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G 501.6a

Reg. No. :

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

April · 2019
PHYSICS – Paper - VII
NUCLEAR PHYSICS AND ANALOG ELECTRONICS

Time: 3 hrs.   Max Marks: 100

SECTION – A

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

a) What is tunnel effect in α - decay?

b) What is K – electron capture?

c) What is half life period? Give the relation between half life period and decay constant.

d) State Geiger – Nuttal law.

e) What are isotones? Give an example.

f) What is mass defect? Give the expression for mass defect.

g) What is nuclear fission? Give an example.

h) What is pair annihilation?

i) Name the four basic interactions of nature.

j) What is meant by tracer technique?

k) Why are nuclear fusion reactions called thermonuclear reactions?

l) What is slew rate of an Op-amp?

SECTION – B

Answer TWO full questions from each unit:

UNIT – I

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

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

3. a) What is radioactive equilibrium? Deduce the condition for transient equilibrium of the daughter with the parent substance.   **(6)**

   b) Using Heisenberg's uncertainty principle, estimate the rest mass of the meson, assuming the range of nuclear forces as 1.5 fermi.   **(4)**

4. a) What are cosmic ray showers? Give the cascade theory of showers.   **(6)**

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

UNIT – II

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

   b) Deduce the expression for threshold energy in an endoergic reaction.   **(4)**

6. a) Describe the working of betatron. Derive the betatron condition.   **(6)**

   b) With a neat diagram, explain the construction and working of LINAC.   **(4)**

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

9. a) Draw the circuit diagram of a CE amplifier and explain the role of each component.   **(6)**

   b) Describe the ideal characteristics of Op-amp. In what way a practical Op-amp differs from it?   **(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) Distinguish between positive and negative feed back.   **(4)**

SECTION – C

Answer any <u>FOUR</u> of the following: **(4x5=20)**

11. Thorium 228 emits α - particles of energy 5.42 MeV. Calculate the α – disintegration energy.

12. Protons are accelerated in a LINAC having 100 gaps with a potential difference of 1KV across each gap. Find the final energy of the protons. If the length of the first tube is 1m, what is the length of the 50th tube?

13. A small signal silicon n-p-n, transistor amplifier has the following parameters. $h_{ie} = 3.5K$, $h_{fe} = 250$, $R_E = 2K\Omega$, $R_L = 5.6K\Omega$, $R_1 = 30K\Omega$, $R_2 = 18K\Omega$, $V_{CE} = 5V$, $V_{CC} = 12V$ and $I_C = 2mA$. Find the input and output resistance; voltage gain and power gain.

14. IN a cyclotron, dees with diameter 2m, accelerate α – particles to the energy of 100 MeV. Calculate the magnetic field strength and frequency of the oscillator used.

15. For the inverting amplifier, the input voltages are 3V, 5V and 7V and corresponding input resistances are 3KΩ, 5KΩ and 7KΩ respectively and feed back resistor is 5KΩ. Calculate the output voltage.

16. The activity of a radio active sample drops to $1/6 th$ of its initial value in 80 minutes. What is its half-life?

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St Aloysius College (Autonomous) Mangaluru

B.Sc. Semester VI – Degree Examination
April 2019

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) Mention any two limitations of AM.

   b) Draw the waveforms to show the formation of FM wave by the carrier wave and modulating signal.

   c) Which are three primary colours used in TV?

   d) What is meant by progressive scanning?

   e) What is a clock pulse?

   f) What is a register?

   g) Give logic circuit for OR gate using NAND gate.

   h) Give the logic diagram for a half adder.

   i) What is isotope effect?

   j) What are nano-materials?

   k) What are quantum dots?

   l) What is critical current in superconductors?

SECTION – B

Answer TWO full questions from each unit:

UNIT – I

2. a) Describe AM radio receiver with a block diagram.   (6)

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

3. a) Explain the working of CRT.   (6)

   b) What is modulation? Explain briefly the need for modulation.   (4)

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

   b) Obtain a relation for the total power of AM wave in terms of the power of (4) the carrier wave and modulation index.

UNIT – II

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

   b) Explain the working of NOT gate using transistor.   (4)

6. a) Explain the working of JK flip-flop.   **(6)**

    b) Explain the working of a decade counter.   **(4)**

7. a) State and prove De-Morgan's theorems and give their representations **(6)**
        using logic circuits.

    b) What is BCD-to-7 segment decoder? Discuss it qualitatively.   **(4)**

UNIT – III

8. a) What is a super conductor? Explain the effect of external magnetic field **(6)**
        on super conductivity.

    b) Briefly explain the various nano structures.   **(4)**

9. a) Distinguish between linear and non-linear media. Explain polarisation in **(6)**
        non-linear media.

    b) Give the applications of super conductors.   **(4)**

10. a) Discuss the sum and difference frequency generation.   **(6)**

    b) What is Meissner's effect? Give the expression for critical magnetic field **(4)**
        at any temperature.

SECTION – C

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

11. Calculate the modulation factor of an AM wave, if the maximum peak to peak
    voltage is 16mV and the minimum peak to peak voltage is 4mV. Using the
    value determine the total power of the AM wave, if the power of the carrier
    wave is 5KW.

12. An AM Broadcast radio transmitter radiates radio waves at 20 KW at
    modulation index 75%. Calculate the power of the carrier wave.

13. A sinusoidal carrier voltage of frequency 1MHz and 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 sideband terms. Also calculate the bandwidth.

14. Simply the equation $Y = \overline{(A+B).C}$ and draw the logic circuit for the simplified
    equations.

15. Simplify the Boolean equation

    $Y = \overline{A}\,B\overline{C} + AB\overline{C} + ABC$

16. The transition temperature of mercury with average atomic mass of
    200.59amu is 4.153K. Determine the transition temperature of one of the
    isotope $_{80}Hg^{204}$.

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(2014 batch onwards)

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

April - 2019

CHEMISTRY – Paper VII

Time: 3 Hours   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

1. **Answer any <u>TEN</u> of the following questions in 1 to 3 sentences.**

(2x10=20)

a) Dipole moment of CO_2 is zero. But one of its vibrations is IR active. Why?

b) What is Raman shift?

c) What is meant by triple point of water?

d) Give the selection rules in vibrational spectroscopy.

e) What is meant by stability constant?

f) Define rapticity. Give an example for dihapto ligands.

g) Give the preparation of methyl magnesium bromide.

h) Give any two applications of organo aluminium compounds.

i) What is recemisation?

j) Assign E or Z configuration for the following
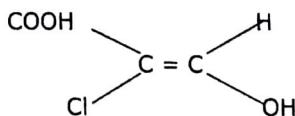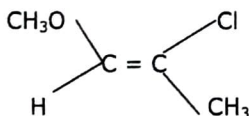
k) How is crotonic acid prepared from ethyl aceto acetate?

l) What are diastereomers? Give example.

PART – B

2. **Answer any <u>TEN</u> of the following questions in 2 to 5 sentences**

(3x10=30)

i) How does anharmonic motion affect the IR spectrum?

ii) The force constant of HBr is $410nm^{-1}$. The bond length and moment of inertia are 0.128nm and $2.5 \times 10^{-47} kgm^2$ respectively. Calculate frequency of vibration of the molecule. Given $C = 3 \times 10^8 ms^{-1}$.

iii) Explain mutual exclusion principle with an example.

iv) Explain Ice-salt freezing mixture.

v) What are inert and labile complexes? Give an example for each.

vi) State 18 electron rule. Explain with an example.

vii) Explain the structure of methyl Lithium.

Contd...2

viii) What is meant by thermodynamic and kinetic stability of metal complexes?

ix) Explain geometrical isomerism in oximes.

x) What is meant by resolution of racemic mixture? Explain the biochemical method of resolution.

xi) Explain Walden inversion with an example.

xii) Explain the alkylation of ethyl aceto acetate.

PART – C

Answer any <u>TEN</u> of the following questions   **(5x10=50)**

3. Explain the vibrational energy levels of simple harmonic oscillator.

4. Explain the formation of stokes & antistokes lines in the Raman spectra.

5. Explain the phase diagram of Sulphur system

6. Give the thermodynamic derivation of Gibb's phase rule.

7. Derive an expression for stepwise and overall formation constant of the complex. What is the relationship between them?

8. What is Trans effect? Explain how trans effect is useful in the synthesis of cis and trans $[Pt (NH_3)_2]Cl_2$ complexes.

9. Explain the nature of bonding in metal carbonyls.

10. What are mononuclear metal carbonyls? Write the preparation and structure of nickel tetra carbonyl.

11. Explain the different conformational isomers of 1, 2-Dichloroethane. Write a note on the relative stability of the conformers.

12. Explain keto-enol tautomerism in ethyl acetoacetate with two supporting reactions to each.

13. What is Claisen condensation? Explain its mechanism.

14. Discuss the optical isomerism in tartaric acid.

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(2014 batch onwards)

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

April 2019

CHEMISTRY – Paper VIII

Time: 3 Hours

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

1. Answer any **TEN** of the following questions in 1 to 3 sentences.

(2x10=20)

a) Define transport number of an ion.

b) What is meant by activity coefficient?

c) Give Debye-Huckel-Onsager equation. Explain the terms involved in it.

d) What is meant by electrophoretic effect?

e) What is meant by BOD?

f) What are propellents? Give examples.

g) What is meant by octane number?

h) Define atom economy.

i) What is coupling constant?

j) What is meant by 'Nuclear Shielding'?

k) What are dyes? Give two examples.

l) What are alkaloids? Give two examples.

