ANALOG ELECTRONICS

Time: 3 hrs. **Max Marks: 100**

SECTION – A

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

a) Give the empirical relation between range and velocity of an alpha particle.

b) What are mirror nuclei? Give one example

c) What is K-electron capture? Give one example

d) What are pair production and pair anhilation?

e) What is the structure of a neutron according to quark model?

f) What is a magnetic bottle? Where it is used?

g) What are fissile and fertile materials?

h) Why quenching agents are introduced into GM tube?

i) What is a small signal amplifier?

j) Write any two characteristics of an ideal Op-Amp

k) Draw the circuit diagram of adder using Op-Amp.

l) Define positive feedback. Where is it used?

SECTION - B

Answer <u>TWO</u> full questions from each unit:

UNIT – I

2.a) Which are the paradoxes of β-ray spectra? Explain how these paradoxes are accounted using Pauli's neutrino hypothesis. **(6)**

b) Obtain an expression for the alpha particle disintegration energy. **(4)**

3.a) Describe with theory Dempster's mass spectrograph. Explain how isotopic abundances can be determined using the mass spectrograph. **(6)**

b) Write the similarities between a liquid drop and a nucleus. **(4)**

4.a) Explain the variation of cosmic ray intensity with i) Latitude ii) East-West direction. **(6)**

b) Explain the classification of fundamental particles with respect to mass. **(4)**

UNIT – II

5.a) Explain the various types of nuclear reactions. **(6)**

b) Write a short note on fast breeder reactors. **(4)**

6.a) Obtain the four factor formula for thermal reactors and discuss the condition for criticality. **(6)**

b) Mention the basic properties of neutron. **(4)**

Contd.... 2

7.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 construction and working of a GM detector. **(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) Explain the need of a buffer amplifier. How it is realized using an Op-Amp. **(4)**

9.a) Derive expression for current gain, voltage gain, input resistance and output resistance of a CE amplifier using h-parameter model of a transistor. **(6)**

b) Draw the circuit of Op-Amp subtractor and obtain the expression for its output. **(4)**

10.a) Explain the theory of lead lag network. Draw the circuit of Wein-bridge oscillator using Op-Amp and explain its working. **(6)**

b) What is a non-inverting amplifier? Obtain the expression for the voltage gain of an inverting amplifier. **(4)**

SECTION – C

Answer any <u>FOUR</u> of the following: **(4×5=20)**

11. The isotopes of U^{238} and U^{235} occur in nature in the ratio 140:1. Assuming that at the time of earth's formation, they were present in equal ratio, make an estimation of the age of earth. Half life of U^{238} and U^{235} are 4.5×10^9 years and 7.13×10^8 years respectively.

12. A beam of alpha particles of energy 4 MeV is incident normally on the gold foil. The number of alpha particles striking per unit area of the screen at an angle 10^0 is 50000. Calculate the number of alpha particles striking unit area of the screen at an angle 20°.

13. What is the power output of a ${}^{235}_{92}U$ reactor working at 25% efficiency if it takes 30days to use up 8kg of fuel? Each fission of ${}^{235}_{92}U$ produces 200 MeV of energy.

14. A Betatron working on an operating frequency of 60Hz has a stable orbit of diameter 1.6m. Find the energy of the electron gained per turn and also the final energy if the magnetic field at the orbit is 0.32T.

15. For the subtractor circuit using an Op-Amp, input voltages are V_1=5V and V_2=2V, R_1=10K, R_2=20K and R_f =47K respectively. Calculate the output voltage.

16. For the inverting amplifier if the input voltages are 2V, 4V and 6V and the corresponding resistances are 2kΩ, 4kΩ and 6kΩ respectively and the feedback resistor is 3kΩ. Calculate the output Voltage.

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G 501.6b

(2014 Batch Onwards)

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St Aloysius College (Autonomous)

Mangaluru

B.Sc. Semester VI– Degree Examination

February - 2022

PHYSICS- PAPER VIII

COMMUNICATION AND DIGITAL ELECTRONICS, SPECIAL PROPERTIES OF MATERIALS

Time: 3 hrs. **Max Marks: 100**

SECTION – A

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

a) Draw the wave forms representing carrier wave, modulating signal and amplitude modulated wave.

b) Calculate the total power of an AM wave in terms of power of the carrier wave for unit modulation index.

c) Mention any two limitations of AM.

d) What are the uses of CRO?

e) State De Morgan's first theorem and give its representation when two variables are involved.

f) Give the Boolean expression for the NOT operation and its symbol.

g) Give the truth table for a two input NOR gate.

h) What is a counter? How may flipflops are needed for a 3bit ripple counter.

i) What is a superconductor? Define critical temperature for a super conductor.

j) What are critical current & critical field in a super Conductor?

k) What are Cooper Pairs?

l) What are two-dimensional nano-materials? Give an example.

SECTION B

Answer <u>TWO</u> full questions from each unit:

UNIT – I

2.a) Explain the working of a cathode ray tube. **(6)**

b) Define modulation index. Obtain a relation for the same interms of V_{max} and V_{min}. **(4)**

3.a) What is amplitude modulation? Derive an expression for the instantaneous voltage of an amplitude modulated wave. **(6)**

b) Explain 'Progressive Scanning' Technique. **(4)**

4.a) Describe FM radio transmitter with a block diagram **(6)**

b) Give a comparison between AM and FM. **(4)**

Contd....2

UNIT – II

5.a) What is a full adder? Explain its truth table, Boolean equation and logic diagram. **(6)**

b) Explain working of AND gate using diodes. **(4)**

6.a) Explain the working of a clocked RS flip-flop with truth table. **(6)**

b) State and prove De-Morgan's second theorem. Give the figures using logic gate which represent the theorem. **(4)**

7.a) With a circuit, show how a XOR gate can be constructed using a combination of NOT, AND and OR gates. Also realise XOR gate using NAND gates. **(6)**

b) Explain the working of a Decade Counter. **(4)**

UNIT – III

8.a) Explain the characteristics properties of super conductors. **(6)**

b) Explain briefly the construction and properties of carbon nano-tubes. **(4)**

9.a) Distinguish between linear and nonlinear media. **(6)**

b) Explain Meissner effect in super conductivity. **(4)**

10.a) Explain the difference between type I and type II super conductors. **(6)**

b) Explain the properties of nano-materials. **(4)**

SECTION – C

Answer any <u>FOUR</u> of the following: **(4×5=20)**

11. The expression for an AM wave is $V=5(1+0.6\cos 6280t)\times \sin 211\times 10^4 t$.
    (i) What are the minimum and maximum amplitudes of the AM wave?
    (ii) What frequency components are contained in the modulated wave and what is the amplitude of each component?
12. An AM broadcast radio transmitter radiates radio waves at 20KW at modulation index 75%. Calculate the power of the carrier wave.
13. Calculate the modulation factor for AM wave, if the maximum peak-to-peak voltage is 16mV and the minimum peak-to-peak voltage is 4mV. Using this value, determine the total power of AM wave, if the power of carrier wave is 5KW.
14. Simplify $Y = \bar{A}B\bar{C} + AB\bar{C} + ABC$
15. Simplify the following Boolean equation and draw the logic diagram to realize it. $Y = AB\overline{CD} + \bar{A}B\overline{CD} + B\overline{CD}$
16. The transition temperature of mercury with average atomic mass of 200.59amu is 4.153K. Determine the transition temperature of one of the isotopes $_{80}Hg^{204}$.

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St Aloysius College (Autonomous)
Mangaluru
B.Sc.- SEMESTER VI– Degree Examination
July/August - 2022
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. Give its expression.
   b) Homonuclear diatomic molecules are IR inactive but Raman active. Why?
   c) Why anti stokes lines are less intensive than stokes lines?
   d) Write expression for Gibbs phase rule. Explain the different terms.
   e) Explain inert complex with an example.
   f) What is Ziegler Natta catalyst?
   g) What are simple organometallic compounds? Give an example.
   h) How is $Co_2(CO)_8$ prepared?
   i) What are active methylene compounds? Give an example.
   j) Define stereogenic center.
   k) Write the absolute configuration of Glyceraldehyde.
   l) What are Threo and Erythro compounds?

PART - B

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

2. (i) Explain bathochromic shift with an example.
   (ii) Give any three differences between Raman and IR spectroscopy.
   (iii) Explain the formation of stokes and antistokes lines in Raman spectra.
   (iv) Explain the application of phase rule to one component system by taking water as an example.
   (v) Write a note on IR spectra of mononuclear metal carbonyls.
   (vi) Explain trans effect.
   (vii) Write any two methods of preparation of organomercury compounds.
   (viii) What are π acceptor or π acid ligands? Give an example.
   (ix) Write a note on chair conformation of cyclohexane.
   (x) How do you determine the configuration of oximes from dipole moment measurements?
   (xi) Give the synthesis of α,β unsaturated acid from ethyl acetoacetate.
   (xii) Explain the different optical isomers of Lactic acid.

Contd...2

PART - C

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

3. Describe the vibrational energy levels of simple harmonic oscillator.
4. Describe the instrumentation of Raman spectrometer with a neat labelled sketch.
5. Derive an expression for the Gibbs phase rule.
6. Explain the application of phase rule of two component system for Pb-Ag system.
7. What are stepwise and overall stability constants? Derive a relation between stepwise and overall stability constants.
8. Give any one method for the preparation of methyl lithium. Describe the structure of methyl lithium.
9. Describe the substitution reactions of square planar complexes.
10. Explain the preparation and structure of Nickel tetracarbonyl.
11. How do you determine the configuration of ketoximes by Beckmann's rearrangement?
12. Define resolution. Explain the different methods used for the resolution of racemic mixture.
13. Write the different conformational isomers of 1,2 Dichloroethane. Mention the relative stability of the conformers.
14. Explain the mechanism of Keto-enol tautomerism of ethyl acetoacetate.

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St Aloysius College (Autonomous)

Mangaluru

B.Sc.- Semester VI – Degree Examination

July/August - 2022

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) Give Debye- Huckel- Onsagar equation.
   b) Define transport number.
   c) Give the expression for cell emf of a concentration cell.
   d) Define molar conductance. How is it related to conductivity?
   e) What is Biochemical Oxygen Demand?
   f) What are particulates? Give an example.
   g) What is annealing of glass?
   h) Define flash point of a fuel.
   i) Give the number of ^1H NMR signals obtained for ethanol and ethyl acetate.
   j) What is spin-spin splitting?
   k) State isoprene rule.
   l) Write the structural formulae of menthol and camphor.

PART - B

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

2. (i) Describe the moving boundary method of determining transport number of an ion.
   (ii) The conductivity of saturated solution of $BaSO_4$ is 3.06×10^{-6} ohm^{-1} cm^{-1} and its molar conductance is 1.53 ohm^{-1} cm^2 mol^{-1}. Calculate the solubility product of $BaSO_4$.
   (iii) Explain electrophoretic effect.
   (iv) Give the principle of conductometric titration of weak acid against weak base.
   (v) Write a note on radioactive waste.
   (vi) How is natural gas obtained? Give its composition.
   (vii) Explain one method of preparing RDX.
   (viii) Give any 6 principles of green chemistry.
   (ix) Give the proton NMR spectra with values of chemical shift and interpret the spectra in terms of position and splitting of peaks of ethyl bromide.
   (x) Explain the different types of coupling constant.

Contd...2

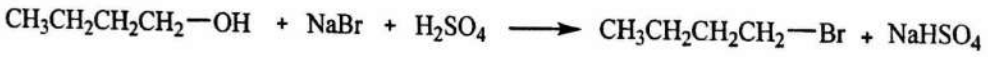
(xi) How are alkaloids extracted from plants?

(xii) Give the preparation of malachite green.

PART - C

Answer any <u>TEN</u> of the following questions. **(5×10=50)**

3. Explain the determination of solubility product of sparingly soluble salt by conductometric method.
4. Explain the conductometric determination of mixture of weak and strong acids against strong base.
5. What is quinhydrone electrode? How the pH of a solution determined using quinhydrone electrode?
6. Explain how solubility product of a sparingly soluble salt is determined using concentration cell.
7. What are water pollutants? Explain any 4 major water pollutants.
8. With a neat diagram, explain the manufacture of producer gas.
9. Discuss the classification of secondary explosives giving suitable examples.
10. What is atom economy? Calculate the atom economy for the synthesis of 1-bromobutane shown below:



11. Explain the instrumentation of NMR spectroscopy.
12. Describe the Witt's theory of colour and constitution.
13. Explain the preparation of alizarin.
14. Give the structural elucidation of nicotine.

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(2014 batch onwards)

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St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester VI – Degree Examination
July/August - 2022
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: **(10×2 ½ = 25)**

1. Check if $(2x + y^2 + 2xz)dx + 2xydy + x^2dz = 0$ is integrable.
2. Solve $y^2dx - zdy + ydz = 0$
3. Solve: $\frac{xdx}{y^2z} = \frac{dy}{x^2z} = \frac{dz}{y^3}$
4. If $f(x) = sinhx$ is defined in $-\pi < x < \pi$, find a_0 and a_n.
5. State the Dirichlet condition for the existence of Fourier expansion.
6. Obtain the half range sine series for unity in $(0, \pi)$.
7. If $\{v_1, v_2, \ldots, v_n\}$ is an orthonormal set, then prove that $v_1, v_2, \ldots, v_n$ are linearly independent.
8. Define a Vector space over the field F.
9. Prove that (1, 0, 1), (1, 1, 1) and (0, 0, 1) are linearly independent.
10. Prove that sum of two linear transformation is a linear transformation.
11. Prove that image of a linear transformation is a subspace.
12. Define row rank of a $m \times n$ matrix.
13. Define Characteristic roots of a linear transformation.

14. Find row rank of a matrix $A = \begin{bmatrix} 6 & -2 & 18 \\ -4 & 1 & 11 \\ -5 & 2 & 16 \end{bmatrix}$.
15. Define minimum polynomial of a matrix $A \in Mn(F)$.

PART- B

UNIT - I

Answer any THREE of the following: **(3x5 = 15)**

1. If the total differential equation $Pdx + Qdy + Rdz = 0$ is integrable, show that $P(Q_z - R_y) + Q(R_x - P_z) + R(P_y - Q_x) = 0$.
2. Solve: $cos\,x\,(sin\,y + sin\,z)\,dx + cos\,y\,(sin\,z + sin\,x)\,dy + cos\,z\,(sin\,x + sin\,y)\,dz = 0$
3. Solve: $(2xz - yz)\,dx + (2yz - zx)\,dy + (x^2 - xy + y^2)\,dz = 0$.
4. Solve: $z^2\,dx + (z^2 - 2yz)\,dy + (2y^2 - yz - xz)\,dz = 0$.
5. Solve the simultaneous equations: $\frac{dx}{z(x+y)} = \frac{dy}{z(x-y)} = \frac{dz}{x^2+y^2}$.

Contd...2

UNIT- V

Answer any THREE from the following: **(3× 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. State and Prove Cayley – Hamilton Theorem.
3. Let $A \epsilon\ M_n(F)$ with $q(x) = a_0 + a_1 x + \cdots + x^m$ as the minimum polynomial of A. Prove that A is non-singular if and only if $a_0 \neq 0$.
4. Show that system of equations

   $x_1 - 2x_2 + x_3 = ½$

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

   $x_1 + x_2 + x_3 = 1$, has no solutions.
5. Prove that similar matrices have the same minimum polynomial.

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(2007 batch onwards)

G 503.6b(ii)

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St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester VI – Degree Examination
July/August - 2022
MATHEMATICS -Paper VIII
Numerical Methods

Time: 3 Hours **Max Marks: 100**

Note: Answer all parts.

PART A

I. Answer any TEN of the following. **(10x2½=25)**

1. Obtain a formula for the error in quotient of two numbers.
2. Find relative, absolute and percentage error in taking 1/3 as 0.333.
3. Find the interval of unit length in which the equation $x^3 - 2x - 5 = 0$ has a root.
4. What are the advantages of Lagrange's interpolation formula over Newton's interpolation formula?
5. If $u_o = 3, u_1 = 12, u_2 = 81, u_3 = 2000, u_4 = 100$, find $\Delta^4 u_0$.
6. Write the formula for the divided difference $[x_0, x_1, x_2, x_3]$.
7. Write a formula for $\frac{dy}{dx}$ at $x = x_0$ using Newton's forward differences.
8. Find the rank of the matrix $\begin{bmatrix} 1 & 2 & 3 \\ 1 & 4 & 2 \\ 2 & 6 & 5 \end{bmatrix}$.