PART – B

2. Answer any **TEN** of the following questions in 2 to 5 sentences

(3x10=30)

i) Explain conductometric titration curves for weak acid-strong base titration.

ii) What is meant by relaxation effect?

iii) Give any three advantages of conductometric titrations.

iv) The equivalent conductance of 0.1N solution of acetic acid was found to be 1.5 $Sm^2/g.eq$. If equivalent conductance at infinite dilution is $3x10^2 sm^2/g.eq$. Calculate the degree of dissociation of acetic acid.

v) What is meant by chemical oxygen demand (COD)? Give its significance.

vi) Write a note on soil pollution.

vii) Explain the manufacture of TNT & RDX.

viii) Explain the manufacture of glass.

ix) An organic compound gives a resonance peak at 60.000244 MHz in a NMR spectrometer working at a frequency at 60 MHz. If TMS peak is obtained at 60 MHz, calculate the chemical shift in δ scale.

x) Explain NMR spectra of ethyl bromide.

xi) How are alkaloids extracted from plants?

xii) Write the synthesis of methyl orange.

PART – C

Answer any <u>TEN</u> of the following questions   **(5x10=50)**

3. Describe moving boundary method of determining the transport number of an ion.

4. How do you determine the pH of a solution using quinhydrom electrode?

5. Explain the construction and working of calomel electrode.

6. Explain any two types of concentration cells.

7. What is photochemical smog? How is it formed in the atmosphere? What are its consequences?

8. Calculate the atom economy by taking any two organic reactions.

9. Explain the production of bio gas.

10. Give the principles of green chemistry.

11. Explain any two factors affecting the chemical shift.

12. Explain the synthesis of alizarin and Congo red.

13. Explain the theory of HNMR spectroscopy.

14. Explain 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
April - 2019

MATHEMATICS – Paper VII
Partial differential equations, Fourier Series and Linear Algebra

Time: 3 Hours   Max. Marks: 100

Note: Answer all parts

PART – A

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

1. Verify the condition of integrability of the differential equation
   $(y^2 + yz) dx + (xz + z^2) dy + (y^2 - xy) dz = 0$.

2. Solve: $y^2 dx - zdy + ydz = 0$.

3. Solve the simultaneous equations: $\dfrac{x}{y^2 z} dx = \dfrac{dy}{x^2 z} = \dfrac{dz}{y^3}$.

4. State Dirichlet's conditions for existence of a Fourier series expansion.

5. In the Fourier series expansion of $f(x) = 4 - x^2, -2 < x < 2$ find a_0.

6. Find the half range sine series of $f(x) = x, \; 0 < x < \pi$.

7. Prove that Kernel of a homomorphism is a subspace.

8. Determine whether $(1, 0, 1), (1, 1, 1)$ and $(0, 0, 1)$ are linearly independent.

9. Show that any subset of a linearly independent set is linearly independent.

10. Find the matrix of the linear transformation defined by $(1, 1) \to (0, 1)$ and
    $(-1, 1) \to (3, 2)$

11. Prove that the product of two linear transformations is a linear transformation.

12. If a linear transformation is singular then prove that there exists $\xi \in V, \xi \neq 0$ such
    that $T(\xi) = 0$.

13. Define Characteristic roots of a linear transformation.

14. If $A \in M_n(F)$ and $\lambda \in F$ then prove that λ is a characteristic root of A if and only
    if $A - \lambda I$ is singular.

15. Define row rank of a $m \times n$ matrix.

PART – B
UNIT - I

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

1. Solve : $(1 + yz) dx + x(z - x) dy - (1 + xy)dz = 0$.

Contd...2

2. Solve: $z^2 dx + (z^2 - 2yz) dy + (2y^2 - yz - xz) dz = 0$

3. Solve : $xydx + (x^2 y - zx) dy + (x^2 z - xy) dz = 0$.

4. Solve: $2yzdx + zxdy - xy(1+z) dz = 0$.

5. Solve the simultaneous equations: $\dfrac{dx}{\cos(x+y)} = \dfrac{dy}{\sin(x+y)} = \dfrac{dz}{z}$.

UNIT - II

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

1. Find the Fourier expansion of the function

$$f(x) = \begin{cases} 0, & -\pi \le x \le 0 \\ \sin x, & 0 \le x \le \pi. \end{cases}$$

2. Find the half range sine and cosine series for $f(x) = x(\pi - x), \ 0 \le x \le \pi$.

3. Obtain the Fourier series for the function $f(x) = e^{-ax}, \ -\pi < x < \pi$.

4. Express $f(x) = |x|$ as Fourier series in $(-\pi, \pi)$. Hence deduce
$$\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \ldots = \frac{\pi^2}{8}.$$

UNIT - III

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

1. Let V be the internal direct sum of $V_1, V_2, \ldots, V_n$. Then prove that V is isomorphic to their external direct sum $V_1 \oplus V_2 \oplus \ldots \oplus V_n$.

2. If $v_1, v_2, \ldots, v_n$ is a basis of V and $w_1, \ldots, w_m$ are linearly independent in V, then prove that $m \le n$.

3. If $u, v \in V$, an inner product space, then prove that $|(u, v)| \le \|u\| . \|v\|$.

4. Let V be a finite dimensional inner product space. Prove that V has an orthonormal set as the basis.

5. a) Prove that $L(S)$ is a subspace

   b) If $v_1, \ldots, v_n$ are linearly independent then prove that any vector in their linear span has a unique expression as a linear combination of $v_1, \ldots, v_n$.

UNIT - IV

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

1. Prove that a linear transformation T of a vector space V with finite basis $\alpha_1, \alpha_2, \ldots, \alpha_n$ is nonsingular if and only if the vectors $T(\alpha_1), \ldots, T(\alpha_n)$ are linearly independent.

2. If $A = m(T)$ with respect to the basis $v_1, \ldots, v_n$ and B is the matrix of T with respect to the basis $w_1, \ldots, w_n$ then prove that there exists a non singular matrix C such that $B = CAC^{-1}$.

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3. Prove that dimension of the domain is equal to $rank + nullity$.

4. Prove that $m(T_1 T_2) = m(T_2).m(T_1)$

5. Prove that inverse of a linear transformation is linear.

UNIT - V

Answer any **THREE** of the following.

(3x5=15)

1. Find the inverse of the matrix $\begin{bmatrix} 1 & 0 & 0 \\ 2 & 2 & -1 \\ 1 & -1 & 1 \end{bmatrix}$.

2. Solve the system of non-homogeneous linear equations

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

3. Let $q(x) = a_0 + a_1 x + ... + x^m$ be the minimal polynomial of $A \in M_n(F)$. Then prove that A is nonsingular if and only if $a_0 \neq 0$.

4. If $A \in M_n(F)$ and $\lambda_1, ..., \lambda_m$ in F be distinct characteristic roots of A. If $v_1, v_2, ..., v_m$ are the corresponding characteristic vectors then prove that $v_1, ..., v_m$ are linearly independent.

5. State and prove Cayley Hamilton theorem.

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(2007 batch onwards)

Reg No.:

St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester VI – Degree Examination
APRIL · 2019
MATHEMATICS -Paper VIII
Numerical Methods

Time: 3 Hours

Note: Answer all parts.

Max Marks: 100

PART A

I Answer any TEN of the following.

(10x2½=25)

1. Find the formula for the error in the quotient a/b.

2. Express the numbers 2.23853 and 1.2335 correct to four significant digits.

3. Find an interval in which the equation $x^3 - 3x - 5 = 0$ has a real root.

4. Write the Newton's backward difference interpolation formula.

5. What is the sixth difference of a polynomial of degree 5?

6. Express $\Delta^3 y_0$ in terms of y_0, y_1, y_2, y_3.

7. Define the divided difference $[x_0, x_1, x_2]$.

8. Write a formula for $\frac{dy}{dx}$ at $x = x_0$ using Newton's backward differences.

9. Find the approximate value of $\int_1^3 \frac{1}{x} dx$ by dividing $[1, 3]$ into 4 subintervals.

10. Find the column norm of the matrix $\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$

11. Find the rank of the matrix $\begin{bmatrix} 5 & -1 & 2 \\ 0 & 3 & 1 \\ 1 & 0 & 2 \end{bmatrix}$.

12. Show that A= $\begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix}$ is orthogonal.

13. Write the nth approximation in Picard's method.

14. Write Adams Moulton corrector formula.

15. For $y' = -y, y(0) = 1$, find $y(0.1)$ by Euler's method.

PART – B
UNIT - I

Answer any THREE questions.

(3×5=15)

1. Find a root of the equation $x^3 - 2x - 5 = 0$ correct to two decimal places using bisection method.

2. Using the method of iteration find the root of the equation $2x = \cos x + 3$, correct to 3 decimal places. Take $x_0 = \frac{\pi}{2}$.

3. Describe the method of false position to find the root of an equation.

4. Find a real root of the equation $x = e^{-x}$ using Newton Raphson method. Choose $x_0 = 1$.

5. Find a double root of the equation $x^3 - x^2 - x + 1 = 0$ choosing $x_0 = 0.8$.

UNIT – II

Answer any THREE questions.   (3×5=15)

1. Derive Newton's forward difference formula.

2. Find the missing term in the following table.

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

3. In the table below, the values of y are consecutive terms of a series of which the number 21.6 is the 6th term. Find the 10th term of the series.

x	3	4	5	6	7	8	9
y	2.7	6.4	12.5	21.5	34.3	51.2	72.9

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. Using Lagrange's interpolation formula, express the rational function $\dfrac{3x^2 + x + 1}{(x-1)(x-2)(x-3)}$ as a sum of partial fractions.