9. Show that $A = \begin{bmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{bmatrix}$ is orthogonal.
10. Find for what value of λ the equation $2x + 3y + 5z = 9$, $7x + 3y - 2z = 8, 2x + 3y + \lambda z = \mu$ have no solution.
11. Write forward difference table for the data.

x	0	1	2	3	4
y	1	2	9	28	65

12. Evaluate $\int_0^1 x^3\, dx$ with $h = 0.5$ using trapezoidal rule.
13. Solve $y' = x + y, y(0) = 1$ by Taylor series method.
14. Using Picard's method obtain the first approximation for the solution of differential equation
    $\frac{dy}{dx} = x + y, y(0) = 2.$
15. Write Adams – Moulton Predictor formula.

Contd...2

PART – B

UNIT - I

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

1. Explain the method of bisection to find a real root of the equation $f(x) = 0$.
2. Using the method of iteration, find the root of the equation $xe^x - 1 = 0$ between 0 and 1 correct to 3 decimal places.
3. Find a real root of the equation $x \log_{10} x = 1.2$ correct to 2 decimals using the method of false position.
4. Find the root of the equation $cosx = 3x - 1$ correct to 3 decimals by the method of iteration.
5. Find a real root of the equation $x^3 - 3x + 1 = 0$ using Newton Raphson method.

UNIT - II

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

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

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

3. From the following table, find the member of students who obtained less than 45 marks.

Marks	30-40	40-50	50-60	60-70	70-80
No. of students	31	42	51	35	31

4. Given the table of values

x	150	152	154	156
$y = \sqrt{x}$	12.247	12.329	12.410	12.490

Evaluate $\sqrt{155}$ using Lagrange's interpolation formula.

5. Resolve $\frac{x^2+x-3}{x^3-2x^2-x+2}$ into partial fractions.

UNIT - III

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

1. Derive Newtons general interpolation formula with divided differences.
2. Evaluate $\int_0^6 \frac{dx}{1+x^2}$ with $n = 6$ using trapezoidal rule.
3. 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.

Contd...3

4. 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

5. The velocity of a car running on a straight road at intervals of 2 minutes, are given below. Apply Simpson's rule to find the distance covered by the car.

Time in minutes	0	2	4	6	8	10	12
Velocity in Km/hr	0	22	30	27	18	7	0

UNIT - IV

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

1. Solve the system of equations:
   $x + 4y - z = -5,\ x + y - 6z = -12, 3x - y - z = 4$ by Gauss Elimination method.
2. Describe Jacobi's method to solve a system of equations.
3. Solve the system of equations:
   $20x + y - 2z = 17, 3x + 20y - z = -18, 2x - 3y + 20z = -25$ by Gauss Seidal method. Carryout 2 iterations.
4. Examine the consistency of the system of equations:
   $x - 4y + 5z = 8, \quad 3x + 7y - z = 3, \quad x + 15y - 11z = -14$
5. Solve the sytems of equations
   $10x_1 - 2x_2 - x_3 - x_4 = 3,\ -2x_1 + 10x_2 - x_3 - x_4 = 15,$
   $-x_1 - x_2 + 10x_3 - 2x_4 = 27,\ -x_1 - x_2 - 2x_3 + 10x_4 = -9$
   by Jacobi's method. Carry out 2 iteration.

UNIT - V

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

1. Find $y\ (0.1)$, using Taylor series method for the differential equation $\frac{dy}{dx} = x - y^2, y\ (0) = 1.$
2. Derive Adams-Moulton corrector formula.
3. Using Adams-Bash forth predictor formula, evaluate $y(0.4)$ for the differential equation $\frac{dy}{dx} = \frac{1}{2}xy, y(0) = 1$ with starting values $y(0.1) = 1.0025, y(0.2) = 1.0101, y(0.3) = 1.0228.$
4. 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.
5. Using Picard's method, solve $y' = x + y^2\ ; y(0) = 1.$

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(2014 batch onwards)

Reg. No: | | | | | | |

St. Aloysius College (Autonomous)

Mangaluru

B.Sc. Semester VI – Degree Examination

July/August - 2022

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. A raindrop beginning at rest falls from a cloud 1024 feet high. How long does it take to reach the ground? What is the velocity when it strikes the ground?
2. State velocity square law.
3. What manufacturing progress function $T = T_1 x^{\alpha}$ describes the table of values given below

Unit No. (x)	1	2	4	8
Hours of labour	32,000	25,600	20,480	16,384

4. Find the median waiting time for any fixed p.
5. Determine the optimal order size, if 40 items are sold per day with carrying cost 0.10$ and ordering cost 100$.
6. Suppose a measuring process is applied to an object has probability density function

$$y = \begin{cases} \frac{1}{10} & \text{if } 5 \le x \le 15 \\ 0 & \text{for all other .} \end{cases}$$

What is the probability of getting a measurement between 5 and 8?

7. Define the terms accuracy and fruitfulness of a mathematical model.
8. Define multiple correlation coefficient.
9. Draw the curves representing $P(t) = r^t P(0)$.
10. Write down the algorithm of pivot transformation.
11. Define Basic feasible solution.
12. Find the sensitivity of Eratosthenes model.
13. State the travelling salesman problem.
14. Find the first two terms of solution of $x(t+1) - x(t) = [x(t)]^2 - 2t^3, x(0) = 0$.
15. 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	

Contd....2

PART – B

UNIT - I

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

1. Explain the steps in building a mathematical model.
2. Explain the building of a model for manufacturing progress curve with suitable example.
3. Prove that raindrops are too close to earth to change their acceleration as they fall.
4. Using inverse square law model, find an expression for escape velocity.
5. Derive the expression $P(t) = r^t P(0)$ for a population growth model.

UNIT - II

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

1. Construct the Leslie model for population growth.
2. Suppose 20 balls are sold per day having carrying cost \$0.05 and ordering cost \$100. Find the optimal order size and total cost if ordering size is 50.
3. Explain the family planning model.
4. Construct the controlled source seismology model and describe the various 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.

UNIT - III

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

1. If a straight line $y = m(x - \bar{x}) + c$ is a best fit for the data $(x_1, y_1), (x_2, y_2), \ldots, (x_n, y_n)$ then find the expression for m and c.
2. Construct the College Enrollment model.
3. As one digs into earth, the temperature varies as given below. Find an expression for regression line.

Meters below the surface (x)	28	68	178	248	298
Degrees above base point (y)	0	1.2	4.7	9.3	10.5

4. Find R^2 for the regression equation $y = 0.4x - 1.4$ for the following table.

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

5. The following data is concerned with growth of a plant. Fit a least square line and use it to predict the height at 7 months and at 9 years.

Months after grafting (g)	1	2	3	4	5	6
Height in inches (h)	0.8	2.4	4.0	5.1	7.3	9.4

Contd...3

UNIT - IV

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

1. Explain Aristarchus model to find ratio of the distances.
2. Using Malthus model explain how an imprecise model can be valuable.
3. The power P supplied by a factory depends on resistance x in the circuit according to the formula $P = x\left(\frac{10}{100+x}\right)^2$. If x can be any positive number, how should we choose it to get maximum power.
4. Maximize $P = 5x + 2y$ subject to $x, y \geq 0$, $x + 3y \leq 14$ and $2x + y \leq 8$ using graphical method.
5. Solve by simplex method: Maximize $P = 5x_1 + 6x_2$ subject to $x_1, x_2 \geq 0$, $2x_1 + 4x_2 \leq 24$ and $6x_1 + 3x_2 \leq 30$.

UNIT – V

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

1. Solve the transportation table.

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

2. Explain the algorithm for construction of Euler's circuit.
3. Find the first five terms of the solution to the difference equation $x(t+1) - x(t) = [x(t)]^2 + t,\ x(0) = 1$.
4. State the rules for stepping stone method.
5. Find the improvement index for each unused square.

1 ○	2	5 ○
2	3 ○	5 ○
3 ○	4	1
5 ○	1	2

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(2014 Batch onwards)

G 503.6b (vi)

Reg. No: | | | | | | |

St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester VI – Degree Examination
July/August - 2022
MATHEMATICS – Paper VIII
Distribution Theory

Time: 3 Hours **Max. Marks: 100**

Note: Answer all parts

PART – A

Answer any TEN of the following: **(10×2½ = 25)**

1. Define a continuous random variable stating two examples.
2. State two conditions required for a probability function to be called as probability density function.
3. Show that $V(aX - b) = a^2V(X)$
4. Suppose X is a Binomial Variate with parameters $\left(7, \frac{1}{2}\right)$. What is $P(X \leq 1)$?
5. If X is a Poisson variate with parameter $\lambda = 9$, find the mode of the distribution.
6. If $E(X) = 144; V(X) = 19$, find $E(X^2)$.

7. If X has a uniform distribution over the range $(10, 20)$, find the mean and variance.
8. Suppose X is a Beta two variate with parameters (m, n) then give the expressions for its mean and variance.
9. Define Geometric Distribution. State the situation in which it can be applied.
10. Normal distribution is a symmetric distribution. Justify
11. For a normal distribution mean = 8, variance = 16. Find quartile deviation and mean deviation from mean.
12. When do you say (X, Y) follows Bivariate Normal distribution?
13. Distinguish between convergence in probability and convergence in distribution?
14. State Markov's inequality and explain its application
15. Verify whether the following is a bivariate distribution

$$f(x) = \begin{cases} \frac{x^2y^2}{8} & 0 \leq x \leq 1, \quad 0 \leq y \leq 1 \\ 0 & otherwise \end{cases}$$

Contd...2

PART – B

UNIT - I

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

1. A continuous random variable X has the following distribution function.

$$F(x) = \begin{cases} 0 & if\ 0 \le x \le 2 \\ k(x-1)^4 & if\ 2 \le x \le 4 \\ 1 & if \quad x > 4 \end{cases}$$

Find the p.d.f. of the distribution and hence find the constant k.

2. Define Mathematical Expectation. State and prove addition theorem of expectation.

3. The joint distribution of X and Y is as follows

X \ Y	0	1	2
0	$1/18$	$1/9$	$1/6$
1	$1/9$	$1/18$	$1/9$
2	$1/6$	$1/6$	$1/18$

Find the Mean and Variances of the variables X and Y.

4. Find $r(X,Y)$ for the two dimensional random variable having the following *p.m.f*:

$$p(x,y) = \begin{cases} \frac{x+y}{21}, & x = 1,2,3 \ \ y = 1,2 \\ 0 & otherwise. \end{cases}$$

UNIT - II

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

1. Derive mode of Binomial distribution with parameters n and p.
2. Obtain an MGF of Poisson distribution and hence find its mean and variance.
3. State and prove memoryless property of Geometric Distribution.
4. a) In a specific geographic area, about 65% of the population is in favour of capital punishment. A jury of 12 members has been selected for a particular murder trial and the prosecution has presented a strong case. Assuming that the jury has been selected randomly, find the probability that
   i) None of the members support the capital punishment
   ii) At the most 3 support the capital punishment **(3)**

   b) The probability that a child exposed to a contagious disease will catch it is 0.8. Find the probability that the 10th child exposed to the disease will be the 6th to catch it.

(4 ½)

Contd....3

UNIT - III

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

1. Find the mean and variance of Gamma distribution with single parameter.
2. Obtain an expression for median for a normal variable with parameters μ and σ^2.
3. a)5000 students appeared for an examination. The mean marks were 49 and the S.D of marks was 6. Assuming the marks to be Normally distributed what proportion of students scored more than 55 marks? If in the same examination Grade 'A' is to be given to the students scoring more than 70 marks. What proportion of students will receive the grade 'A'? **(4)**
   b)Derive variance of a Beta Variate of first kind with parameter (m, n) **(3 ½)**
4. In a Normal distribution 31% of the items are below 45 and 8% are over 64. Find the mean and Standard Deviation of the distribution

UNIT - IV

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

1. Suppose (X, Y) is a two dimensional continuous random variable following a Bivariate Normal Distribution, find the marginal distribution of X.
2. Let X and Y have BND with $\mu_X = 4, \mu_Y = 9, {\sigma_X}^2 = 4$ and ${\sigma_Y}^2 = 9$ and ρ=0.
   Find i) $P[(X+Y) \leq 14]$ ii) $P[(X+Y) > 8]$ iii) $P[(2X+Y) \leq 8]$
3. If (X, Y) has a BND obtain the conditional distribution of Y given $X = x$.
4. Deduce MGF of Bivariate Normal random variable and hence obtain mean and variance.

UNIT - V

Answer any TWO of the following: **(2 x 7½ = 15)**

1. State and prove De-Moivre's Laplace Central Limit Theorem.
2. $\{X_n\}$ is a sequence of independent random variables with $P\left(X_k = \pm k^{1/4}\right) = 1/2$. Examine whether WLLN holds for the sequence $\{X_n\}$.
3. a) State convergence in probability. Prove that if X_n and Y_n converge to X and Y in probability, then $X_n + Y_n$ converges to $X + Y$. **(6)**
   b) State Central Limit Theorem. **(1½)**

4. a) a) Life time of a certain brand of an electric bulb may be considered as a random variable with mean 1200 hours and SD 140 hours using central Limit theorem, find the probability that the average life of 50 electronic components
   i) Exceed 1000 hours ii) Between 1,200 and 1,400 hours. **(4)**
   b) An unbiased coin is tossed 100 times. Using central limit theorem, find the probability that number of heads is
   i) Between 20 and 40 ii) more than 65. **(3 ½)**

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(2015 Batch onwards)

G 504.6a

Reg. No. | | | | | | |

St Aloysius College (Autonomous)
Mangaluru

B.Sc. Semester VI – Degree Examination

July/August - 2022

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) In a Pseudo inverter, the Gate terminal of PMOS transistor is Connected to _____
a)+5V b) -5V c) 0V d) source

ii) _____ transducer requires energy to be put in to it inorder to translate changes due to measurand
a) Active b) Passive c) Pressure d) Local

iii) What causes the Piezoelectric effect?
(a)Heat or dissimilar metals (b) Pressure on a crystal
(c)amount of exposure (d) film-screen contact

iv) _____architecture is used to design VLSI
a) System on chip b) system on a circuit
c)system on a device d) single open circuit

v) VLSI technology uses ---------- to form IC
Diodes b) resistors c) buffers d) transistors

vi) CLB is acronym for ___ _
a) configurable logic block b) configurable logic buffer
c) critical logic block d) critical logic buffer

vii) The maximum mobility of electrons is more than holes in _____
a) CMOS b) BiCMOS c) GaAs d) NMOS

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) Recording electrical activities associated with the heart is known as _____
a) EEG b) EOG c) EMG d)ECG

xi) FPGA devices are of_____type
a)EPROM b) PLD c) SROM d) SLD

Contd...2

xii) PAL stands for _____

a) Programmable array logic b)programmable array link

c)programmable array load d) programme array line

(10x1=10)

2. Answer any TEN questions.

i) State Moore's law.

ii) Mention any two types of passive transducers.

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) Draw the circuit diagram of Saturated load Inverter.

viii) Mention any two performance measures of VLSI circuits

ix) Define Transducer

x) What is meant by PULL UP circuit?

xi) What do you mean by Actuators?

xii) The total number of output square pulses of a line following robot are 280. Total number of transparent rectangular spacing on the disk=20. Calculate the total number of rotations the disk has made?

(10x2=20)

3. Answer any TEN questions.

i) Draw the block diagram of Audiometer.

ii) Draw the circuit diagram of a CMOS Inverter circuit.

iii) Mention the differences between Transducer and Sensor?

iv) Explain a capacitive Transducer.

v) How are Physiological signals generated?

vi) Explain the principle of Pacemaker.

vii) Give the circuit of two input OR Gate using CMOS.

viii) State and explain Moore's law.

ix) Mention any two advantages of FPGA.

x) With necessary diagram explain the classification of ASIC's.

xi) Mention any two differences between PAL and PLA.

xii) Draw the topological block diagram of a CMOS circuit.

SECTION – B

4. Answer any SEVEN questions. **(7x4=28)**

i) Explain a temperature measuring transducer.

ii) Write a note on Pass Transistors.

iii) With a block diagram explain each section of Biomedical Instrumentation.

iv) With block diagram explain Impedance Pneumography.

v) Define Sheet resistance and hence derive the expression for Sheet resistance.

vi) Design a AND gate using VLSI technique.

Contd...3

vii) With a circuit diagram explain

(i) Saturated load Inverter and (ii)CMOS inverter.

viii) Implement the following Boolean expressions in PLA.

$$Y_1(A, B, C) = \sum(2,4,6,7)$$

$$Y_2(A, B, C) = \sum(0,3,6,7)$$

ix) Explain different types of joints used in Robotics.

x) Explain the architecture of FPGA.