UNIT - III

Answer any THREE questions.   (3×5=15)

1. Using the following table, find $f(x)$ as a polynomial in x by divided difference formula.

x	-1	0	3	6	7
f(x)	3	-6	39	822	1611

2. 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

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

4. Evaluate $\int_a^b \dfrac{1}{1+x^2}\, dx$ using Simpson's one-third rule taking h=0.125.

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

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

Estimate the value of the solid formed.

UNIT - IV

Answer any THREE questions.   **(3×5=15)**

1. Examine the consistency of the system of equations
   $2x - 3y + 5z = 1,$ $3x + y - z = 2,$ $x + 4y - 6z = 1.$

2. Solve the following sytems of equations by Gauss elimination method
   $2x + 4y + z = 3,$ $3x + 2y - 2z = -2$ $x - y + z = 6$

3. 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.

4. Solve the sytems of equations $83x + 11y - 4z = 95$
   $$7x + 52y + 13z = 104$$
   $$3x + 8y + 29z = 71$$

   Gauss- Seidal method. Carryout 2 iterations

5. Explain Gauss elimination method to solve the system of $m \times n$ simultaneous linear equations.

UNIT - V

Answer any THREE questions.   **(3×5=15)**

1. Given $\frac{dy}{dx} - 1 = xy$ and $y(0) = 1$, obtain Taylor series for $y(x)$ and compute $y(0.1)$ correct to 4 decimal places. .

2. Given $\frac{dy}{dx} = x^2 + y$, with $y(0) = 1$ determine $y(0.02)$ and $y(0.04)$ using Euler's modified method, taking $h = 0.02.$

3. 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.

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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(2007 batch onwards)

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Reg. No:

St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester VI – Degree Examination
April–2019
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. An object falls starting from rest for 2 seconds. How far does it fall and how long does it take for the object to fall 144 feet?

2. Show that rain drops are too small to move the earth?

3. Show that if x is the distance traveled by falling body, dropped from rest then $\frac{dx}{dt} = 8\sqrt{x}$.

4. If $\overrightarrow{F(0)} = \begin{bmatrix} 80 \\ 40 \\ 20 \end{bmatrix}$ and $m_0 = 1$, $m_1 = 1$, $m_2 = 2$, $P_0 = \frac{3}{4}$, $P_1 = \frac{3}{4}$, find $\overrightarrow{F(\Delta)}$.

5. Find what proportion of women with $p = 0.1$ have a waiting time less than the mean for $p=0.1$.

6. Using inverse square law, show that rain drops are too small to move the Earth?

7. When do you say a model is accurate and when do you say robust?

8. Draw the curves representing $P(t)=r^t P(o)$.

9. When is a mathematical model called general?

10. Define the terms generality and fruitfulness for a mathematical model.

11. Define basic feasible solution for a transportation problem.

12. 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	

13. Find the first two terms of solution
$x(t+1)-x(t)=t^2 +t+1, \quad x(0) = -1$

14. State Knapsack problem

15. Suppose 20 percent of yeast population splits in any 15 minute interval, in one unit time of 2 hours. What formula connects $x(t+1)$ to $x(t)$?

PART – B
UNIT - I

Answer any THREE questions.   (3×5=15)

1. Explain the steps in building a Mathematical Model.

2. Construct the manufacturing progress curve model for airplane with progress rate of 90% and reformulate it.

3. Find the escape velocity using inverse square law model.

4. Construct Galileo's Gravitational Model, Evaluate it and modify it .

5. Derive an expression for terminal velocity of a drizzle drop. Find the terminal velocity of a drizzle drop, with diameter 0.00025 cm, Compare it with that of a fog droplet with diameter $\frac{1}{10}$th of that of the drop.

UNIT - II

Answer any THREE questions.   (3×5=15)

1. Construct the Leslie model for population growth.

2. Explain the inventory policy model.

3. Explain the family planning model and find an expression for $\bar{w}$ and s_m.

4. State the four categories of errors in modeling. Explain them using a "Controlled Source seismology".

5. Suppose a speck of dust is weighed and weight x is fit by uniform probability density function

$$y = \begin{cases} \dfrac{1}{10} & 5 \leq x \leq 15 \\ 0 & otherwise \end{cases}$$

What is the probability of getting a measurement between 5 and 8. If two measurements are taken, what is the probability that first falls between 5 & 8, the second falls between 8 & 10.

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 $(x_1, y_1), (x_2, y_2), \dots \dots, (x_n, y_n)$, then find the expression for m.

2. Find R² for the regression equation $y = 11.302x - 6.319$. Which is the best fit for the data given below.

x	0.54	0.70	0.76	1	1.65	2.35
y	0.7	2.0	2.9	4.2	6	25.4

3. Construct the College Enrollment model.

4. Find R² for the regression equation $y = 0.40x - 1.48$ for the table

X	28	68	178	248	298
Y	0	1.2	4.7	9.3	10.5

5. 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

G 503.6b(v)

UNIT - IV

Answer any THREE questions.   (3×5=15)

1. Construct Aristarchus Model and find its sensitivity.

2. Using the Malthus model, explain imprecise model can be valuable.

3. The power P supplied by a factory depends on external resistence x in the circuit. According formula $P= x \left(\dfrac{10}{100+x}\right)^2$, If x can be any positive number how should we choose it to get maximum power.

4. Solve by simplex method, Maximize $P = 5x_1 + 6x_2$
   subject to $x_1, x_2 \geq 0$ and $2x_1 + 4x_2 \leq 24$
   $$6x_1 + 3x_2 \leq 30$$

5. Minimize: $P = 3x + 2y$ graphically subject to $x, y \geq 0$, $5x + 7y \geq 35$ and $10x + 4y \geq 40$.

UNIT – V

Answer any THREE questions.   (3×5=15)

1. Find the optimal B.F.S for the following table.

2	1	3	5	50
2	2	4	1	35
1	4	3	2	70
40	55	25	35	

2. State the rules for Stepping Stone method.

3. Explain the algorithm for Construction of Euler's circuit in a graph.

4. Find the improvement index for each unused square where circular indicates B.F.S

1	2	5
○		○
2	3	5
	○	○
3	4	1
○		
5	1	2
○		

5. State north west Corner rule and apply it to the table.

	D_1	D_2	D_3	
S_1				55
S_2				25
S_3				35
	35	45	35	

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(2014 Batch onwards)

G 503.6b (vi)

Reg. No: ☐☐☐☐☐☐

St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester VI – Degree Examination
April - 2019

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. Distinguish between probability mass function and probability density function.

2. Show that $E\left(\dfrac{-X}{a}\right) = -\dfrac{1}{a}E(X)$.

3. State any two properties of a cumulative distribution function.

4. Derive the variance of the Bernoulli random variable with parameter p.

5. Suppose X is a binomial variate with parameters $\left(6, \dfrac{1}{2}\right)$ find the mode of the

   distribution.

6. Suppose X is a Poisson variate satisfying $P(x = 0) = P(x = 1)$. What is $E(X)$?

7. Explain the relationship between negative binomial distribution and geometric distribution.

8. For a binomial random variable with parameters n and p; mean $= 16$ and variance $=4$. Find the parameters of the variable.

9. Obtain the mean of X with p.d.f. $f(x) = \dfrac{1}{\theta}e^{-x/\theta}, x > 0$.

10. Write down the probability density functions of beta variate of first kind and second kind.

11. Show that for normal distribution all odd ordered moments about mean vanish.

12. Find the MGF of gamma distribution.

13. Find mode of Poisson distribution.

14. State the properties of normal distribution.

15. What do you mean by convergence in probability and convergence in distribution.

PART – B
UNIT - I

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

1. State and prove addition theorem of expectation for discrete and continuous random variables.

2. If a random variable X has the following distribution.

X	10	11	12	13	14	15
$p(x)$	$k+0.02$	$k+0.05$	$5k-0.02$	$7k+0.03$	$2k+0.02$	$2k$

Find a) k b) $V(x)$ c) $V(0.3X)+0.3$ d) $V(0.3X+0.3)$

3. If X is a random variable with p.d.f. $f(x)=6x(1-x); 0<x<1$. Find its mean and variance.

4. For the following bivariate probability distribution find the correlation coefficient r_{xy}.

x \ y	1	2	3
-5	0	0.1	0.1
0	0.1	0.2	0.2
5	0.2	0.1	0

UNIT - II

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

1. Find the mean and variance of negative binomial distribution.

2. The number of accidents occurring in a city on a day follows Poisson distribution with parameter 1.7

   i) Find the probability that on a particular day no accidents occur.

   ii) How many days of an year would you expect to be free of accidents?

3. State and prove lack of memory property of geometric distribution.

4. a) A car hiring firm has 2 cars which the firm hires. Day by day the demand for a car on each day is distributed as a Poisson distribution with mean 1.5. Calculate the probability of the days on which

   i) Neither of the cars are used

   ii) Some demand is refused.

   b) The probability that a student pilot passes the written test for a private pilot license is 0.7. Find the probability that the student will pass the test.

   i) On the third day

   ii) Before the fourth day.

                                            (3+4½)

UNIT - III

Answer any **TWO** of the following.

                                            (2×7½=15)

1. a) Derive an expression for even order central moments of a normal distribution.

   b) State and prove additive property of gama distribution with one parameter.

                                            (4½+3)

2. Find the mean and variance of beta distribution of second kind.

G 503.6b (vi)

3. A random variable distributed normally has an unknown mean and unknown S.D. The probability that a R.V X exceeds 4 is 0.9772 and the probability that X exceeds 5 is 0.9332. Find the mean and standard deviation.