SECTION – C

Answer any <u>THREE</u> full questions. **(10x3=30)**

5. a) With the help of block diagram discuss the working of Heart-lung machine. **(5)**

b) Write a note on Impedance Pneumography. **(5)**

6. a) Draw the circuit diagrams of OR, NOR, AND, NAND, XOR and XNOR gates using Transmission Gates. **(5)**

b) With necessary diagrams, explain i) A Caliper Myograph and ii) A Spirometer using a Potentiometer Transducer. **(5)**

7. a) With necessary diagrams explain i) Polarization ii) Depolarization iii) Repolarization of a cell when it is stimulated? **(5)**

b) With a neat diagram explain the working of a Proximity sensor (IR SENSOR). **(5)**

8. a) With necessary diagrams, Explain a Rotational encoder **(5)**

b) With a circuit diagram explain the working of a HALF ADDER using VLSI design technique. **(5)**

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G 504.6b (2015 batch onwards)

Reg. No:

St Aloysius College (Autonomous)
Mangaluru

B.Sc. Semester VI– Degree Examination
July/August - 2022

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) REP instruction repeats until
(a) AX=0 b) BX =0 c) CX=0 d) CX # 0

ii) In 8086 μP has _____ bit PSW register
a) 4 b) 16 c) 8 d) 20

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) 8086 μP has _____ bit address and _____ bit data bus.
a) 20, 16 b) 16, 20 c) 16, 16 d) 20, 8

vii) _____ is not a string constant in C language
a) "ABC" b) "123" c) 123 d) "hi"

viii) 17%3 is ----- in C language
(a)2 b) 3 c) 17 d) 5

ix) The C statement a+=b is same as
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[9] is _____
a) 100 b) 0 c) garbage value d) wrong statement

xi) -------- 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)

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) Mention the pointer register corresponding to CS
vi) What is field specifier used to print a single character in C language?
vii) Write the syntax of #define statement in C language.
viii) Give the general format of floating point representation of data in C language.

G 504.6b

ix) Give the syntax of the string function which gives the length of a string.

x) Give the order of preference (hierarchy) of arithmetic operators applicable to integer arithmatics in C language.

xi) Write the syntax of declaration of a single dimensional array in C language.

xii) Mention the different types of integer data available in C language.

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

i) What is meant by pipeline 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 an 8086 program to divide two 8-bit numbers.

vi) Mention the role of AX register in 8086μP.

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) With syntax explain a string function used to concatenate two string s in C language

xi) Write a C program to find the area of a circle.

xii) Mention rules to be followed when coining the variable names 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 any two arithmetic instructions of 8086 μP.

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) Write a C program to accept an integer from the key board and print its factorial.

x) Write a C program to print whether the accepted character is vowel or not.

Section – C

Answer any THREE full questions

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-else if 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) Write an 8086 program to calculate first 8 Fibonacci numbers **(5)**

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(2019 Batch Onwards)

G505.6a

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

St Aloysius College (Autonomous)

Mangaluru

B.Sc. Semester VI – Degree Examination

July/August - 2022

COMPUTER SCIENCE –paper VII

DATA ANALYTICS

Time: 3 Hours. Max Marks: 100

PART –A

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

a) What are the different types of patterns?

b) What is data reshaping?

c) What are factors in R?

d) What is logistic regression?

e) Describe Extract-Transform-Load (ETL) cycle.

f) Discuss the layers of connections in neural networks.

g) What is page rank?

h) Write a brief note on Social Network Analysis.

i) What are BI Tools? Name any 2 BI tools.

j) Write a short note on web mining.

k) What is decision tree.

l) State any four objectives of graphical excellence.

PART –B

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

UNIT - I

2. a) Explain how Business Intelligence can help for arriving at better decisions? (6)

b) Explain the Star schema of data architecture for Data Warehouse(DW). (7)

c) Explain the significance of data cleansing and preparation (7)

3. a) What is data mining? Explain any four significant data mining techniques. (8)

b) What is the significance of Confusion Matrix and predictive accuracy in classification? Explain. (6)

c) State and explain the design considerations for data warehouse (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) Explain the different kinds of looping statements in R with an example. (6)

c) What are the data frames? Write its significance in R-Language (6)

5. a) Explain R Objects. (6)

b) What are the different functions for reading and displaying data in R? Explain with examples (7)

c) Explain with examples different user-defined functions in R. (7)

Contd...2

G505.6a

UNIT – III

6. a) Create a decision tree for the following data set. The objective is to predict the class category (Loan approved or not).

Age	Job	House	Credit	Loan Approved
Young	False	No	Fair	No
Young	False	No	Good	No
Young	True	No	Good	Yes
Young	True	Yes	Fair	Yes
Young	False	No	Fair	No
Middle	False	No	Fair	No
Middle	False	No	Good	No
Middle	True	Yes	Good	Yes
Middle	False	Yes	Excellent	Yes
Middle	False	Yes	Excellent	Yes
Old	False	Yes	Excellent	Yes
Old	False	Yes	Good	Yes
Old	True	No	Good	Yes
Old	True	No	Excellent	Yes
Old	False	No	Fair	No

Then solve the following problem using the model.

Age	Job	House	Credit	Loan Approved
Young	False	False	Good	??

(16)

b) Explain the principles of an ANN. (4)

7. a) What are the advantages and disadvantages of regression models (8)

b) What is unsupervised learning? When is it used? (6)

c) Explain neural network with a decision tree (6)

UNIT – IV

8. a) Explain the relational data model with the help of an example. (8)

b) Discuss the different applications of Text Mining. (6)

c) Explain the tools and techniques in big data. (6)

9. a) Explain the different ways of managing big data. (8)

b) Explain page Rank and HITS Algorithm. (6)

c) Explain the web usage mining architecture. (6)

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(2019 Batch Onwards)

G505.6b Reg. No.: | | | | | | |

St Aloysius College (Autonomous)

Mangaluru

B.Sc. Semester VI – Degree Examination

July/August - 2022

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)**

a) How do we pass a variable by reference in PHP?

b) How do we return multiple values from user defined functions in PHP.

c) What is the use of substr() function in PHP?

d) What do you mean by dynamic webpage?

e) How do we link an external CSS file into an HTML file?

f) List the various scalar data types in PHP.

g) What is the purpose of update command?

h) Write PHP statements to insert data into mysql table

i) Explain <a>tag in HTML.

j) What is the difference between echo() and print() in PHP?

k) State any two categories of SQL statements.

l) What is the use of rowspan and colspan attribute.

PART –B

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

UNIT - I

2. a) Explain the Structure of HTML Program with an example. **(8)**

b) What is a frame? Explain <frame> and <frameset> tags with its attributes and examples. **(6)**

c) Explain any seven types of selectors in CSS. **(6)**

3. a) What is a style sheet? Explain different types of style sheet. **(8)**

b) Explain following tags used to construct web form:

a. <FORM> b. <INPUT> c. <SELECT> **(6)**

c) Write a note on a) Web Browser b) Web Server **(6)**

UNIT – II

4. a) With examples, explain different types of if statements. **(8)**

b) Explain the unique features of PHP. **(6)**

c) Write a PHP script to read a set of comma separated floating point numbers through a text area from user and print the average of the numbers. The user is free to input any number of floating point values within the limit of the text area. **(6)**

Contd...2

G505.6b

5. a) Write code in PHP which accepts two strings from the user and displays them after concatenation Also write any two string functions with syntax and example. (8)

b) Define operators. Explain different types of operators used in PHP. (6)

c) Explain for each loop with example. (6)

UNIT – III

6. a) Explain different MySQL data types. Give Examples. (8)

b) What are two types of PHP arrays? How do they differ? (6)

c) What is a function? How are they created and used in PHP? Create a PHP program which finds the factorial of number recursively using functions. (6)

7. a) How do you create a user defined function in PHP? Explain with an example. (8)

b) What is the difference between in_array () and array_search ()? (6)

c) Write a PHP script to find max and min from array? (6)

UNIT – IV

8. a) Answer the following: i) Get session variables ii) Destroy session (8)

b) Explain Database specific functions in MySQL with example. (6)

c) Explain the features of MySQL database. (6)

9. a) Explain about the connectivity of PHP & MySQL using an example and retrieve the records from the table student stored in MySQL. (8)

b) What are Cookies? Explain how Cookies are Set, View and Deleted? (6)

c) Describe the methods of PHP Exception class. (6)

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(2016 Batch Onwards)

G 506.6a

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

St Aloysius College (Autonomous)

Mangaluru

B.Sc. - Semester VI

July/August -2022

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 sampling frame.
2. Distinguish between sample survey and census survey.
3. State any two advantages of sampling.
4. Define SRSWOR.
5. Show that $E(\bar{y}) = \bar{Y}$ under SRSWOR.
6. What is finite population correction?
7. What are non-sampling errors?
8. Show that SRSWOR is more efficient than SRSWR in estimating the mean of a population.
9. Describe stratified random sampling.
10. State any two merits of stratified random sampling.
11. Write the expression for standard error of $\bar{Y}_{st}$ under proportional allocation.
12. Explain proportional allocation in case of stratification.
13. Give an example for cluster sampling.
14. Explain sampling of attributes.
15. With usual notations show that E(p)=P.

PART – B

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

16. What is sample survey? In what respect is it superior to census survey?
17. Explain lottery method of selecting random samples.
18. Show that sample mean square is an unbiased estimator of population variance under SRSWR.
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. Derive the formula of $V(\bar{y}_{st})$ stratified sampling and hence obtain $V(\bar{y}st)$ prop.
22. Derive an expression for variance of the sample mean under Neyman's allocation for stratified random sampling.
23. Prove that systematic sampling is more efficient than simple random sampling if and only if $S^2_{wsy} > S^2$.

Contd...2

24. Prove that under simple random sampling for attributes show the estimate of $V(p) = \frac{N-n}{N(n-1)}$ pq.

PART – C

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

25. Explain the various steps involved in a sample survey?
26. i) Obtain an expression for $V(\bar{y})$ under SRSWOR.
27. i) Derive the unbiased estimator of population mean under SRSWOR. **(2)**
    ii) Under SRSWOR show that sample mean square is an unbiased estimator of population mean square. **(8)**
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 $n_h \propto \frac{N_h S_h}{\sqrt{C_h}}$.
29. Prove that $V(\bar{y}st)_{opt} \leq V(\bar{y}st)_{prop} \leq V(\bar{y})_{SRS}$.
30. i) When there is a linear trend in the population, prove that $V(\bar{y}st) \leq V(\bar{y}sys) \leq V(\bar{y})_{SRS}$. **(7)**
    ii) State the advantages of systematic sampling. **(3)**

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(2016 Batch Onwards)

G 506.6b

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

St Aloysius College (Autonomous)

Mangaluru

B.Sc. - Semester VI

July/August - 2022

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. What is the difference between dynamic and static model?
2. Define Prescriptive model with an example.
3. Define the following terms in LPP (i) Objective function (ii)Profit coefficient.
4. Write any two properties of LPP.
5. Mention any two application of duality in LPP.
6. Write down the mathematical form of TP and explain the components.
7. State any two real life examples for TP.
8. How is the penalty calculated in Vogel approximation method?
9. What do you mean by two person zero sum game?
10. AP is called a special case of TP. Justify.
11. Distinguish between Pure and mixed strategies
12. Explain the principle of dominance.
13. Distinguish between direct and indirect inventory.
14. Explain the terms i) Holding cost ii) Set up cost in inventory problems.
15. What are Economic Order Quantity and lead time in inventory problems?

PART – B

(6x6=36)

II. Answer any SIX of the following.

16. Explain the main phases of OR.
17. Briefly discuss the graphical method of solving an LPP.
18. Define duality. What are the rules for converting a primal into dual?
19. Explain the steps involved in North West Corner Rule and matrix minima method.
20. State the mathematical model of TP. How do you resolve degeneracy in TP?
21. Distinguish between balanced and unbalanced AP. How do you convert maximization problems to minimization while solving an AP.
22. How do you show A's Problem as the Dual of the B's Problem in Game theory?
23. Obtain the EOQ model with uniform rate of production and demand but without shortages.
24. Explain why inventory is maintained?

Contd....2

PART – C

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

25. What are artificial variables? Explain Charne's Big M method of solving a LPP.
26. Explain the steps involved in MODI method of solving a TP.
27. How do you get optimal solution to an AP using Hungarian Method?
28. Obtain the EOQ model with uniform rate of production and demand shortages being allowed.
29. Explain News Paper Boy Problem.
30. Briefly explain purchase inventory models with prize breaks. Discuss the situation when there are two prize breaks.

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(2014 Batch Onwards)

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St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester VI– Degree Examination
July/August - 2022
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) Define water potential. Write its components
2) Name the enzyme involved in Starch sugars interconversion theory. Mention its roles.
3) What is aeroponics? Write any two advantages.
4) What is meant by non-essential elements? Give two examples.
5) What is Pasteur's effect?
6) What is red drop and Emersons enhancement effect?
7) Define quantum yield. What is the quantum yield of photosynthesis?
8) What are Chemotrophs? Give two examples.
9) Define growth in plants. List the various phases of it.
10) What is stratification of seeds?
11) What are short day plants? Give two examples.
12) Write any two types of paratonic nastic movements in plants.

SECTION – B

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

1) Explain how cell acts as an osmotic system.
2) Explain Munch mass flow hypothesis.
3) What is guttation? Explain the structure of a hydathode.
4) Define RQ. Explain the RQ of various metabolites.
5) Explain photorespiration and add a note on its significance.
6) Describe Hatch- Slack pathway.
7) What is vernalization? Explain its practical utility.
8) Explain the physiological and biochemical changes accompanying seed germination.
9) Explain the roles played by abscisic acid in plants.

SECTION – C

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

1) Describe the theories of ascent of sap in plants. Add a note on their merits and demerits.

Contd...2

G 507.6a

2) Explain the roles and deficiency symptoms of potassium and phosphorus in plants.
3) Explain the mechanism of transpiration. Why it is a necessary evil?
4) Explain electron transport chain.
5) Explain non cyclic photophosphorylation. Write its significance.
6) Describe the process of respiration occurring in the cytoplasm.
7) Write short notes on
    a) Synthetic auxins
    b) Photoperiodic induction
    c) Phytochromes
    d) Geotropism
8) Explain the discovery, chemical nature and physiological effects of Gibberellins in plants.
9) Write notes on
    a) Causes of seed dormancy
    b) Arc auxanometer and its working principle.

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(2014 Batch Onwards)

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St Aloysius College (Autonomous)

Mangaluru

B.Sc. Semester VI– Degree Examination

July/August - 2022

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) What are transposons? Mention its significance.
2) What is Pharmacognosy? Mention its branches.
3) What is RNA editing?
4) What is protoplast culture? Write any two applications.
5) Write any four application of plant tissue culture in agriculture.
6) Write any two differences between primary and secondary metabolites.
7) Mention the principle of spectroscopy.
8) What are terpenoids? Give two examples.
9) Define AYUSH
10) Write the organoleptic characters of ginger.
11) What are plant steroids? Mention its types.
12) Define enzyme. Mention any two therapeutic uses of enzyme.

SECTION – B

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

1) Write a brief note on mRNA processing.
2) Mention the factors affecting medicinal plant cultivation.
3) Briefly explain the types of bioremediation.
4) Mention the differences between organized and unorganized drugs.
5) What are Monoclonal antibodies? Explain their application in the field of Medicine.
6) Write the source, physiochemical properties and therapeutic properties of Glycosides.
7) Give an account on significance of plant phenols.
8) Write a note on drug adulteration.
9) With schematic representation, explain citric acid pathway.

Contd...2

SECTION – C

III Answer any <u>FIVE</u> of the following. (5x10=50)

1) Explain Lac operon concept in prokaryotes.
2) Give an account on principle, procedure and application of TLC
3) Describe Mevalonic acid pathway. Add a note on its significance.
4) Describe the steps involved in the production of Transgenic plants.
5) Give an account on History, scope and branches of Pharmacognosy.
6) Give an account on principle, procedure and application of Soxlet.
7) Describe Pollen culture in detail. Add a note on its applications
8) Give a detailed account on carbohydrate containing drugs.
9) What are alkaloids? Give an account on source, properties and therapeutic uses of any two medicinal plants containing drugs.

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St Aloysius College (Autonomous)

Mangaluru

B.Sc. Semester VI – Degree Examination

July - 2022

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 <u>TEN</u> of the following.** (10X2=20)

a) Define Innate Immunity with one example.

b) Write a note on macrophages.

c) What are the symptoms of Amoebiasis.

d) Define Vaccines.

e) Write a note on Chikunguniya.

f) What are the different modes of transmission of Dengue?

g) What are acute and chronic toxicity?

h) Mention any two local breeds of Buffaloes.

i) What is sericulture?

j) Name any two fish diseases and their control measure.

k) Mention the different castes in honey bees.

l) Give two examples for Epigeic form of earthworm.

PART – B

Select <u>ONE</u> full question from each unit.