4. a) The life in years of a certain type of electrical switch has an exponential distribution with an average life of 2 years. If 100 of these switches are installed in different systems.

   i) What is the probability that atmost 30 fail during the first year?

   ii) What is the probability that atleast 20 fail in the first year?

   b) Derive median and variance of an exponential variate with parameter θ.

   (3+4½)

UNIT - IV

Answer any _TWO_ of the following.   **(2×7½=15)**

1. Suppose that (X,Y) is a two-dimensional continuous R.V has a bivariate normal distribution find the marginal distribution of X.

2. If (X,Y) has a bivariate normal distribution obtain the conditional distribution of X given $Y=y$.

3. Deduce the M.G.F. of bivariate normal distribution and hence obtain its mean and variance.

4. Let X and Y have BND with $\mu_X=5$, $\mu_Y=10$, $\sigma_X^2=1$ $\sigma_Y^2=25$ and $P=0$.
   Find i) $P[(X+Y)\le16]$ ii) $P[(X+Y)>15]$ iii) $P[(2X+Y)\le15]$.

UNIT - V

Answer any _TWO_ of the following.   **(2×7½=15)**

1. State and prove Linderberg Levy central limit theorem.

2. $\{X_n\}$ is a sequence of random variables with $P\left(X_k=\pm k^{¼}\right)=\frac{1}{2}$. Examine whether WLLN holds for the sequence $\{X_n\}$.

3. a) Life time of a certain brand of an electric bulb may be considered as a random variable with mean 1200 hrs and S.D 250 hrs. Using central limit theorem find the probability that the average life of 60 bulbs

   i) Exceed 1400 hrs   ii) Between 1250 and 1350 hrs

   b) An unbiased coin is tossed 100 times. Using central limit theorem, find the probability that number of heads

   i) Between 30 and 55   ii) more than 60   **(4+3½)**

4. a) State and prove any two properties of convergence in probability.

   b) State Markov's theorem.   **(6+1½)**

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(2015 batch onwards)

G 504.6a

Reg. No: ☐☐☐☐☐☐

St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester VI– Degree Examination
April– 2019
ELECTRONICS - Paper VII
Biomedical Instruments, VLSI and Robotics

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. **Answer All questions.**

    (12×1=12)

    i) Which of the following can be measured using piezo-electric transducer?
        a) velocity   b) Displacement   c) force d) sound

    ii) The nMOS inverter consists of nMOS transistor as driven and
        a) Resistor as a load
        b) Depletion mode nMOS as a load
        c) Enhancement mode nMOS as a load
        d) Any of the above

    iii) What are the advantages of BiCMOS?
        a) High gain
        b) High frequency characteristics
        c) Better noise characteristics   d) All of the above

    iv) Flash memory is a non-volatile storage device in which data
        a) can be erased physically
        b) can be erased electrically
        b) can be erased magnetically
        d) can not be erased.

    v) Which is comparatively slower device?
        a) ROM   b) RAM   c) Flash memory   d) Static RAM

    vi) The drives in industrial robot are known as _____
        a) Actuators   b) controllers   c) sensors   d) Manipulators

    vii) Which of the following is not a characteristic of ideal transducer?
        a) High dynamic range   b) Low linearity   c) High repeatability   d) Low noise

    viii) EMG measures_____
        a) Electrical activity of the heart
        b) Electrical activity of the brain
        c) Electrical activity of the visual cortex   d) Electrical activity of the muscle

    ix) Bio-optical physiological signals are used in the determination of _____
        a) blood oxygenation   b) blood distribution
        c) functioning of heart   d) functioning of brain

    x) The degree to which variations in the output of an instrument follow input variations is referred to as
        a) Sensibility   b) Linearity   c) hysteresis   d) Accuracy

    xi) Physiological signals obtained from the retina of the eye is called
        a) ECG   b) EMG   c) ERG   d) EEG

    xii) _____ represents depolarization in action potential curve
        a) +ve slope   b) -ve slope   c) Zero slope   d) both a and b

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

    (10×1=10)

    i) What is meant by Electroencephalogram?

    ii) What is the magnitude of action potential of a cell?

    iii) Give on example for Respiration sensor.

    iv) What is meant by pneumograph?

    v) Mention one application of Resistive transducer.

    vi) What do you mean by microelectrodes?

    vii) Why power dissipation to minimum is CMOS circuits?

viii)   Draw the symbol Transmission Gate in VLSI.

ix)   What type of transistors are used in PULL UP tree in CMOS network.

x)   Give the full form of VLSI.

xi)   Give the equation for sheet resistance.

xii)   What is meant by velocity sensor?

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

i)   Mention any two basic types of biopotential electrodes.

ii)   What is the principle of working of a thermistor based transducer as respiration sensor?

iii)   Mention any two types of ventilators.

iv)   Mention any two requirements for giving specifications of biomedical instrumentation system.

v)   Mention any two differences between static & dynamic CMOS logic.

vi)   Explain the working of pass transistor.

vii)   Draw the circuit diagram of a Flip-Flop consturcted in VLSI technology.

viii)   State Moore's law

ix)   Give the circuit of two input NAND gate using CMOS.

x)   Draw the nMOS inverter circuit.

xi)   Explain the working of inductive type of transducer.

xii)   What are the power dissipations in CMOS circuits?

Section – B

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

i)   Explain the basic objectives of man-instrumentation system.

ii)   Explain photoelectric methods of measuring pulse pressure.

iii)   What are the diagnoses made from EEG?

iv)   With a table explain Microelectronics evolution.

v)   With circuit diagram explain the working of a BiCMOS inverter.

vi)   Design a 2 to 1 MUX using VLSI design Technique.

vii)   Design a XNOR gate using VLSI design technique.

viii)   Explain the basic architecture of FPGA.

ix)   With a neat diagram explain the working of a Rotational encoder.

x)   With a diagram explain the classification of Active and passive transducers.

Section – C

Answer any THREE full questions

5. a)   With necessary diagrams explain   (5)
         i) Polarisation   ii) Depolarisation and
         iii) Repolariization of a cell when it is stimulated

    b)   How does ECG help in the diagnosis of malfunctioning of the heart?   (5)

6. a)   With a block diagram, explain the working of a dialysis machine.   (5)

    b)   Explain the principles and techniques of Impedance pneumograph.   (5)

7. a)   Design a half adder using VLSI design technique.   (5)

    b)   Construct CMOS circuit for the evaluation of Boolean expression   (5)
         $y = \overline{A + B}$ and explain its working.

8. a)   With a neat diagram explain a simple linear actuator.   (5)

    b)   With an example explain a programmable logic Array (PLA).   (5)

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(2015 batch onwards)

G 504.6b

Reg. No. ☐☐☐☐☐

St Aloysius College (Autonomous)
Mangaluru

B.Sc. Semester VI – Degree Examination
April - 2019
ELECTRONICS – Paper VIII
8086 Microprocessor and C language

Time: 3 hrs.   Max Marks: 100

Note: This question paper has THREE sections. SECTION A, SECTION B and SETION 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 8086 μP _____ flag is used during string manipulation.

   a) IF   b) TF   c) DF   d) OF

ii) _____ register is used to hold the port address during I|O operations.

   a) BX b) DX c) DL d) DI

iii) In the statement NUM DD 50 dup(?) the variable NUM will be associated with _____ byte locations.

   a) 200   b) 100   c) 50   d) 800

iv) _____ is non-maskable interrupt in 8086 μP.

   a) INT 00H   b) INT21H   c) INT02H   d) INT40H

v) _____ instruction transfers control from main program to a procedure.

   a) RET   b) CALL   c) IRET   d) JMP

vi) When REP prefix is used with string instructions, _____ register is used to hold the loop count.

   a) CX   b) CL   c) BX   d) DX

vii) _____ is a unary operator in C language.

   a) <   b) %   c) --   d) =

viii) _____ is the only function all C programs must contain.

   a) system()   b) printf()   c) main()   d) getch()

ix) _____ is not a data type in C language.

   a) real   b) char   c) double   d) float

x) The break statement is used to exit from _____

   a) an if statement   b) for loop

   c) program   d) main() function

xi) _____ is not a storage class in C language.

   a) Static   b) dynamic   c) auto   d) extern

xii) An array is a collection of _____

   a) different data types scattered through memory
   b) same data types placed next to each other in memory
   c) Same data types scattered throughout memory
   d) Different data types placed next to each others in memory.

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(10x1=10)

2.   **Answer any <u>TEN</u> questions:**
  i)   What is meant by minimum mode configuration of 8086 μP?
  ii) Write the general format of LENGTH directive.
  iii) What are conditional branch instructions?
  iv) What is meant by non-maskable interrupt?
  v)   What is a local variable in a macro?
  vi) Mention the limitation of programmed I/O.
  vii) What is meant by void function?
  viii) Can "int" data type be used to store the value 32768? Justify your answer.
  ix) Differentiate between =and== operators in C language.
  x)   Rectify the error and write the correct C language statement.
       For (i=0,i<10,i^{++});
  xi) Mention the function of scanf() statement in C language.
  xii) What is a recursive function?

3.   **Answer any <u>TEN</u> questions.**   (10x2=20)
  i)   Mention any two advantages of memory segmentation.
  ii) Write an alternate instruction for each of the following codes.

a) MOV ALL,05H	B) PUSH AX
MOV BL, 02H	PUSH BX
MUL BL	POP AX
	POP BX

  iii) With example explain EVEN directive.
  iv) Briefly explain interrupt vector table.
  v)   With an example explain the procedure to calculate the physical address.
  vi) Mention the advantages of string instructions in 8086 μP.
  vii) Given k=50, p=10, x=2, z=41. Evaluate the following
         a) (k!=p)&&(x>z)
         b) (k==p)&&(x!=z)
  viii) What is a string? Write the general format of defining a string in C language.
  ix) Mention the differences between getchar() and getch() functions.
  x)   Define array in C language. Initialize an array of 10 integers.
  xi) Explain 'break' statement in C language.
  xii) Differentiate between while & do...while statements in C language.