Unit I

II a) Give an account of Primary lymphoid organs. (10)

b) Write a note on Myasthenia gravis. (5)

c) Explain Immunological memory. (5)

OR

III a) Discuss the causative factors and mode of transmission and preventive measures of AIDS. (10)

b) Explain briefly the structure of IgG. (5)

c) Write explanatory note on i) Spleen ii) Lymph nodes. (5)

Contd...2

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Unit II

IV a) With neat labelled diagram explain the life cycle of *Entamoeba histolyitica.* **(10)**

b) Write a note on Cholera. **(5)**

c) Explain the pathogenicity of Taeniasis. **(5)**

OR

V a) Write explanatory note on i) Vectors of parasitic diseases ii) H1N1. **(10)**

b) What are the control measures of Malaria? **(5)**

c) Explain mode of infection and transmission of *Plasmodium.* **(5)**

Unit III

VI a) Explain the impact of Pesticides pollution on human populations. **(10)**

b) Give a brief account of milk and its products. **(5)**

c) Explain briefly disease and control measures of silkworm. **(5)**

OR

VII a) Describe the techniques of culturing pearls. **(10)**

b) Write a note on Biomagnification with relevant examples **(5)**

c) Discuss the importance of cattle in Biogas and Manure. **(5)**

Unit IV

VIII a) Give an account of bee keeping and management. **(10)**

b) Write a note on economic importance of poultry. **(5)**

c) Explain briefly the life cycle of earth worm. **(5)**

OR

IX a) Explain housing management of poultry **(10)**

b) Describe the Ecological Classification of Earth worm. Add a note on Vermiwash. **(5)**

c) What are the Economic importance of Honey and Bee wax? **(5)**

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St Aloysius College (Autonomous)

Mangaluru

B.Sc. Semester VI – Degree Examination

July/August - 2022

ZOOLOGY – Paper VIII

Ethology, Evolution and Palaeontology

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)

a) Define Circadian rhythm with example.

b) What is play behaviour? Give an example.

c) Define social organization. Give an example.

d) Name any two migratory fishes.

e) What is innate behaviour? Give an example.

f) Comment on Elvers.

g) List any two types of wasp nests.

h) Define Variation.

i) What is sympatric speciation?

j) Write any two features of *Mesohippus*.

k) What are catastrophic events?

l) What is synthetic theory of evolution?

PART – B

Select ONE full question from each unit.

Unit I

II a) Explain the Social organization in monkey troops. (10)

b) Write a note on imprinting. (5)

c) Differentiate between territorial and foraging behaviour. (5)

OR

III a) What is acquired behaviour? Explain different types with suitable examples. (10)

b) Write a note on termite colony. (5)

c) Differentiate between acoustic and chemical commun (5)

Contd...2

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Unit II

IV a) What are the causes for bird Migration? Add a note on preparation for migration by birds **(10)**

b) Write a note on diversity in mating system in animals **(5)**

c) Write a note on Courtship in frogs. **(5)**

OR

V a) Give an account of nesting behaviour in Birds. **(10)**

b) Explain reproductive strategies in animals. **(5)**

c) Write a note on anadromous migration. **(5)**

Unit III

VI a) Explain the evidences of organic evolution from palaentology **(10)**

b) Write a note on Natural selection. **(5)**

c) Write a note on chemical evolution theory. **(5)**

OR

VII a) Define Hardy Weinberg Equilibrium? Explain the various factors affecting it. **(10)**

b) Differentiate between analogous and homologous organs. **(5)**

c) Differentiate between gene flow and genetic drift **(5)**

Unit IV

VIII a) Explain macro evolution and micro evolution with illustrations **(10)**

b) Explain different types of fossils. **(5)**

c) Write a note on *Australopithecus.* **(5)**

OR

IX a) Explain evolution of Horse. **(10)**

b) Write a note on extinction linked to species characteristics. **(5)**

c) Write a note on *Archaeopteryx.* **(5)**

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St Aloysius College (Autonomous)

Mangaluru

B.Sc. Semester VI – Degree Examination

July/August - 2022

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)**

a) Types of DNA

b) Helicase

c) Codon degeneracy

d) Frame shift mutation

e) Base analog

f) Alkylating agents

g) Molecular scissors

h) Plasmids

i) Transgenic plants

j) Human genome project

k) BLAST

l) Genome size

PART – B

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

UNIT -I

2. a) Write the genetic code and mention its characteristics. **(9)**

OR

b) List out the various molecules and enzymes involved in DNA replication, with their respective roles.

c) Semiconservative Replication. **(6)**

UNIT –II

3. a) Discuss chemical mutagenesis. **(9)**

OR

b) With appropriate example, discuss how the mechanism of transformation was proved.

c) Base excision repair mechanism. **(6)**

UNIT -III

4. a) Discuss in detail about restriction enzymes. Add a note on its significance. **(9)**

OR

b) Define PCR. Describe the principle of its working. Add a note on its usefulness.

c) Bioterrorism. **(6)**

Contd...2

UNIT –IV

5. a) Elaborate on the approaches and application of Multiple alignment of Sequence. **(9)**

OR

b) With respect to prokaryotes, give a comparative account on Sizes and ORF Contents-small genomes and large genomes. **(6)**

c) Structural data bases.

PART – C

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

6. a) Transposons
b) *lac* operon
c) Mutation as a tool in molecular genetics
d) Conjugation
e) TLC
f) Sequence analysis

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St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester VI – Degree Examination
July/August - 2022
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 (2x10=20)

1. **Define/Answer any TEN of the following:**
   a) Blanching
   b) Radurization
   c) Food poisoning
   d) Polio
   e) Thermal Death Point
   f) Flat Sour
   g) Baffles
   h) Stock Culture
   i) Malting
   j) Antibiotics
   k) Hydrocarbons
   l) Vinegar

PART – B (15x4=60)

Answer 'a' or 'b' and 'c' is compulsory from each unit.

UNIT -I

2. a) Explain in detail about sources of food contamination. (9)

OR

b) Describe preservation of food by low temperature.

c) Write briefly on preservatives in food. (6)

UNIT –II

3. a) Explain in detail about food borne infections. (9)

OR

b) Explain in detail about biochemical activities of microorganisms in milk.

c) Write a short note on Aflatoxins. (6)

UNIT -III

4. a) Explain about the construction of a Fermenter. (9)

OR

b) Explain in detail about wine production in industries.

c) Write briefly on Strain development in industries. (6)

UNIT –IV

5. a) Explain in detail the production of Bakers yeast. (9)

OR

b) Explain in detail the production of Penicillin.

c) Write briefly about trickling generators used for vinegar production. (6)

PART – C

6. **Answer any FOUR of the following.** (5x4=20)
   a) Ideal food preservative
   b) TA spoilage
   c) RODAC plate method
   d) Microbiology of Hard Cheese
   e) Single Cell Protein
   f) Synthetic Penicillin

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St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester VI – Degree Examination
July/August - 2022
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)

a) Write the difference between simple and complex media.
b) What is incineration?
c) How do you identify bacteria and fungi by staining method.
d) Why virus is called living entity?
e) Mention the carbon and nitrogen sources for growth of microbes.
f) How to differentiate T_H and T_C cells?
g) What are Abzymes?
h) Write the difference between Antigenicity and Immunogenicity.
i) Mention different types of Hypersensitivity reactions.
j) What is rejection sensitization?
k) Define Haptens.
l) What is Antigenic drift? Give example.

PART – B

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

2. Write the colony morphological characteristics of bacteria.
3. Write a note on Robert Koch.
4. Explain general characteristics and replication of TMV
5. Classify the virus based on genetic material. Give example.
6. Write a note on secondary lymphoid cells.
7. What is the difference between T and B cells? Write its functions.
8. Write about the growth curve and phases of the growth curve.

PART – C

Answer any FIVE of the following: (5x10=50)

9. Explain the Lectin pathway.
10. Explain lysogenic and lytic life cycle.
11. Write a note on HIV and Herpes virus.
12. Explain different types of ELISA.
13. In detail explain any one of each organ and system specific immune disorder.
14. With neat labelled diagram explain basic antibody structure and its types.

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(2019 Batch onwards)

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St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester VI – Degree Examination
July/August - 2022
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)**

a) Write the difference between simple and complex media.
b) What is incineration?
c) How do you identify bacteria and fungi by staining method.
d) Why virus is called living entity?
e) Mention the carbon and nitrogen sources for growth of microbes.
f) How to differentiate T_H and T_C cells?
g) What are Abzymes?
h) Write the difference between Antigenicity and Immunogenicity.
i) Mention different types of Hypersensitivity reactions.
j) What is rejection sensitization?
k) Define Haptens.
l) What is Antigenic drift? Give example.

PART – B

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

2. Write the colony morphological characteristics of bacteria.
3. Write a note on Robert Koch.
4. Explain general characteristics and replication of TMV
5. Classify the virus based on genetic material. Give example.
6. Write a note on secondary lymphoid cells.
7. What is the difference between T and B cells? Write its functions.
8. Write about the growth curve and phases of the growth curve.

PART – C

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

9. Explain the Lectin pathway.
10. Explain lysogenic and lytic life cycle.
11. Write a note on HIV and Herpes virus.
12. Explain different types of ELISA.
13. In detail explain any one of each organ and system specific immune disorder.
14. With neat labelled diagram explain basic antibody structure and its types.

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(2019 Batch onwards)

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St Aloysius College (Autonomous)

Mangaluru

B.Sc. Semester VI – Degree Examination

July/August - 2022

BIOCHEMISTRY – Paper VIII

CLINICAL AND MEMBRANE BIOCHEMISTRY

Time: 3 Hours. **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)**

a) Differentiate between serum and plasma.
b) Define the term half-life in radioactivity.
c) Define osmosis with an example.
d) What are Ionophores? Give example.
e) What is SGPT? How is it useful in liver tests?
f) Define the term Curie.
g) What are free radicals? How are they detected?
h) What is phagocytosis? Give example.
i) What is Niemann-Pick disease?
j) Write the types of the active transport system.
k) Define the terms cancer and carcinogens.
l) What are the uses of radioactive elements in medicine?

PART – B

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

2. Write a note on Atherosclerosis.
3. Give the general characteristics of tumor cells.
4. Explain the Fluid mosaic model with a neat labeled diagram.
5. Write a note on safety measures in handling radioactive materials.
6. Write a note on sickle cell anemia.
7. Explain the working of the GM counter.
8. Write a note on the clinical application of LDH.

PART – C

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

9. Write a note on tumor markers and their clinical significance.
10. Explain the normal constituents of blood.
11. Explain the working of the solid and liquid scintillation counters.
12. Explain the abnormal constituents of urine.
13. Write a note on Oncogenes and tumor suppressor genes.
14. Write a short note on a) Haemophilia b) Phenylketonuria.

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(2019 Batch Onwards)

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St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester VI - Degree Examination
July/August- 2022
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)**

a) What is soil pollution? Give two examples of soil pollutants.
b) What is the role of protozoans in various interactions in the environment?
c) What is competition? Give an example.
d) What is rhinitis? How it appears?
e) Name the microorganisms found in fresh water?
f) What is amoebiasis? How to prevent it?
g) Define COD.
h) What is primary treatment in liquid waste management?
i) Define biofertilizers and give two examples.
j) What are the limitations of biopesticides?
k) What is firewood? Why it is still the energy source?
l) What is gasohol?

PART – B

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

2. How microbial hydrogen is produced? Explain.
3. What is renewable energy? Explain the pros and cons of it.
4. Explain the production of cyanobacterial biofertilizer.
5. Explain any 2 methods of *in situ* bioremediation.
6. Explain the mechanism of enrichment of ores by microorganisms.
7. Explain the clinical manifestation of cholera.
8. Explain Anderson and Burkarde sampling technique for air borne microbes.
9. Explain carbon cycle.
10. Write short notes on coastal regulatory zone.

PART – C

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

11. What is air pollution? List out the causes and remedies for air pollution.
12. List out and explain various positive interactions between various soil microorganisms.
13. Explain the procedure of qualitative water analysis.
14. Explain any two methods employed during secondary treatment of liquid waste.
15. Explain the role and mechanism of action of Bacteria as biopesticide.
16. Explain the process of Biogas production.

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St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester VI - Degree Examination
July/August - 2022
BIOTECHNOLOGY – Paper VIII
Bioprocess Technology

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)**

a) Define aerobic fermentation.
b) What is submerged fermentation? Mention any one of its importance.
c) What is tPA ? Mention any one use.
d) Define Pasteurization and mention any two types
e) Mention any two applications of enzymes in textile industry.
f) Define secondary metabolite and give any two examples.
g) Write any two significance prebiotics.
h) What are aflatoxins?
i) Define biosensor. Mention its uses.
j) What are extrinsic factors of food responsible for spoilage? Give any two examples.
k) Mention any two methods of cell lysis.
l) Mention any two uses of citric acid.

PART – B

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

2. Illustrate Primary metabolites and with suitable examples.
3. Describe the principle of Gel filtration chromatography
4. Write a note on methods of improvement of industrially important microbial strains.
5. Describe batch fermentation and its importance in production of metabolites.
6. What is streptokinase and explain its applications.
7. Write a note on uses, sources and recovery of lysine.
8. Explain probiotics and its importance.
9. Discuss botulism and its impact on human and animal health.
10. Explain Rotary drum filtration.

PART – C

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

11. Give a detailed account on nutritional value and production of edible mushrooms.
12. Discuss methods of prevention of food by various high temperature methods.
13. Describe the tests used for determination of quality of milk.
14. Write an account on industrial production of penicillin.
15. Discuss the design of fermenter.
16. Explain the formulation of media for fermentation.

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(2019 Batch Onwards)

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St Aloysius College (Autonomous)

Mangaluru

B.Sc. - SEMESTER VI – Degree Examination

July/August - 2022

ECONOMICS – PAPER VII

INDIAN ECONOMICS

Time: 3 hrs. Max Marks: 100

SECTION – A

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

1. Write a note on economic crisis of 1991.
2. Define the concept of poverty in India.
3. What is sustainable agricultural development?
4. What is meant by industrial sickness?
5. Explain briefly the significance of service Sector in India.
6. What is energy crisis?

SECTION – B

II. Answer any FOUR of the following: (4x10=40)

7. What are the characteristics of Indian Economy?
8. Explain the types of unemployment in India.
9. Explain the major land reforms adopted in India.
10. Explain the changing scenario of banking sector in India.
11. Explain the main features of Industrial Policy of 1991.
12. Briefly explain the various health schemes of government of India.

SECTION – C

III. Answer any TWO of the following: (2x20=40)

13. What are the problems of agricultural marketing in India? Suggest remedial measures.
14. Explain the various poverty alleviation programmes in India.
15. Define MSME's. Explain the role and problems of MSME's in India.
16. Explain the various financial sector reforms in India.

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(2019 Batch onwards)

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St Aloysius College (Autonomous)

Mangaluru

B.Sc. - SEMESTER VI – Degree Examination

July/August - 2022

ECONOMICS – PAPER VIII

ECONOMETRICS

Time: 3 hrs. **Max Marks: 100**

NOTE: Econometrics log will be provided.

PART - A

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

1. Prove that A.M of Y = A.M of predicted Y.
2. Prove that E (ut.ut-2) = $\rho^2 \sigma_u^2$.
3. Write a note on Dummy variable.
4. Write a note on autoregressive model.
5. Write a note on zero sum game.
6. What is objectivity in research?

PART – B

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

7. Prove that $\beta_2 \sim N [\beta_2, \sigma^2/ \Sigma x_i^2]$.
8. Prove that $d \sim 2 (1- \rho)$.
9. Explain the causation in the use of dummy variable.
10. Explain almon approach to distributed – lag model.
11. Briefly explain the concept of Nash equilibrium.
12. Briefly explain various types of research.

PART – C

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

13.

Y	X
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

a) Find out regression function from the above table
b) Find out R^2, adjusted R^2 and ESS.

Contd....2

14.

Savings	Income
40	100
50	200
50	300
70	400
65	500
65	600
80	700

A) Test following hypothesis H_0: $\beta_1 = 0$ and H_0: $\beta_2 = 0$ at 5% significance level.

B) Construct 95% confidence interval for the population parameter.

C) Interpret the regression function.

Note: Savings Function

15.

N	N	M	N	N	M	M	N	N	H
M	M	M	M	M	M	X	X	X	H
M	X	X	N	N	N	M	M	M	L
M	M	M	M	N	N	N	N	N	L
N	N	N	N	N	M	X	M	M	0

Note: M-Maximum Value, N-Minimum Value

A) Find out R, E(R) and σ_R

B) 95% confidence interval for R

C) Test Ho: all the observations are random

H_1: all the observations are not random

16. What is multicollinearity? Explain the consequences of multicollinearity.

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