SECTION – B

4.   **Answer any <u>SEVEN</u> questions.**   (7x4=28)
  i)   Draw the bit pattern of PSW and explain the control flags of 8086 μP.
  ii) With example explain any two arithmetic instructions in 8086 μP.
  iii) Write an 8086 assembly language program to find largest of an array of 10 bytes.
  iv) Explain the stack and the functions associated with it in 8086 μP.

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v) Write a note on MACROs in 8086 μP.

vi) With example explain switch case statements in C language.

vii) Write a 'C' program to get the sum of two matrices.

viii) With example explain different data types used in C language.

ix) With an example explain recursion of functions in C language.

x) Mention the outputs of each of following C language program segments.

 a) int x=100;
  printf("%d\n",10+x++);
  printf("%d\n",10+C++x);

 b) int x=100, y=200;
  printf("%d,(x>y)?x:y);

 c) int,f=1, n=3;
  For (i=1;i<=n;i++) .
  {
  f=f*i;
  }
  Printf("result=%d",f);

 d) int x=10,y=15, t;
  t=x;
  x=y;
  y=t;
  Printf("x=%d,y=%d",x,y);

SECTION – C

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

5. a) What are interrupts? Explain the steps involved in the execution of interrupts in 8086 μP. **(6)**

 b) With example explain any two string instructions in 8086 μP. **(4)**

6. a) With block diagram, explain the minimum mode configuration of 8086 μP. **(6)**

 b) With examples explain **(4)**
  i) OFFSET and ii) SIZE directives of 8086 μP.

7. a) With examples explain the different relational operators in C language **(6)**

 b) Explain i) gets() and (ii)printf() statement of C language. Give example to each. **(4)**

8. a) Write a C language program to concatenate two strings. **(6)**

 b) Explain any two storage classes in C language. **(4)**

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(2015 Batch onwards)

G505.6a

Reg. No.: ☐☐☐☐☐☐

St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester VI – Degree Examination
April - 2019
COMPUTER SCIENCE – PAPER VII
MICROPROCESSOR ARCHITECTURE AND PROGRAMMING

Time: 3 Hours.   Max Marks: 100

PART –A

1. **Answer any TEN of the following.**   **(10X1=10)**

a) Write the difference between SUB and CMP instructions.

b) What is the role of direction flag in string transfer instructions?

c) Write any two value returning attribute directives.

d) Differentiate between instruction and directive.

e) Write the full form of LEA.

f) What is meant by Polling?

g) How many address lines are present in 8086 processor?

h) Give the syntax and meaning of JNZ instruction.

i) What is an IP register? Why it is needed?

j) Differentiate between NOT and NEG instruction.

k) Write any two software interrupt instructions.

l) Write the prototype of function int86x.

2. **Answer any FIVE questions.**   **(5X2=10)**

a) Find the address of the next instruction to be executed if CS=2000, IP=475H, SI=0300H.

b) Define macro in 8086.

c) What is the purpose of LDS instruction of 8086?

d) What is meant by inline assembly language programming?

e) Write the purpose of PUSH and POP instructions.

f) Differentiate between intersegment and intrasegment jumps.

PART – B

Answer any ONE full question from each unit.   **(4X20=80)**

Unit I

3. a) What is addressing mode? Explain any three types of addressing modes in detail.   **(8)**

b) Explain the following assembler directives with syntax and example.

   i) PUBLIC ii) EXTRN iii) ORG iv) ENDP   **(6)**

c) Explain the data transfer instructions of 8086.   **(6)**

4. a) With the help of timing diagram, explain the various sub activities during memory write cycle.   **(8)**

b) Explain any four branching instructions. (8)

c) Explain any two segment registers of 8086. (4)

Unit II

5. a) With syntax and example, explain any four string operation instructions. (6)

b) Explain any five flag manipulation instructions. (5)

c) Explain the purpose of DAA instruction with example. (5)

d) Explain the packed BCD arithmetic instructions. (4)

6. a) What is a REP Prefix? How it is used in string manipulation instructions? Explain with example. (8)

b) Explain the various shift instructions with example. (6)

c) Explain the CBW and CWD instructions with an example each. (6)

Unit III

7. a) Distinguish between a macro and procedure. Explain with syntax and example, how to define macro and procedure. (8)

b) What is meant by segment combination? Explain any three possible combine types. (6)

c) What is nested macro? Explain with example. (6)

8. a) Explain the stack operations with neat diagram. (7)

b) Explain any two methods of parameter passing to a procedure. (5)

c) Write an ALP to find the length of entered string. (4)

d) What is the use of local variables? Explain. (4)

Unit IV

9. a) Differentiate between hardware and software interrupts. (6)

b) Write a note on interrupt service routine. (6)

c) Explain the interrupt INT 21H with an example. (4)

d) Write a note on maskable and non-maskable interrupts. (4)

10. a) Explain interrupt service routine. (6)

b) Explain the interface functions. (6)
   i) intdosx   ii) intr   iii) getinterrupt

c) Explain the interrupt I/O with neat diagram. (5)

d) Write a note on single step interrupt. (3)

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G505.6b(i)

(2015 Batch onwards)

Reg. No.: ☐☐☐☐☐☐

St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester VI – Degree Examination
April - 2019
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) What is a web browser?

   b) What are the attributes used in <body> tag?

   c) Define <table> tag.

   d) List the four components necessary to build a PHP application in your development environment.

   e) What is the output of the following code?

   ```
   < ? php
       echo "you said\"Hello\"  " ;
   ? >
   ```

   f) What does the echo statement do?

   g) What is the use of gettype () operator?

   h) What is an associative array?

   i) What are the two types of PHP arrays?

   j) Explain any two PHP error levels.

   k) What are the three components of a function?

   l) State any two categories of SQL statements.

PART – B

Answer any ONE full question from each unit.   (4X20=80)

Unit I

2. a) What is a Style Sheet? Explain the different types of Style Sheet.   **(8)**

   b) Explain the structure of an HTML program.   **(6)**

   c) Explain the different types of lists in HTML.   **(6)**

3. a) Write a note on – i) Electronic Mail   ii) Web Server   **(6)**

   b) Explain any five text formatting tags.   **(5)**

   c) Explain the <img> tag in HTML.   **(5)**

   d) Explain the usage of style IDs with example.   **(4)**

Unit II

4. a) With example, explain any two types of loops.   **(6)**

   b) Explain the following string functions with example-

   i) strcmp()   ii) substr()   iii) trim()

   iv) addslashes()   v) str_replace()   **(5)**

   c) List and explain the data types available in PHP.   **(5)**

   d) Explain the if-elseif-else statement with an example.   **(4)**

5. a) Write the difference between a while loop and a do-while loop. Illustrate your answer with an example.

(6)

b) Explain any five numeric functions to convert between number bases with example.

(5)

c) Explain interrupting and skipping loops with the help of an example.

(5)

d) Write the features of PHP.

(4)

Unit III

6. a) Explain the following array functions with examples.

i) array-slice()   ii) shuffle()   iii) array-diff()

iv) asort()   v) array-intersect()

(10)

b) How can you set default argument values in functions? Explain with the help of an example.

(5)

c) State the important advantages of packaging your code.

(5)

7. a) Explain any five Date and Time functions.

(10)

b) Explain how arrays can be processed using an Array Iterator.

(6)

c) How can you make PHP automatically assign the next available array index to a value? Explain with the help of an example.

(4)

Unit IV

8. a) Write PHP code to record every visit made by a user to web page using a session.

(8)

b) Write the SQL command for each of the following operations:

i) Search for records matching specific criteria.

ii) Delete a specific subset of rows.

iii) Modify record matching specific criteria.

(6)

c) Explain the different PHP Error Categories with an example.

(6)

9. a) Explain the following PHP validation functions-

i) is-numeric ()   ii) strval ()   iii) ctype-digit ()

iv) checkdate ()   v) filter-var ()

(10)

b) Explain the various functions used to assist developers in the tasks of sanitizing input and output.

(6)

c) List some of the security features of cookies.

(4)

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(2016 Batch Onwards)

G 506.6a

Reg. No.:

St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester VI – Degree Examination
April - 2019
STATISTICS – PAPER VII
SAMPLING THEORY

Time: 3 hrs.   Max Marks: 100

Note: Answer all parts

PART – A

Answer any TWELVE of the following.   (2×12=24)

1. Define sampling frame.
2. Briefly explain multi stage sampling.
3. State any two advantages of sampling.
4. What are non sampling errors?
5. Define SRSWOR.
6. Show that $E(\bar{y}) = \bar{y}$ under SRSWOR.
7. Prove that $V(\bar{y}) = \frac{\sigma^2}{n}$, under SRSWR.
8. Show that SRSWOR is more efficient than SRSWR in estimating the mean of a population.
9. Define stratified random sampling.
10. State any two merits of stratified random sampling.
11. Write down the expression for the standard error of $V(\bar{y}_{st})$.
12. Explain proportional allocation in case of stratification.
13. Give an example for cluster sampling.
14. Explain sampling of attributes.
15. With usual notation show that $E(p) = P$.

PART – B

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

16. What is a sample survey? In what respect it is superior to census survey?
17. Explain lottery method of drawing random sample.
18. Show that sample mean square is an unbiased estimator of population variance under SRSWR.
19. Show that with usual notations under SRSWOR $V(\bar{y}) = \frac{N-n}{Nn}S^2$.
20. Show that $\bar{y}_{st} = \sum W_h \bar{y}_h$ is unbiased for the population mean in stratified random sampling. Also find its variance.
21. Derive an expression for the variance of $\bar{y}_{st}$ under proportional allocation.
22. With usual notations, prove that $V(\bar{y}_{sys}) = \frac{S^2}{n}\frac{(N-1)}{N}[1 + (n-1)\rho]$ where ρ is the intraclass correlation coefficient.
23. What are the advantages and disadvantages of systematic sampling?

24. Prove that under SRS for attributes,

$$V(p) = \left(\frac{N-n}{N-1}\right)\frac{PQ}{n}.$$

PART – C

Answer any FOUR of the following.   (10×4=40)

25. a. Explain briefly principal steps in a sample survey.   (6)

    b. What are the sources of sampling error?   (4)

26. a. Explain different types of sampling.   (6)

    b. How do you draw random sample from a frequency table?   (4)

27. Prove that in SRSWOR $E(s^2) = S^2$.   (10)

28. With usual notations prove that $V(\bar{y}_{st})_{opt} \leq V(\bar{y}_{st})_{prop} \leq V(\bar{y}_{st})_{SRSWOR}$.   (10)

29. With usual notations prove that $V(\bar{y}_{sys}) = \frac{N-1}{N}S^2 - \frac{k(n-1)}{N}S^2_{wsy}$

Also compare $V(\bar{y}_{sys})$ with $V(\bar{y})_{SRSWOR}$.   (10)

30. a. What do you mean by cluster sampling?   (3)

    b. In a single stage cluster sampling with clusters of equal size show that sample mean is unbiased estimator of the population mean. Also derive an expression for the variance of the estimated mean.   (7)

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(2016 Batch Onwards)

G 506.6b(i)   Reg. No.:

St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester VI – Degree Examination
April - 2019
STATISTICS – PAPER VIII
OPERATIONS RESEARCH

Time: 3 hrs.   Max Marks: 100

Note: Answer all parts

PART – A

Answer any **TWELVE** of the following.   (2×12=24)

1.a) Define LPP.

 b) With reference to an LPP define

   i) Multiple solution   ii) Unbounded solution

 c) What are artificial variables?

 d) What are surplus variable?

 e) What is meant by dual of an LPP?

 f) Define transportation problem.

 g) Write the mathematical model of assignment problem.

 h) How do you solve an unbalanced transportation problem?

 i) Mention any two advantages of duality in LPP.

 j) Define loop.

 k) Write down the steps involved in converting a LPP into standard form.

 l) State any two characteristics of game.

 m) Define zero-sum game.

 n) Define inventory.

 o) Explain saddle point method.

PART – B

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

2. Briefly explain various phases of OR.

3. Find the basic solutions for the system of equations

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

   $2x_1 + x_2 + 7x_3 + 2x_4 = 4$

4. Explain the graphical method of solving an LPP.

G 506.6b(I)

5. Write down the dual of the following LPP.

$Max\ z = x_1 - 3x_2 + 4x_3$

$s.t \qquad 2x_1 - 4x_2 + 4x_3 \le 8$

$\qquad\qquad 3x_1 - 2x_2 \le 12$

$\qquad\qquad -3x_1 + 4x_2 + 8x_3 \le 10$

$\qquad\qquad 5x_1 + 2x_2 + 3x_3 \le 6$

$\qquad\qquad x_1, x_2 \ge 0$ and X_3 is unrestricted in sign.

6. Explain the mathematical formulation of TP.

7. With reference to a TP, define –
   i) Feasible solution   ii) Optimum solution   iii) Non-degenerate solution

8. How do you obtain IBFS to a TP by North West Corner Rule?

9. Explain any three models of OR.

10. Under game theory, explain the concept of dominance method.

PART – C

Answer any <u>FOUR</u> of the following. (10×4=40)

11. a. Give the algorithm of Big M method for solving an LPP. (6)

    b. Give an example of an LPP with the objective function,

       i) to be minimized   ii) to be maximised (4)

12. a. Explain the U-V method for testing the optimality of a BFS. (7)

    b. Explain the matrix minima method. (3)

13. a. Show that in a AP the optimal assignment remains unchanged when we subtract a constant from each element in a row. (6)

    b. State and prove the necessary and sufficiency condition for the existence of feasible solution in a TP. (4)

14. a. Derive the expression for the EOQ in case of uniform demand, instantaneous production, where shortages are not allowed. (6)

    b. Derive the criterion for solving a Newspaper Boy Problem. (4)

15. a. Show that for any zero-sum two person game, where optimal strategies are not pure strategies and for which the player A's pay off matrix is

$$\begin{array}{c} & B \\ \begin{array}{c} x_1 \\ A \\ x_2 \end{array} & \begin{bmatrix} y_1 & y_2 \\ a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix} \end{array}$$ and optimal strategies (x_1, x_2) and (y_1, y_2) are

   determined by $\dfrac{x_1}{x_2} = \dfrac{a_{22}-a_{21}}{a_{11}-a_{12}}, \dfrac{y_1}{y_2} = \dfrac{a_{22}-a_{12}}{a_{11}-a_{21}}$ and the value of the game to

   player A is given by $Y = \dfrac{a_{11}a_{22} - a_{12}a_{21}}{(a_{11}+a_{22})-(a_{12}+a_{21})}$ (5)

    b. What do you mean by price breaks? Explain the procedure of finding EOQ with two price breaks. (5)

16. Derive the expression for the EOQ in case of uniform demand, (10)

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(2014 Batch onwards)

G 507.6a

Reg. No. ☐☐☐☐☐☐

St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester VI – Degree Examination
April - 2019
BOTANY-Paper VII
Plant Physiology

Time: 3 hrs.   Max Marks: 100

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

SECTION - A

Answer any **TEN** of the following in a few sentences each   (10×2=20)

1. Define the terms solute potential and pressure potential.
2. Write any four physiological role played by Calcium in plant nutrition.
3. Why plants need proper irrigation when synthetic fertilizers are put to them?
4. What are antitranspirants?
5. Define the law of limiting factor.
6. Write the significance of photorespiration.
7. Define Pasteur's effect.
8. What is Emerson's effect.
9. What is scarification?
10. What are dormins? Give an example.
11. Mention and define the movement seen in the leaflets of *Desmodium gyrans*.
12. Mention any two practical applications of auxins.

SECTION– B

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

1. Explain the role of nitrogen and phosphorus in plants.
2. Write a note on Guttation.
3. Explain root pressure theory of Ascent of sap.
4. Explain the fermentation process.
5. Write a note on pigment systems.
6. What is vernalisation? Add a note on its practical applications.
7. Explain the types of paratonic movements of locomotion.
8. Explain the physiological effects of cytokinins.
9. What is oxidative photophosphorylation ? Explain.

SECTION – C

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

1. Describe passive absorption of water by plants.
2. Describe mass flow hypothesis of movement of organic solutes in plants.
3. Give a detailed account on glycolysis.
4. Describe the different steps of C_4 cycle.
5. Explain growth regions. Add a note on growth curve.
6. Describe different types of nastic movements.
7. Describe different types of plants classified on the basis of photoperiodism. Add a note on photoperiodic induction.
8. Describe non-cyclic photophosphorylation.
9. Give an detailed account proton exchange pump theory of stomatal movement.

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(2014 batch onwards)

G. 507.6b

Reg. No: ☐☐☐☐☐☐

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

April - 2019

BOTANY – Paper VIII
Molecular Biology II, Biotechnology, Plant Propagation and Pharmacognosy

Time: 3 Hours   Max. Marks: 100

Instructions: a) Answer all the sections.
b) Draw diagrams wherever necessary.

SECTION – A

I. **Answer any TEN of the following in a few sentences each. (10x2=20)**

1. Differentiate between structural and regulator genes.

2. What are monoclonal antibodies? Mention any two applications.

3. What is the principle of working of LAF cabinets?

4. Define pharmacognosy. Mention any two branches.

5. Mention any two factors affecting cultivation of medicinal plants.

6. What is drug substitution? Give examples.

7. What are glycosides? Give any two examples.

8. What is the significance of Shikmate Pathway?

9. Name the botanical sources of any two lipid based drugs.

10. Mention any two therapeutic applications of resins.

11. List out any four morphological features employed in crude drug evaluation with examples.

12. Write about any two hazards of transgenic plants.

SECTION – B

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

1. Write a note on gene battery model.

2. Give a comparative account of Siddha and Homeopathy systems of medicine.

3. What is *ex-vivo* gene therapy? Explain with an example.

4. Explain the role of phytohormones in organogenesis.

5. What are organized drugs? Explain with suitable examples.

6. Explain how anatomical features are used in drug evaluation.

7. Explain the therapeutic potential of phenolic compounds with examples.

8. Write a short note on secondary metabolism.

9. Explain the oxidative phase of pentose phosphate pathway.

SECTION – C

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

1. Explain processing of mRNA in eukaryotes.
2. Described the process of gene-cloning using a plasmid vector.
3. Explain the principle, types and applications of spectroscopy.
4. Explain haploid plant production. Write any two applications of haploid plants.
5. Give an account of chemical evaluation of crude drugs with examples.
6. List out the physico-chemical properties and therapeutic applications of alkaloids with examples.
7. Describe Citric Acid cycle with the help of a schematic representation.
8. Give an account of primary metabolites as crude drugs.
9. Write short notes on

    a) Ayurveda   b) History of Pharmacognosy

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(2014 Batch onwards)

G.508.6a

Reg. No.:

St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester VI – Degree Examination
April - 2019
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

(10X2=20)

I   Answer any TEN of the following.

a) Enumerate any two functions of IgG.

b) Differentiate innate immunity from acquired immunity.

c) Expand AIDS. Name the pathogen that causes AIDS.

d) List the symptoms of typhoid.

e) Name the primary and secondary hosts of *Wuchereria*.

f) Write short note on H_1N_1.

g) Define LC_{50} and LD_{50}

h) Name any two indigenous and exotic breeds of cattle.

i) What is spinning with reference to sericulture?

j) Name the different castes of honeybee colony.

k) Name any two poultry diseases.

l) What is vermiwash? Mention its uses.

PART – B

Select ONE full question from each unit.

Unit I

II a) Give a detailed account on secondary lymphoid organs.   **(10)**

b) Explain the mode of transmission and effects of arthritis.   **(5)**

c) Write a note on toxoid vaccines.   **(5)**

OR

III a) Explain the mode of transmission, effects and preventive measures
of Myasthenia gravis.   **(10)**

b) Define passive and active immunity. Explain with relevant
examples.   **(5)**

c) Write a note on antibody diversity.   **(5)**

Unit II

IV a) Give a detailed account on transmission and mode of infection of
cholera and measles.   **(10)**

b) Discuss the pathogenecity of *Ascaris*.   **(5)**

c) Explain the control measures of malaria.   **(5)**

OR

G.508.6a

V a) Explain the life history of *Ancylostoma*. (10)

b) Write a note on dengue. (5)

c) Explain the mode of transmission and symptoms of giardiasis. (5)

Unit III

VI a) Explain the life history of *Bombyx mori*. Add a note on silkworm rearing. (10)

b) Give a brief account on construction of aquaculture tanks. (5)

c) What is bioaccumulation? Explain with an example. (5)

OR

VII a) Give a detailed account on factors influencing toxicity. (10)

b) Discuss the utility of cattle in biogas and manure production. (5)

c) Write explanatory note on induced breeding and fish seed production. (5)

Unit IV

VIII a) With reference to apiculture explain –

i) Economic importance of honey and bee wax.

ii) Bee keeping and management (10)

b) Describe semi intensive method of poultry management. (5)

c) Write any five applications of vermicompost. (5)

OR

IX a) Explain the life cycle of earthworm. Add a note on vermicomposting. (10)

b) Write a brief note on honey bee diseases and their control measures. (5)

c) Write a short note on raniket disease of poultry. (5)

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(2014 Batch onwards)

Reg. No.: ☐☐☐☐☐☐

G.508.6b

St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester VI – Degree Examination
April - 2019
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

(10X2=20)

I   **Answer any <u>TEN</u> of the following.**

a) What is social behaviour? Mention any two animals as examples.

b) How do honey bees communicate?

c) Define instinct behaviour. Give an example.

d) What is polygamy? Give an example.

e) Explain parental care in *Racophorous*.

f) In connection with 'courtship behaviour', what is display? Give an
example.

g) Define Hardy-Weinberg law.

h) What are co-acervates?

i) Define genetic drift.

j) What is sympatric speciation?

k) Define homologous organ. Give an example.

l) Define micro evolution with example.

PART – B

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

Unit I

II a) Define innate behaviour. Give an account of different types of innate
behaviour.   (10)

b) Explain social behaviour in monkey troop.   (5)

c) Write a note on foraging behaviour.   (5)

OR

III a) What is society? Explain social behaviour in termites.   (10)

b) Explain chemical communication with example.   (5)

c) Write a note on – i) conditional reflex
ii) insight learning   (5)

Unit II

IV a) Explain courtship behaviour in spiders.   (10)

b) Give detailed account of parental care in fishes.   (5)

c) Write a note on polyandry.   (5)

OR

Contd...2

V a) What is migration? Explain the different types of migration in birds.   **(10)**

 b) Write a note on parental care in amphibia.   **(5)**

 c) Explain courtship behaviour in birds.   **(5)**

Unit III

VI a) Explain the postulates of Darwinism.   **(10)**

 b) Explain the evidences of organic evolution from biochemistry.   **(5)**

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

OR

VII a) Give an account of evidences of organic evolution from anatomy and morphology.   **(10)**

 b) What is Lamarckism? Explain.   **(5)**

 c) Write a note on pre-cambrian rocks.   **(5)**

Unit IV

VIII a) What are fossils? Give an account of fossilization and types of fossils.   **(10)**

 b) With reference to evolution of horse describe – i) Eohippus

                                                                  ii) Mesohippus   **(5)**

 c) What is speciation? Write a note on allopatric speciation.   **(5)**

OR

IX a) With reference to evolution of man explain –

 i)   Australopethicus

 ii)   trends in human evolution   **(10)**

 b) Give an account of major extinctions in the geological time scale.   **(5)**

 c) Give a brief account of dinosaurs.   **(5)**

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(2014 batch onwards)

G 509.6a

Reg. No.:

St Aloysius College (Autonomous)
Mangaluru
B.Sc. - Semester VI – Degree Examination
April - 2019
MICROBIOLOGY – Paper VII

Principles of Bacterial Genetics, Genetic Engineering and Bioinformatics

Time: 3 hrs.

Max Marks: 100

Instructions: Draw Diagrams wherever necessary.
Answer Questions from Part -A, B and C.

PART – A

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

a) Initiation codon

b) Biological sequences

c) Nucleotide

d) DNA gyrase

e) BLAST

f) DNA excision repair

g) FASTA

h) Hfr strain

i) Plaque formation

j) Nif gene

k) ORF

l) Bioterrorism

PART – B

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

UNIT - I

2. a) Describe the characteristics of the genetic code

OR

2. b) Explain the mechanism of DNA replication in prokaryotes. (9)

2. c) Write a short note on the LAC operon of E.coli (6)

UNIT - II

3. a) Explain the different types of transduction.

OR

3. b) Explain mutations produced by radiations. (9)

3. c) Write a short note on the Griffith experiment. (6)

UNIT – III

4. a)   Explain the types of vectors in genetic engineering.

OR

4. b)   Explain in detail on electrophoresis.   **(9)**

4. c)   Write briefly on the principles of genetic engineering.   **(6)**

UNIT – IV

5. a)   Explain the human genome project.

OR

5. b)   Explain in detail bioinformatic databases.   **(9)**

5. c)   Write a note on small and large prokaryotic genomes.   **(6)**

PART – C

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

6. a)   Thin layer chromatography.

   b)   Production of transgenic plants.

   c)   Post replication repair

   d)   Mutation as a tool in molecular genetics.

   e)   Intragenic and intergenic suppression.

   f)   Gene distribution in bacteria and archaea.

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(2014 batch onwards)

Reg. No.:

St Aloysius College (Autonomous)
Mangaluru
B.Sc. - Semester VI – Degree Examination
April - 2019
MICROBIOLOGY – Paper VIII
Applied Microbiology

Time: 3 hrs.   Max Marks: 100

Instructions: Draw Diagrams wherever necessary.
            Answer Questions from Part -A, B and C.

PART – A

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

a) Wood smoke

b) Flat sour

c) Solid state fermentation

d) Hydrocarbons

e) Cellar storage

f) Clostridium

g) Temperature control in fermentor

h) Bakers yeast

i) Canning

j) Sticky film

k) Submerged generator

l) Radicidation

PART – B

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

UNIT - I

2. a) Explain preservation of food using low temperature

OR

2. b) Explain the types of preservatives used in food preservation.   (9)

2. c) Write briefly on sources of food contamination.   (6)

UNIT – II

3. a) Explain in detail canned food spoilage

OR

3. b) Explain the methods of Pasteurization for milk.   (9)

3. c) Write briefly on standard plate count.   (6)

UNIT - III

4. a)   Explain the production of beer in industry.

OR

4. b)   Explain the production of wine in industry.

(9)

4. c)   Write a short note on types of fermentations.

(6)

UNIT – IV

5. a)   Explain in detail pencillin production in industry.

OR

5. b)   Explain in detail single cell protein production in industry.

(9)

5. c)   Write a short note on vinegar production using trickling generator.

(6)

PART – C

Answer any **FOUR** of the following.

(5x4=20)

6. a)   Fermentor design

   b)   Strain improvement

   c)   MBRT

   d)   Mycotoxins

   e)   Spoilage of fish

   f)   Extrinsic factors for microbial growth in food

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G 510.6a

Reg. No: ☐☐☐☐☐☐

St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester VI– Degree Examination
April- 2019
BIOCHEMISTRY - Paper VII
Microbiology, Immunology and Endocrinology

Time: 3 Hours

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.   (10×2=20)

1. a) Give the functions of T helper cells.
   b) Mention the contributions of Alexander Flemming.
   c) What is complex media? Give an example.
   d) How do you differentiate gram +ve bacteria from gram-ve bacteria?
   e) What is humoral immunity?
   f) Mention the effects of adjuvants.
   g) What are the functions of Ig A antibody?
   h) Define Haptens & Epitopes.
   i) What is totipotency and multipotency?
   j) Mention the role of macrophages.
   k) Give an example for peptide hormone and mentions its function.
   l) What are the importance of G-proteins as a secondary messenger?

PART – B

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

2. Explain the effect of carbon source and temperature on growth of micro organisms.
3. Explain the classification of viruses based on genetic material with suitable examples.
4. Explain lysogenic cycle of T_4 phage.
5. Mention the immunological role of Bone marrow & spleen.
6. What are monoclonal antibodies ? Explain its production.
7. Write a note on stem cells.
8. Explain the functions of thyroid hormones.
9. Explain the general mechanism of steroid hormone action.

PART -C

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

10. Explain i) Colony characteristics and ii) Bacterial growth curve.
11. Give a detail account on sterilization.
12. Expand and explain ELISA & RIA. Add a note on their applications.
13. What is graft rejection? Explain the different types of transplants and process of graft rejection.
14. Explain about organ specific autoimmune disorders and hypersensitive Type I.
15. What are hormones? Name the hormones and functions of pituitary gland.
16. Write a short notes on i)AIDS   ii) Hormones of pancreas

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(2013 batch onwards)

G 510.6b

Reg. No:

St. Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester VI – Degree Examination
April - 2019

BIOCHEMISTRY – Paper VIII
Clinical and Membrane Biochemistry

Time: 3 Hours   Max. Marks: 100

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

PART – A

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

1. a) Mention the normal constituents of urine.
   b) Name the good cholesterol and its normal concentration in blood.
   c) What is the role of lipases in pancreatitis?
   d) Name the marker enzymes in Myocardial infarction.
   e) Define half-life and radioactive decay.
   f) What is the cause and symptoms of phenylketonuria?
   g) Name any one radioisotope used in medicine and mention its role.
   h) Give any two properties of cancer cells.
   i) What is Neimannpick disease?
   j) Distinguish sarcoma and carcinoma.
   k) What is antiport system in cell membrane? Give one example.
   l) Name the carbohydrates associated with plasma membrane.

PART – B

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

2. Name the abnormal constituents of urine and give the clinical significance of uric acid.
3. Discuss on serum lipid profile.
4. Write a note on sickle-cell anaemia.
5. Explain the clinical significance of CPK and pancreatic amylase.
6. What is carcinogenesis? Explain the mechanism of carcinogenesis.
7. Write a note on Ionophores.
8. Explain the method of detection of radioactivity by liquid scintillation counter.
9. Write a note on active transport system.

PART – C

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

10. Discuss the clinical significane of alkaline phosphatase and ALT.

11. What is Diabetes mellitus? Explain the types and symptoms.

12. Give an account on a) Lipoproteins b) atherosclerosis

13. What are tumour markers? Discuss the characteristics, classification and clinical significance in brief.

14. Explain the fluid Mosaic model of plasma membrane and describe its functions.

15. Discuss the role of

    a) drugs   b) Radioisotopes and   c) enzyme in cancer treatment.

16. What are free radicals? Explain their generation and uses.

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(2014 batch onwards)

Reg. No.

G 511.6a

St Aloysius College (Autonomous) Mangaluru

B.Sc. Semester VI – Degree Examination
April – 2019

BIOTECHNOLOGY –Paper VII
ENVIRONMENTAL BIOTECHNOLOGY

Max Marks: 100

Time: 3 hrs.

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

PART - A

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

1.a) Define biogeochemical cycle. Mention the types.

b) Write any two effects of non-renewable resources on environment.

c) Mention any two environmental protection laws.

d) Give two disadvantages of biodiesel.

e) What is commensalism? Give one example.

f) Write any two properties of biopesticides.

g) Write any two examples for air borne diseases caused by allergens.

h) Name any two phosphate solubilising organisms.

i) Give two examples for estuarine microbes.

j) Write any two advantages of landfilling.

k) Define phytoremediation with an example.

l) Define BOD. What is the BOD value for drinking water?

PART – B

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

2. Explain the role of *Halobacterium* in microbial H_2 production.

3. Give an account of air pollution control measures.

4. Write a note on various qualitative methods to study soil microbes.

5. Comment on plants as biopesticides.

6. Write a note on microbial composition of air.

7. Explain the use of sea weeds in soil enrichment.

8. Give an account of water borne diseases caused by protozoans.

9. Explain primary treatment of liquid wastes.

10. Comment on bioleaching of copper.

PART – C

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

11. Give a detailed account of sources, effects and control measures of water pollution.

12. Explain the production of cyanobacterial biofertilizer.

13. Give an account of biogas production. Add a note on factors affecting it.

14. Comment on different air sampling methods used in analysis.

15. Give a detailed account of secondary sewage treatment methods.

16. Explain nitrogen cycle in detail. Add a note on its significance.

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(2014 batch onwards)

G 511.6b

Reg. No.

St Aloysius College (Autonomous)

Mangaluru

B.Sc. Semester VI – Degree Examination

April – 2019

BIOTECHNOLOGY – Paper VIII
BIOPROCESS TECHNOLOGY

Time: 3 hrs.   Max Marks: 100

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

PART - A

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

1.a) Differentiate between batch culture and continuous fermentation.

b) Differentiate between primary and secondary metabolites.

c) Mention the steps involved in downstream processing.

d) Define cross flow filtration.

e) Name the organisms involved in the production of alcohol.

f) Mention the different types of biosensors.

g) Write the applications of enzymes in food and brewing industry.

h) Expand SGOT and SGPT.

i) Mention the types of food based on spoilage.

j) Define acidity and pickling.

k) Comment on acidophilic milk.

l) Differentiate between probiotics and prebiotics.

PART – B

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

2. Discuss the growth kinetics of stationary phase.

3. Explain precipitation techniques in detail.

4. Describe the sterilization of fermenters.

5. Explain the industrial production of citric acid.

6. Explain the application of enzymes in starch and textile industry.

7. Explain any two methods of immobilization.

8. Give an account on any two food toxins.

9. Describe the microbial spoilage of food.

10. Describe the process involved in the preparation of cheese.

PART – C

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

11. Explain batch filters and continuous filters.

12. Define inoculum preparation. Add a note on carbon and nitrogen source in the fermentation media.

13. Explain the primary screening of or organisms producing important metabolites.

14. Describe the industrial production of

     a) Penicillin   b) α - amylase.

15. Explain the factors affecting the spoilage of food. Add a note on its preservation.

16. Explain briefly

     a) Pasteurization   b) Preparation of curd.

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(2016 Batch onwards)

Reg. No. :

G 513.6a

St Aloysius College (Autonomous)
Mangaluru
B.Sc. - SEMESTER VI – Degree Examination
April - 2019
ECONOMICS – PAPER VII
INDIAN ECONOMICS

Max Marks: 100

Time: 3 hrs.

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 concept of poverty in India.
3. Briefly explain the concept of sustainable agricultural development.
4. Write a note on disinvestment.
5. Point out the reforms in Air Transport in India.
6. Explain the concept of Inclusive Growth.

PART – B

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

7. Explain the causes for over population in India.
8. Analyse the causes of unemployment in India.
9. Explain the effects of globalization on Indian agriculture.
10. Examine the role of SEZ in the industrial development of India.
11. Describe the Fiscal Sector Reforms in India.
12. Explain the various health schemes of government of India.

PART – C

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

13. Analyse the present Employment Generation and Poverty Alleviation Programmes adopted in India.
14. Explain the various sources of agricultural credit in India.
15. Examine the problem of industrial sickness in India. Suggest remedies.
16. Explain the achievements and failures of economic planning in India.

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(2016 Batch onwards)

Reg. No. :

G 513.6b

St Aloysius College (Autonomous)
Mangaluru
B.Sc. - SEMESTER VI – Degree Examination
April -2019
ECONOMICS – PAPER VIII
ECONOMETRICS

Max Marks: 100

Time: 3 hrs.

PART - A

(4×5=20)

Answer any **FOUR** of the following questions in about 10 sentences each.

1. Prove that, $\frac{\sum x_i y_i - n\bar{X}\bar{Y}}{\sum x_i^2 - n\bar{X}^2} = \frac{\sum(x_i - \bar{X})(y_i - \bar{y})}{\sum(x_i - \bar{X})^2}$

2. Interpret the following regression function.

   Private final consumption expenses $= 103736.0493 + 0.63$ GDP

   $var(\hat{\beta}_1) = 43393430.86$

   $var(\hat{\beta}_2) = 0.000036$

   $r^2 = 0.9950$ $\sigma^2 = 911106030.36$

3. Write a note on multicollinearity.

4. Write a note on dummy variable in seasonal analysis.

5. Explain the autoregressive lag model.

6. Explain the two stage least square method.

PART – B

(4×10=40)

Answer any **FOUR** of the following questions in about 20 sentences each.

7. Prove that -
   a) $\sum ei = 0$
   b) $\sum eix_i = 0$
   c) $\sum \hat{y}_i ei = 0$
   d) $\bar{y} = \hat{y}$

8. Prove that –
   a) $E(u_t . u_{t-1}) = P . \sigma_u^2$
   b) $E(u_t . u_{t-2}) = P^2 . \sigma_u^2$

9. Find out the $\hat{\beta}_1$ and $\hat{\beta}_2$ by using the following data.

X	18	20	21	23	26	27	29	30	32	34
Y	9	10	12	14	15	17	19	21	22	24

10. Explain the causation in the use of dummy variable.

11. Explain partial adjustment and adaptive expectation model.

12. Briefly explain the simultaneous equation model.

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PART – C

Answer any __TWO__ of the following questions in about 50 to 60 sentences each.

13. Explain the Gauss-Markov's theorem.

14. The following data presents experience and salary structure of a college.
    Y is salary (in thousands), X is years of experience.
    Calculate the regression function and R^2. Write your observations.

X	35.4	38.0	41.7	47.2	51.0	54.3	63.1
Y	15	17	19	22	25	27	30

a) R^2, adjusted R^2 and multiple R.

b) Find out 't' values.

c) Construct 95% confidence interval for the true population parameter.

d) Test, $H_0 : \hat{\beta}_1 = 0$ with 5% significance level.

15. Explain the consequences and remedial measures for multicollinearity.

16. Explain the autoregressive and Kyok's dynamic econometric model.

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